Appendix A

Paper submitted: Data-Driven Characterisation of Distribution Systems for Modelling and Control Applications

2022 International Conference on Smart Energy Systems and Technologies (SEST) | 978-1-6654-0557-7/22/$31.00 ©2022 IEEE | DOI: 10.1109/SEST53650.2022.9898428

Data-Driven Characterisation of Distribution Systems for Modelling and Control Applications

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***Abstract*—Monitoring and control of distribution systems in the presence of renewable energy sources is enabled by active management approaches that utilise real-time information from the network. Such approaches typically rely on knowledge of the distribution system topology and parameters, and use physics-based models that must adequately capture system behaviour; these models become more complex to build or maintain in large, unbalanced and partially observed systems with significant penetration of renewables. An under-explored alternative is to construct simpler, low-order empirical models from time-series measurements of system variables, *i.e.,* system identification; first, however, it needs to be determined which measurements are useful. This paper lays the foundations for such an approach by proposing and investigating new metrics that aim to characterize the controllability and observability of the system with respect to the power–voltage relationship. We propose to use voltage electric distance and statistical tools based on voltage covariance and correlation indicators. We show how these metrics provide useful information about the spatio-temporal variations in system voltages following power injections, potentially enabling the identification of critical nodes for control and observation.**

***Index Terms*—Distribution System Modelling, Voltage Fluctuations, Electrical Distances, Nodes Clustering, Statistical Analysis.**

I. Introduction

A key challenge that emerges under the new regime of operation is maintaining the system voltage within acceptable limits, despite the high variability and uncertainty associated with renewable energy sources [1]. Active Network Management (ANM) has emerged as a technology to provide real-time monitoring and control in future distribution systems [2]. At the heart of the ANM approach is the system model: typically this is physics-based, characterised by the topology and parameters of the network. However, building such a model is particularly challenging for legacy distribution systems, where operators may not have accurate or complete network information.

Research on distribution systems with incomplete information has mainly focused on the state estimation problem [3], [4], [5], [6], often using Phasor Measurement Units (PMUs) measurements to estimate unmeasured states. Such approaches typically assume the network topology is known and the system is observable. A similar approach allows the *parameters*, and hence a model, of the system to be estimated too; however, there remains the assumption that the topology of the system and the structure of the dynamics are known. Additionally, the dynamics of renewable integration may not be fully captured by such an approach and instead merely considered as stochastic exogenous uncertainties.

Where such information is not known and measurements are limited, time-series analysis of available measurements has been used to estimate the topology of the distribution network [7], [8]. More generally, time-series analysis of data allows, via the extraction of meaningful statistics, the identification of the most relevant system characteristics [9] and hence enables the development of system models that adequately capture the dynamics of exogenous variables; in the context of power systems, this allows the adequate identification of how renewable power provision evolves and affects the system voltage [10], [11] without resorting to load flows that assume worst-case scenarios [12].

In this paper, we further explore how available time-series measurements can be used to extract the relevant spatial-temporal voltage–power characteristic of an unbalanced distribution system. With the ultimate aim of constructing low-order models for use in voltage control applications, we propose and investigate new metrics that offer some characterisation of the controllability and observability of the system; that is, the metrics potentially allow the determination of which nodes are the most effective as power injection sites for voltage control, and which nodes are the critical ones for taking voltage measurements. The specific metrics include a power propagation matrix based on a transformed Pearson correlation coefficient, and electrical distance obtained from the nodal voltage covariance matrix.

Sponsored by the University of Sheffield Department of Automatic and Control System Engineering Ph.D. fund, and Departamento Administrativo de Ciencia, Tecnología e Innovación (Colciencias)
Submitted to the 5th International Conference on Smart Energy Systems and Technologies (SEST 2022).

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II. Problem statement

We consider a distribution network composed of a set of nodes $\mathcal{N} := \{1, \ldots, N\}$, where the voltage–power dynamics are governed by differential–algebraic equations (DAEs):

$$\dot{x} = f(x, u, w, t), \tag{1a}$$

$$y = g(x, u, t). \tag{1b}$$

These DAEs capture the physics of the electrical network and the non-deterministic, time-varying and dynamic actions of consumers and producers. In (1), t denotes time, x is a vector of (internal) states, whose time evolution is described by (1a), u is a control input vector containing active/reactive power injections at each node, y is vector collecting the voltages at certain nodes, and w is the vector of uncertain variables affecting the state evolution.

The setting considered in this paper is that it is desired to perform voltage control in the distribution network but the dynamics (1a)–(1b) are unknown, being partially defined by the physics of the electrical network and partially defined by the (non-deterministic) actions of consumers and producers; moreover, the system comprises a large number of states which cannot be measured, and only a subset of the nodal voltages can be measured. We consider an unbalanced radial network, where the topology and parameters of the system are unknown, as is the composition and nature of the loads. Renewable generation is present in the network in the form of uncontrollable power injections at the relevant nodes. We assume that measurements of voltages are available at the feeder and certain nodes.

Fig. 1(a) illustrates this general scenario. Measurements are available at the feeder (parent node i) and then partially in some other sections of the system. In some cases measured nodes may be known to be connected via a line; see nodes k and j. In such cases, the power injections into lines are known (e.g. P_{kj} and P_{jk} in Fig. 1(a)) and the power dissipated or stored in the lines is easily determined (e.g. $P_{kj}^{\text{line}} := P_{kj} + P_{jk}$ in Fig. 1(a)). We then generalize the notion of a line power between connected nodes to a path power between nodes that are not directly connected; for example, as shown in Fig. 1(b), P_{ij}^{path}, P_{ik}^{path} and P_{kj}^{path} is the (real) power dissipated between nodes i and j, i and k, and k and j respectively.

On the other hand, a measured node may be in a part of the network where the connection with other nodes or measured points is unknown (e.g. node e in Fig. 1(a)) and we wish to determine how it interacts with the rest of the network. In such cases, to enable the developments in the rest of the paper, we assume that the *direction* from e to other measured nodes in the system is known; for example, considering nodes e and k, whether it is P_{ec} or P_{er} (where c and r are intermediate, internal nodes) that flows in the direction to node k. This allows us to define P_{ek}^{path} as a meaningful quantity; in particular, the power dissipated along the path between e and k. A sufficient but not necessary means of meeting this assumption is to estimate the connectivity of nodes; this can be achieved from voltage measurements for both fully and partially observed systems [13], [14].

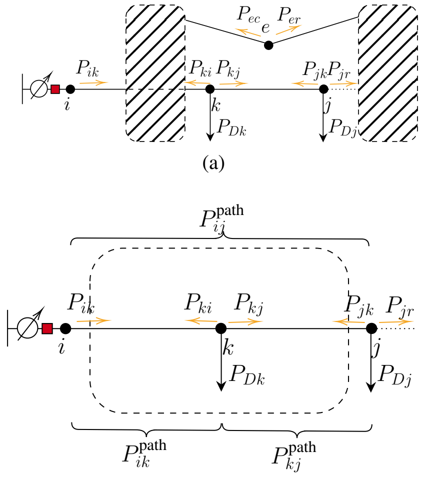

Fig. 1. Conceptual illustration of the partially observable distribution network and definition of line flows.

While a *system identification* process is required to construct a model of (1) at the timescale of interest for voltage regulation, the aim of this paper is, prior to this, to define *which* measured nodes in the system are *critical* to the observability and controllability of the voltage. We propose a set of metrics that utilise real system measurements to assist in achieving this aim.

III. Analysis of power injected throughout lines

A. Validations for power lines losses

A common and simple means of selecting the most appropriate variable to effect voltage control is using the R/X ratio of the system; for example, in low-voltage networks where resistive effects dominate (high R/X), real power injections are used to compensate voltage.

To examine this assumption and expose the R/X ratio for a typical distribution network scenario, time-series simulations of network voltages and power flows were done (using OpenDSS) to determine the real/reactive power dissipated/stored in lines over time and, simultaneous, the voltage profile. Fig. 2 shows the IEEE 123-node system used for the simulations, which includes the positioning of voltage regulators and the states of switches in the network (green for open-switch and red for closed switch). The CREST Demand Model [15] was used to impose a realistic residential daily and diurnal load profile. Simulations were performed over 10 days, and voltage and power data were obtained at a resolution of 10 minutes, making 1440 measurements of each variable in total. The following critical scenarios were simulated in the system:

- S1 Single-phase perturbation at node 85, phase C. Load consumption with a rated power of 400kW and 200kVAr.
- S2 Single-phase perturbation at node 85, phase C. Photovoltaic generation with a rated power of 400kVA at PF:1.

Each of these scenarios lasts for one day and was repeated for ten days; time-series profiles are shown Fig. 3a and Fig.

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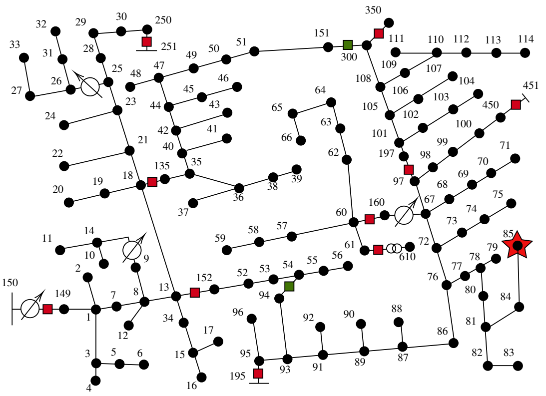
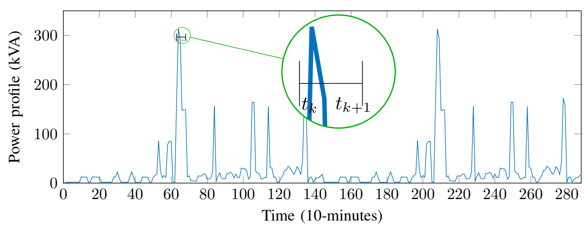


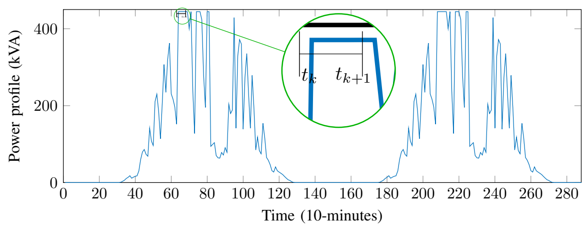
Fig. 2. IEEE 123-node unbalanced distribution system.

3b respectively; the associated network voltage profiles are presented in Fig. 4a and Fig. 4b.

These perturbations are deliberately large to maximise the impact on the network, and represent critical scenarios for voltage control. In real systems it is typical that several small perturbations occur simultaneously throughout the network. However, these are automatically or naturally mitigated and the power across the system remains (largely) balanced. The focus of this paper and the proposed methodology is on critical scenarios where the perturbation requires additional mitigation via control actions to avoid voltages becoming excessively high or low. These scenarios also approximate a regular operation where one part of the system is showing a high imbalance in the power–voltage relation.



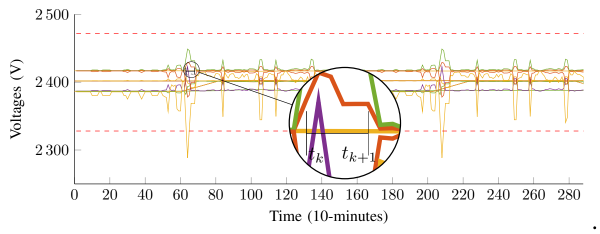
(a) Scenario S1: Load consumption, node 85 phase C.



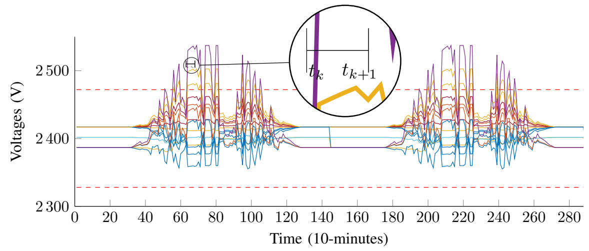
(b) Scenario S2: Photovoltaic generation, node 85 phase C.

Fig. 3. Power profile at node 85 phase C for scenarios S1 and S2: (a) load consumption; (b) photovoltaic generation.

A voltage variation is considered a relevant event when it exceeds $\pm 3\%$ in a load-free scenario [16]. Therefore, only a specific time window where this criterion is met is analysed in the following; based on the simulation parameters and results, the sampling period T is 10 minutes and the time window is 60 minutes, so that $V_i(t_k, t_{k+1})$ contains 6 samples. This



(a) Scenario S1

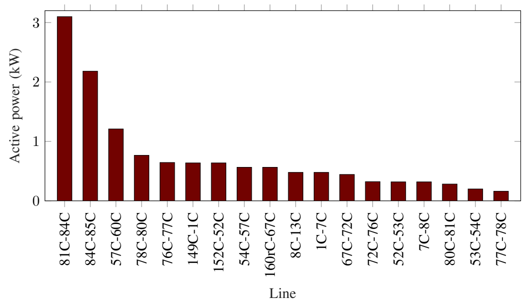


(b) Scenario S2.

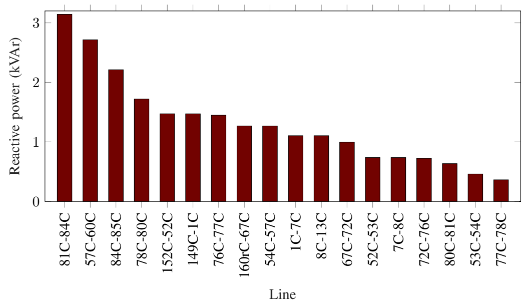
Fig. 4. Network voltage profile (all measured nodes) for scenarios S1 and S2.

choice achieves a reasonable balance between capturing the dynamics of interest and data storage requirements for the scenarios under consideration.

Fig. 5 presents the largest magnitude real power losses and reactive power storages in lines during a 60-minute time window starting at $t_k = 64$ minutes under Scenario S1. It can be seen that (i) the most affected lines are generally those closest to the perturbation and (ii) the relative magnitudes of real and reactive components are broadly similar.



(a) Active power dissipated in lines (in descending order).



(b) Reactive power stored in lines (in descending order).

Fig. 5. Power dissipated (a) and stored (b) in relevant lines of the system during scenario S1, when $t_k = 640$ minutes.

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The well-known relation between real and reactive power dissipated/stored in the line and the current flowing through the line is

$$S^{\text{line}} = \tilde{V}^{\text{line}} \tilde{I}_r^* = |I_r|^2 R_s + \jmath |I_r|^2 X_s, \tag{2}$$

where $\tilde{V}^{\text{line}} := V_s \underline{/\varphi_s} - V_r \underline{/\varphi_r}$ is the voltage drop over the line. Since the same magnitude current affects both real and reactive components, it can be concluded that there are proportional relationships between the real component of the impedance and the active power ($P^{\text{line}} \propto R_s$) and the imaginary component of the impedance and the reactive power ($Q^{\text{line}} \propto X_s$). Moreover, $P^{\text{line}} > Q^{\text{line}}$ implies $R_s > X_s$ and vice versa. Therefore, measuring the power dissipated/stored in lines can give an idea of the corresponding X/R ratio at some specific point in the network and what kind of power actuation is effective for voltage control; in our case, for example, either real or reactive power compensation may be suitable for regulating voltages around line 81C–84C, while nodes around line 57C–60C may be more effectively controlled via reactive power.

This kind of analysis does, however, imply the need to measure power at each end of each line in the system. To avoid this, the first task is to determine how the injection of power at certain nodes in the network impacts the voltages at other nodes.

B. *Proposed input of model associated with power*

The previous simple analysis establishes a relation between power measurements and the effective X/R ratio at discrete points in the network. Assuming that the system's topology is unknown, the next point to be addressed is how the power propagates through the network and impacts nodal voltages. Additionally, the compensation over each phase of the unbalanced distribution system must be considered.

One approach to exploring this connectivity is using information available in voltage measurements [17]; for example, the Pearson correlation coefficient of measured voltages is a useful indicator of phase identification and connectivity between nodes [13], [18], [19]. Let $V_i(t_k, t_{k+1})$ denote the time series of N_t measurements of the voltage at node i, sampled with period T seconds between times t_k and $t_{k+1} = t_k + (N_t - 1)T$. The Pearson coefficient relating voltages at nodes i and j is

$$\rho\left(V_i(t_k, t_{k+1}), V_j(t_k, t_{k+1})\right) = \frac{\sum_{\ell=0}^{N_t-1} \left(V_i(t_k + \ell T) - \bar{V}_i\right)\left(V_j(t_k + \ell T) - \bar{V}_j\right)}{\left\|V_i(t_k, t_{k+1}) - \bar{V}_i\right\|_2 \left\|V_j(t_k, t_{k+1}) - \bar{V}_j\right\|_2} \tag{3}$$

where $\bar{V}_i$ and $\bar{V}_j$ are the sample means of the time series $V_i(t_k, t_{k+1})$ and $V_j(t_k, t_{k+1})$ respectively. From a geometrical perspective, the Pearson coefficient corresponds to the cosine of the angle between the two random variables [20]. Therefore, this coefficient reflects how closely the variations in signals V_i and V_j are matched: if $\rho(V_i, V_j) = 1$ then all of the variance in V_j is explained by V_i.

Assuming the voltage is measurable at n nodes in the network, the $n \times n$ matrix of Pearson coefficients then gives an indication of the connectivity between any pair of nodes but gives no quantification of how the voltage at node i responds to a perturbation elsewhere. To address this we propose new metrics which weight the (transformed) Pearson coefficient by a measure of the power lost/stored between nodes i and j. The proposed metrics M^P and M^Q are constructed, for a pair of nodes (i, j), as

$$M_{ij}^P := \Delta P_{ij}^{\text{path}} \mathcal{Z}\left(\rho\left(V_i(t_k, t_{k+1}), V_j(t_k, t_{k+1})\right)\right) \tag{4}$$

$$M_{ij}^Q := \Delta Q_{ij}^{\text{path}} \mathcal{Z}\left(\rho\left(V_i(t_k, t_{k+1}), V_j(t_k, t_{k+1})\right)\right) \tag{5}$$

where

$$\Delta P_{ij}^{\text{path}} := \max_{t \in [t_k, t_{k+1}]} [P_{ij}^{\text{path}}(t_k, t_{k+1})] - \min_{t \in [t_k, t_{k+1}]} [P_{ij}^{\text{path}}(t_k, t_{k+1})],$$

is the maximum variation seen in the real power loss $P_{ij}^{\text{path}} = P_{ij} + P_{ji}$ during the time window of interest; $\Delta Q_{ij}^{\text{path}}$ is defined similarly. The function $\mathcal{Z}(\cdot)$ is the Fisher z-transformation [19]

$$\mathcal{Z}(\rho) = \operatorname{arctanh}(\rho) \tag{6}$$

which, when applied to the Pearson correlation value, recovers an approximately normal distribution of coefficients and enhances the values that show higher correlations.

The rationale for these metrics is as follows. If the value of M_{ij}^P or M_{ij}^Q is small, it can be inferred that either nodes i and j are not connected by topology or phase, and/or the real or reactive power is close to balance along the path between i and k; further control action along the path (i, j) may not be beneficial. On the other hand, if the value of M_{ij}^P or M_{ij}^Q is large, then it is implied both that nodes i and j are connected and there is significant power variations on the path between them; this indicates part of the system that is not measured and requires control action.

To illustrate this idea, Fig. 6 shows the lines compromised in the perturbation at node 85 phase C (by highlighting the components of M^P and M^Q higher than 0.5), and the nodes in which the voltage variation is higher than 0.03 pu. The nodes that are most perturbed by the event at node 85.C lie on the connected path, and it can be seen how voltage variations propagate across the network.

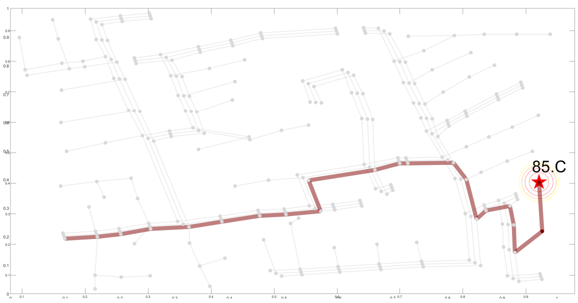

Fig. 6. Distribution of M^P values over the distribution system in presence of high perturbation at node 85, phase C.

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IV. Analysis of observed voltage

How correlated two nodal voltages are is related to the *electrical distance* between them: if a voltage variation is observed at some node i, then the variation at node j can be inferred with some level of uncertainty based on the electrical distance. The traditional measure of electrical distance—calculated from sensitivities—quantifies the width of that uncertainty band [21], and makes it possible to 'trace' voltage variations across electrically close nodes in the network.

Unfortunately, the direct estimation of these electrical distances relies on a real-time knowledge of impedance at discrete points in the network. As a practical alternative, therefore, we seek a proxy for electrical distance that can be computed from available voltage measurements yet provide a similar insight. For this we propose to use the covariance between nodal voltages, which measures the joint variability of the random variables represented by the time-series voltage measurement [22]. The covariance sign shows the linear relationship between the variables, representing the distinction between voltage phases. For a pair of time-series voltage measurements (V_i, V_j) (representing two jointly distributed real random variables with finite second moments), the covariance is given by the expected value of the product of their deviations from their expected values:

$$\operatorname{cov}(V_i, V_j) = \operatorname{E}\left[(V_i - \operatorname{E}[V_i])(V_j - \operatorname{E}[V_j])\right] \tag{7}$$

where $\operatorname{E}[V_i]$ and $\operatorname{E}[V_j]$ are the expected values of V_i and V_j, respectively. A covariance matrix Σ is constructed, where the (i, j) element of the matrix is

$$\Sigma_{i,j} = \operatorname{cov}(V_i, V_j). \tag{8}$$

This matrix is square, symmetric, positive semi-definite—thus meets the axioms of a valid electrical distance metric [21]—and its diagonal contains variances (i.e., the covariance of each element with itself). Column j of Σ gives the covariance between the voltage measurement at node j and each of the other measured nodes. Interestingly, $\Sigma_{i,j}$ can be alternatively expressed [13] as

$$\begin{aligned}\operatorname{cov}(V_i, V_j) = \operatorname{E}[(&R_i(P_i - \operatorname{E}[P_i]) + (X_i(Q_i - \operatorname{E}[Q_i]))\\ &(R_j(P_j - \operatorname{E}[P_j]) + (X_j(Q_j - \operatorname{E}[Q_j]))].\end{aligned} \tag{9}$$

Therefore, Σ contains information regarding the topology and impedance of the grid, further suggesting its suitability as a proxy measure of electrical distance.

Fig. 7a plots Σ following a large perturbation at node 85, phase C (scenario S1), assuming voltage measurements at every node. The larger variations correspond to nodes closest to the perturbation node. However, further interpretation is difficult because the covariance is not a normalised measure; for example, large values in one column compared with another do not necessarily indicate stronger correlations. Therefore, a normalisation of the matrix is proposed to make columns comparable; each column is normalised by its own maximum and minimum values, producing normalised covariances of between 0 and 1; these are plotted in Fig. 7b.

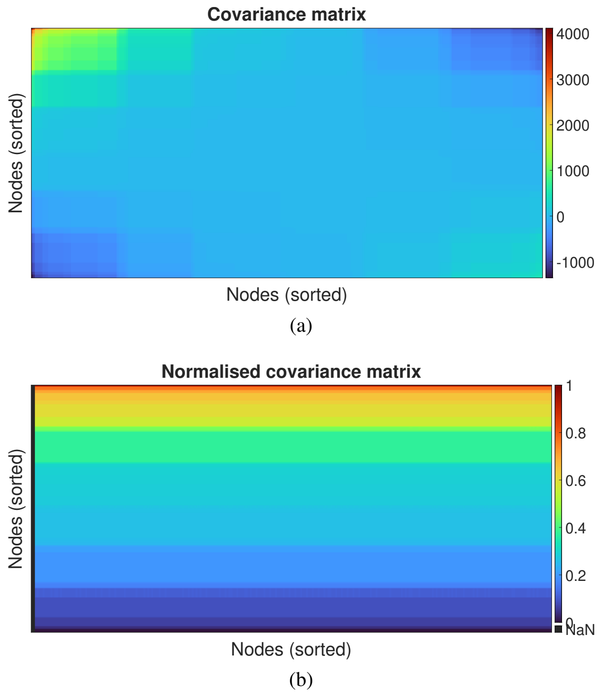

Fig. 7. Σ following a perturbation at node 85, phase C (scenario 1). The plot indicates $\Sigma_{i,j}$ for each pair $(i, j) \in \{1, \ldots, 269\} \times \{1, \ldots, 269\}$, where 269 is the number of phases of the 123-node system. Raw values are shown in (a) and normalised values in (b).

These values now give the voltage covariances from the perspective of each node in the system. To extract a final useful measure of variance for each node, we average the covariances seen with other nodes. Table I shows the results in ranked descending order (in columns 3 and 4) and compares with the actual variation in voltage observed at each node, also ranked in descending order. It can be seen that normalised covariances larger than 0.85 correspond to nodes most affected by voltage perturbation, and can be considered the closest electrically. Other nodes that still are electrically close enough to be impacted correspond to those with covariances larger than 0.65. There are some nodes, such as node 64 phase C, that are highly ranked even though they are spatially far from the perturbation point; this is an effect of the voltage regulator in between, which affects the equivalent electrical distance. The overall voltage variation is an effect of the power balance in the node and the electrical distance from the perturbation.

We also note that since the covariances follow the same broad ranking as the voltage variation per phase, the normalised covariance is indicative of the electrical distance. The main advantage is obtaining a proxy measure of electrical distance without a-priori knowledge of the system topology and parameters, simply from available voltage measurements. We do note, however, that the use of average normalised covariance may only have meaningful information in critical scenarios where the voltage surpasses operational limits. During normal operation, when the system is balanced, the covariance matrix will not contain exceptionally large variations.

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TABLE I
AVERAGE NORMALISED COVARIANCES OBTAINED, AND VOLTAGE VARIATIONS OBSERVED, FOLLOWING A HIGH PERTURBATION AT NODE 85, PHASE C

Voltage variation	Rank nodes	Average normalised cov.	Rank nodes
-5.08%	85, phase C	0.99	85, phase C
-4.19%	84, phase C	0.86	84, phase C
-2.94%	83, phase C	0.75	64, phase C
-2.94%	81, phase C	0.75	65, phase C
-2.94%	82, phase C	0.75	66, phase C
-2.93%	64, phase C	0.75	160, phase C
-2.93%	65, phase C	0.75	63, phase C
-2.93%	66, phase C	0.75	61, phase C
-2.93%	160, phase C	0.75	61s, phase C
-2.93%	61, phase C	0.75	62, phase C
-2.93%	61s, phase C	0.75	60, phase C
-2.93%	62, phase C	0.67	83, phase C
-2.93%	63, phase C	0.67	81, phase C
-2.93%	60, phase C	0.67	82, phase C

V. DISCUSSION

The results obtained have shown that data can be used to characterise the spatial-temporal perturbations in the distribution system. The use of M^P and M^Q, and the normalised covariance, can extract relevant characteristics of the system, such as the nodes most affected by a perturbation (or control action) and the nodes most critical to monitor. Since the time-series measurements used to calculate these metrics include the effects of consumers and generators, the proposed metrics can potentially capture the stochastic behaviour of the system. In terms of model building, since the most effective nodes for locating control actions can be identified from M^P and M^Q, and electrically close nodes can be identified from large covariance values, this potentially allows identification of the most critical nodes for control and observation, reducing the complexity of the model compared to a whole-system one that tries to capture every node and line. For example, nodes with controllable power injections—*e.g.* from inverter-based devices—and large M^P/M^Q values should be considered for inclusion in the input vector u, while nodes with highest average normalised covariance values should be considered for inclusion in the measurement vector y.

Future work will address how, especially in the case of a partially observable network with real stochastic behaviour, the key variables for observation and control can be identified, included in a data-driven model, and used for voltage control.

VI. CONCLUSIONS

In this paper, we investigated means of using measured data to provided information on the controllability and observability of voltages in a distribution system; in particular, which nodal voltages are most impacted by power injections or perturbations, and which voltages are electrically close and can be considered similar in terms of measurement. We proposed new metrics M^P and M^Q which allow an identification and quantification of voltage perturbations at nodes following a power injection or consumption; these require nodal voltage and injected line power measurements to construct. We showed how a normalised covariance matrix of nodal voltages is potentially a useful proxy measure of electrical distance. The proposed metrics were investigated for different scenarios on the IEEE 123-bus unbalanced system.

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Appendix B

Paper submitted: Distribution Systems Modelling by Data-Driven Voltage Characterisation for Control Applications - Part I: Input analysis

Distribution Systems Modelling by Data-Driven Voltage Characterisation for Control Applications Part I: Input Analysis

Carlo Viggiano, Paul Trodden, Eduardo Caicedo, and Wilfredo Alfonso

Abstract—**Active network management has emerged as a potentially effective technology for providing real-time monitoring and control of distribution systems, increasing their capacity for renewable energy integration. Despite using real-time measurements, many of these approaches rely on prior knowledge of the distribution system topology and parameters, utilised in the typically physics-based models that are used to capture system behaviour and support decision making. The complexity of these models is increased when the distribution system is large, unbalanced, only partially observable, and incorporates several heterogeneous distributed sources of generation. On the other hand, it has been demonstrated in several industrial domains, e.g. process control, that empirical relationships constructed from time-series measurements of system variables may provide simple, low-order models that adequately capture system behaviour to facilitate monitoring and control. This paper lays the foundations for such an approach in distribution networks containing distributed energy resources, presenting an analysis of the interactions between power flows and voltage fluctuations, aimed at identifying the relevant spatial-temporal characteristics that govern the power–voltage relationship in the system. Statistical tools based on voltage covariance and correlation indicators are used to describe data, and the maximum capacity of required data to provide useful information is also explored.**

Index Terms—**Distribution System Modelling, Voltage Fluctuations, Electrical Distances, Nodes Clustering, Voltage Control.**

I. Introduction

THE increasing interest of governments in reducing CO_2 emissions has heightened the need for improving the distribution system to permit a high penetration of renewable energy sources. New operational conditions and functionalities are expected for the distribution systems, including bidirectional power flows [1]. A key challenge that emerges under this new regime of operation is maintaining the system voltage within acceptable limits, despite the high variability and uncertainty associated with renewable energy sources [2].

To address this challenge, Active Network Management (ANM) has emerged as a technology to provide real-time monitoring and control in future distribution systems [3]. ANM approaches use models of the system in conjunction with real-time measurements to capture and forecast system behaviour, detect significant changes to system variables, and provide appropriate control actions or coordination signals. At the heart of the ANM approach is the system model: typically this is physics-based, characterised by the topology and parameters of the network. However, building such a model is particularly challenging for legacy distribution systems, where operators may not have accurate or complete information on network assets and system parameters.

Recent research on distribution systems in the absence of complete information has mainly focused on the state estimation problem [4]–[10]. These approaches rely on sufficiently accurate system model that maps states to measured data. In many real distribution systems, where the number of nodes and lines may be large, this model and its parameters may not be known. This has motivated the use of grey-box modelling approaches to estimate the unknown parameters in the physical model [11], [12], but even so a common assumption is knowledge of the system topology. A further limitation common to state estimation approaches is the technical requirement of system observability; in practice, this leads to the requirement that there should be sufficient measurement units around the distribution system in order to allow accurate state and/or parameter estimation. Unfortunately, in many distribution systems measurement units are not prevalent or widespread [13]. Accepting this reality, an alternative question and perspective contemplated in this paper is, considering an almost complete lack of knowledge of system topology and parameters, what kind of models could be created considering the measurements of system variables that *are* available?

The paradigm of *system identification and control*—using time-series measurements of system variables to construct models for control—has seen widespread use and validation in industrial applications outside of the power domain, stretching back several decades [14]–[17]. While time-series analysis has found use in power distribution network modelling and analysis, particularly in support of power flow analysis considering the presence of renewables [18], topology detection [10], [19], [20] and reactive power control [21], to the authors' knowledge no attempt has been made to identify the *broad* dynamics of a distribution system from limited available time-series data, considering the effects and time-evolution of uncontrollable exogenous variables. The term "dynamics" here differs subtly from the traditional notion of power system dynamics, since the relevant characteristics are not limited to just those of

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Sponsored by the University of Sheffield Department of Automatic and Control System Engineering Ph.D. fund, and Departamento Administrativo de Ciencia, Tecnología e Innovación (Colciencias)

Manuscript received July XX, 2022; revised October XX, 2022.

traditional assets i.e., controllable power sources, but are expected to capture the dynamic effects of loads and renewable inputs on system variables such as voltage. Therefore, the identification of these dynamics could be of valuable use in developing voltage control approaches for distribution systems with a high-penetration of renewables, yet scarce availability of measurements.

We aim to lay the foundations for such an approach by conducting, in this two-part paper, an investigation and analysis of the relation between certain measured data in the network—for example, voltages at selected nodes and power flows through selected lines—and what can be inferred about the spatial-temporal profile of the system voltage. Our particular objective is to develop and validate metrics that characterise and quantify this dependency, allowing the wider impact of nodal power fluctuations (owing to changes in load or power injections) to be predicted. We consider an unbalanced network with an arbitrary level of penetration from renewable power sources, and assume nothing in particular about its topology and parameters. In this paper, we examine how measurements of power flows through lines give information on the equivalent impedance of the system; we go on to propose matrices that, using the Fisher z-transformation of the Pearson correlation values between measured nodal voltages, indicate how a voltage variation caused by a nodal perturbation propagates through the network, in terms of which other nodes will also see perturbations. Building on this, we propose to *quantify* the voltage variation and propagation in response to a perturbation event, in the absence of impedance measurements or knowledge, via the use of the covariances of voltage measurements at selected nodes. These developments support our wider aim of developing a framework for identifying distribution system dynamics under limited knowledge and measurements by enabling the identification of the key nodal voltages in the system and offering a non-parametric characterisation of how they respond to inputs. In the companion paper to this one [22], we investigate the efficacy and validity of the proposed metrics via case study simulations on a 123-bus test network subject to different perturbations.

The rest of this paper is organised as follows: the next section defines the system identification problem in terms of the system variables and knowledge assumed before enumerating the specific objectives of this paper. Section III presents an analysis of the relation between nodal voltages and line power flows, culminating in the proposed metrics that indicate how nodal voltage perturbations propagate through the network. In Section IV, the relation between nodal voltage variations and electrical distances is discussed, and it is shown how voltage variations may be quantified if impedance is known; to deal with the more realistic case where impedances are not known, the second part of the section presents voltage covariance as an alternative metric. Finally, discussion and conclusions are presented in Sections V and VI, respectively.

II. Problem statement

A. Motivation

We consider a general distribution network, composed of a set of nodes $\mathcal{N} := \{1, \ldots, N\}$, wherein the voltage–power dynamics are assumed to be governed by differential–algebraic equations (DAEs):

$$\dot{x} = f(x, u, w, t), \tag{1a}$$
$$y = g(x, u, r, t). \tag{1b}$$

As stated, these DAEs are sufficiently general to capture all dynamics in the system—including electromagnetic phenomena—but for the purpose of this paper are assumed to reflect the timescale of interest for voltage control (i.e., in the range of seconds to minutes). These DAEs therefore capture the voltage–power physics of the electrical network and the non-deterministic, time-varying and dynamic actions of consumers and producers. In (1), t denotes time, x is a vector of (internal) states, whose time evolution is described by (1a), u is a vector of control input variables, including nodal active and reactive power injections, y is vector of measured outputs, collecting the voltages observed at certain nodes, and w and r are vectors of uncertain and/or exogenous variables affecting, respectively, the state evolution and system output.

For this study, we consider that it is desired to perform voltage control in the distribution network but the dynamics (1) are unknown. Moreover, the system comprises a large number of unmeasured states, only a subset of the nodal voltages may be measured, and only a subset of nodal power injections are available to manipulate for control purposes. Therefore, a *system identification* process is required to construct a simple yet sufficiently accurate model of the power–voltage dynamics at the timescale of interest for voltage regulation. Prior to identification, however, it is necessary to determine *which* nodal voltages should be measured and nodal power injections should be made available for control in order that (i) the voltages measured give an adequate picture of the voltage profile across the network and (ii) the nodal power injections made are able to adequately influence the voltage profile across the network. In other words, which are the nodes in the system that are *critical* to the observability and controllability of the voltage?

The aim of the paper is to answer to this question. We propose a set of metrics that utilise real system measurements to assist in determining the critical nodes for observability and controllability.

B. Specific paper setting and problem statement

We consider an unbalanced radial network composed of N nodes. The topology and parameters of the system are not completely known, and neither is the composition and nature of the loads. Renewable generation is present in the network in the form of uncontrollable power injections at certain nodes. We assume that measurements of voltages are available at the feeder and some nodes in the network, but it may not be known exactly where these nodes are relative to other nodes.

Figure 1 illustrates a typical scenario under such assumptions. A trio of nodes, n_k, n_j and n_e, are shown in relation to the feeder node n_i; it is known that n_k and n_j are connected by a line, but their specific connections with upstream and downstream nodes are not known beyond that there exists a path to the feeder and a path to downstream nodes. The parameters of the line between n_k and n_j are not necessarily known. It is

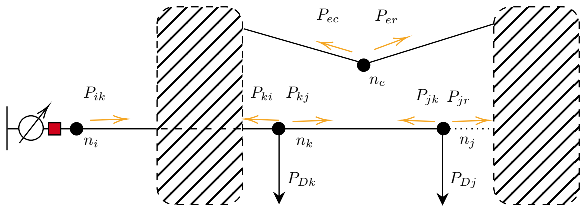

Fig. 1. Illustration of a distribution system with partially known topology and connectivity.

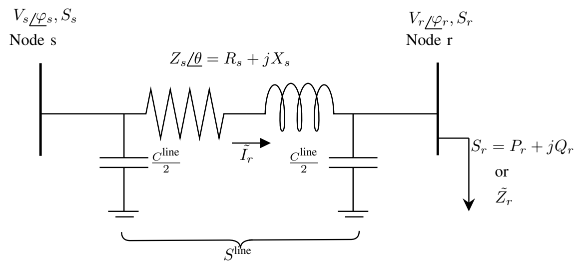

Fig. 2. Power transfer between two nodes of the distribution system.

known that node n_e is within the geographical vicinity of n_k and n_j but its precise connectivity is unknown. We consider the question of, if nodal voltages are measurable and power injections and flows are known at such nodes and other such nodes in the network, what picture can be gleaned of the overall network voltage profile in response to power injections—either controllable or uncontrollable—and demands?

III. Input Analysis: Determining the Impact of Power Injections

The first objective is to identify which of the network nodes are the *critical* ones with respect to providing control actions (power injections). In this section, we present an analysis of how real data measurements of line power flows and nodal voltages provide, in the absence of knowledge on system topology and parameters, information on the impact of power injections on system voltages. For simplicity, it is assumed that measurements are noise-free. We propose a metric based on a weighted transformed Pearson correlation coefficient to indicate the most impacted nodes (in terms of voltage variations) from a power injection at a given node. This provides a partial assessment of the *controllability* of the distribution system and potential decision support on which nodal power injections are effective for voltage control.

A. Preliminary analysis: inferring the voltage–power characteristic from data

A basic characteristic used to describe distribution system behaviour is the X/R ratio. Many existing works on network estimation and identification, e.g. [23], [24], assume a small X/R ratio and therefore that voltage control is achieved by supplying active power to the grid. In practice, however, small X/R may not be a reliable assumption and the supply of reactive power (e.g. by inverters) could be beneficial for voltage control; ultimately this depends on the actual, rather than assumed, voltage–power characteristic of the network. Therefore, in this section a review is given of how to estimate this characteristic from data when impedance parameters are unknown.

1) Inferring the X/R characteristic at discrete points in the network: Even with the X/R ratio not known, voltage and power measurements provide information about network properties and how voltage control should be actuated, as the following simple analysis shows. Consider the reduced two-node equivalent system in Fig. 2. The power S_s is transferred from upstream node s with voltage $V_s\underline{/\varphi_s}$ to downstream node r with voltage $V_r\underline{/\varphi_r}$ and associated current $\tilde{I}_r$. The voltage at node r (neglecting C^{line} for simplicity) is

$$V_r\underline{/\varphi_r} = V_s\underline{/\varphi_s} - \tilde{Z}_s\tilde{I}_r, \tag{2}$$

where $\tilde{Z}_s := Z_s\underline{/\theta} = R_s + \jmath X_s$ is the line equivalent impedance from the beginning of feeder, obtained as

$$\tilde{Z}_s = \frac{|V_s|^2}{P_r^2 + Q_r^2}\left(S_s - S_r\right). \tag{3}$$

Equation (2) can be rewritten in terms of the line loss as

$$\begin{aligned} S^{\text{line}} &= \tilde{V}^{\text{line}}\tilde{I}_r^* = (R_s + \jmath X_s)\tilde{I}_r\tilde{I}_r^* \\ &= |I_r|^2 R_s + \jmath |I_r|^2 X_s, \end{aligned} \tag{4}$$

where $\tilde{V}^{\text{line}} := V_s\underline{/\varphi_s} - V_r\underline{/\varphi_r}$ is the voltage drop over the line. Since the same current magnitude determines both real and imaginary parts, it can be concluded that there are proportional relationships between the active component of the impedance and the active power ($P^{\text{line}} \propto R_s$) and the reactive component of the impedance and the reactive power ($Q^{\text{line}} \propto X_s$). Moreover,

$$P^{\text{line}} > Q^{\text{line}} \implies R_s > X_s \tag{5}$$

$$P^{\text{line}} < Q^{\text{line}} \implies R_s < X_s \tag{6}$$

$$P^{\text{line}} \approx Q^{\text{line}} \implies R_s \approx X_s \tag{7}$$

Therefore, determining the power dissipated or stored in lines at discrete points in the network can indicate the effective X/R ratio at those points and what kind of power injection is most effective for local voltage control. On the other hand, such an approach offers no information on which nodal voltages are effected, and to what extent, by nodal power injections; for that a more comprehensive model of the voltage–power relationship is required.

2) Estimating the network power–voltage characteristic from data: System voltages and the power flows lie on the manifold characterized by the nonlinear power flow equations. In practice, however, voltages and flows may be confined to only a small region of the manifold around the operating point, determined by permitted operational limits. This motivates and justifies the use of linearisation to describe voltage–power relationships. In [25], linearisation of the power flow equation for radial distribution systems leads to the voltage–power relation

$$\bar{V} = \mathbf{1} + \bar{R}\bar{P} + \bar{X}\bar{Q}, \tag{8}$$

where $\bar{V}$ is the vector of voltages for nodes under analysis (without loss of generality, it is assumed that the voltage at substation is 1 pu), $\bar{P}$ and $\bar{Q}$ are matrices of active and reactive power injections, and $\bar{R}$ and $\bar{X}$ are matrices of sensitivities of nodal voltages to active and reactive power injections, respectively; for the voltage at node i considering power injections at node j

$$R_{ij} = \frac{\partial V_i}{\partial P_j} \quad \text{and} \quad X_{ij} = \frac{\partial V_i}{\partial Q_j}. \tag{9}$$

Where distributed generation is present in the network, (8) is easily modified to account for those nodes (denoted g) providing power and those that constitute loads (denoted d):

$$\bar{V} = \mathbf{1} + \bar{R}\bar{P}^g + \bar{X}\bar{Q}^g - \bar{R}\bar{P}^d - \bar{X}\bar{Q}^d. \tag{10}$$

These expressions then provide the desired information about how active and reactive power injections affect nodal voltages throughout the network. However, computing the sensitivity matrices $\bar{R}$ and $\bar{X}$ relies on either knowing the system topology [26], [27] or, if estimated from measurements, that these sensitivities are time invariant [28]–[30]. Thus, (8) and (10) represent a traditional quasi-static load flow model, whereas the voltage–power characteristic in a modern distribution system is governed by the individual and combined dynamic behaviours of the electrical system, loads and generation; for example, the actions of consumers within and across days, and the daily and diurnal variations in solar and wind availability. Therefore, an alternative approach is needed if the model should capture these effects.

B. *The Pearson correlation as a tool to identify connectivity*

The previous analyses provide methods for characterizing the voltage–power relation in a network from measurements, either in the form of the X/R ratio at discrete points or the linear whole-system model (10); the latter quantifies how power injections affect nodal voltages, but assumes time invariance of this sensitivity.

Our aim is to establish a similarly informative relationship, using available measurements of power injections and voltages, albeit also capturing the time-varying effects of loads and DG. To this end, the first step is to identify the nodal connectivity in the network in order to define which nodal voltages are affected by a power injection.

An effective approach to identifying this connectivity is using the statistics available from real-time voltage measurements; for example, previous work has used signatures in time-series data to identify topology changes [31] and the Pearson correlation coefficient as an indicator of phase identification and connectivity [24], [32], [33]. We adopt the latter idea here and extend this in the next section to determine the sensitivity of voltages to power injections. First, we review this technique and illustrate its usefulness for connectivity and phase identification.

Suppose $V_i(t_k, t_{k+1})$ denotes the time series of N_t measurements of the voltage at node i sampled with period T seconds over a window between times t_k and $t_{k+1} = t_k + (N_t - 1)T$, *i.e.* $\{V_i(t_k), V_i(t_k + T), V_i(t_k + 2T), \ldots, V_i(t_{k+1})\}$. The (sample) Pearson coefficient relating nodes i and j is

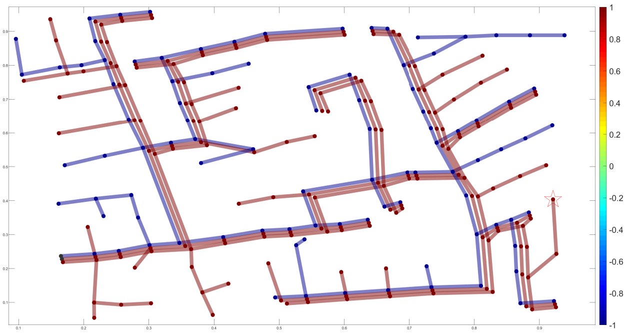

Fig. 3. Pearson coefficients obtained for each node when there is an event with high perturbation at node 85, phase C.

$$\rho\left(V_i(t_k, t_{k+1}), V_j(t_k, t_{k+1})\right) := \frac{\sum_{\ell=0}^{N_t-1} \left(V_i(t_k + \ell T) - \bar{V}_i\right)\left(V_j(t_k + \ell T) - \bar{V}_j\right)}{\sqrt{\sum_{\ell=0}^{N_t-1} \left(V_i(t_k + \ell T) - \bar{V}_i\right)^2}\sqrt{\sum_{\ell=0}^{N_t-1} \left(V_j(t_k + \ell T) - \bar{V}_j\right)^2}} \tag{11}$$

where

$$\bar{V}_i := \frac{1}{N_t}\sum_{\ell=0}^{N_t-1} V_i(t_k + \ell T) \tag{12}$$

is the sample mean of the time series $V_i(t_k, t_{k+1})$ for node i and $\bar{V}_j$ is defined accordingly.

From a geometrical perspective, the Pearson coefficient corresponds to the cosine of the angle between the two random variables [34], [35]. Therefore, this coefficient reflects how closely the variations in signals V_i and V_j are matched: if $\rho(V_i, V_j) = 1$ then all of the variance in V_j is explained by V_i.

To give a simple visualization of how the Pearson coefficients may be used to assess the impact of power injections and identify nodal connectivity, we calculated these for a typical unbalanced distribution system (the IEEE 123-node system—see Part II [22] for further details) following a single-phase perturbation at node 85.C. Using a node (149.C) close to the feeder as a reference, we calculated the Pearson coefficient between each node and this reference. The results are displayed in Fig. 3. The applied perturbation and voltage change at 85.C causes highly correlated voltage changes at all other nodes in the network. (Taking any other reference node shows a similar result.) Two of the phases (B and C) respond to the applied perturbation with positive correlation while the other (A) shows an inverse response because of the electromagnetic compensation in the system. From these data it can be readily identified that the network is fully connected. More than that, however, this brief example shows that measured changes in voltages provide information about the phase in which a perturbation occurred.

What we would like to more precisely determine the quantifiable impact on voltages that a perturbation or power injection has. This is addressed in the next section, wherein we propose to weight (transformed) Pearson coefficients with measurements of line power flows to produce a metric that indicates the nodes most affected by a perturbation.

C. A new metric for combined connectivity identification and voltage sensitivity analysis

It was shown via a simplified analysis in Section III-A1 how measurements of active and reactive powers flows in lines provide information on the equivalent impedance with the rest of the system, and accordingly whether it is active or reactive power control that would be the more effective means by which to achieve voltage regulation. Moreover, in the previous section it was demonstrated how the Pearson correlation coefficient gives enables phase and topology identification from time-series voltage measurements. In this section, we combine these two ideas to produce a single metric that informs on the connectivity of nodes in the network and indicates the sensitivity of voltages at network nodes to active and reactive power variations at a reference node. The propose metric thus provides information on the extent to which a power injection at a controlled node is able to influence the voltage across the network.

Assume that the voltage is measurable at a certain number of nodes in the network, the set of which is $\mathcal{N}_m \subseteq \mathcal{N}$, and the active and reactive power is measurable at both ends of some set of *paths* $\mathcal{E} \subset \mathcal{N}_m \times \mathcal{N}_m$; we make the distinction between a *path* and a *line* to accommodate our problem setting of having incomplete topology information, explained as follows.

Figure 4 depicts two possible situations for measured nodes n_i and n_k in a radial network. In (4a), it is known that n_i and n_j are connected via lines (i, k) and (k, j) and an intermediate node n_k, while in (4b) the precise arrangement of lines between n_i and n_j is not known. For (4a), the active power "loss" and reactive power "storage" in the path $(i, j) \in \mathcal{E}$ are given, respectively, as

$$
\begin{aligned}
P_{ij}^{\text{path}} &= P_{ij} + P_{ji} \ = P_{ij} + P_{ki} + P_{kj} + P_{jk}, \\
Q_{ij}^{\text{path}} &= Q_{ij} + Q_{ji} = Q_{ij} + Q_{ki} + Q_{kj} + Q_{jk},
\end{aligned}
$$

which accounts for the load consumption at n_k. For (4b), the active and reactive path powers are given as

$$
\begin{aligned}
P_{ij}^{\text{path}} &= P_{ij} + P_{ji}, \\
Q_{ij}^{\text{path}} &= Q_{ij} + Q_{ji}.
\end{aligned}
$$

Here P_{ij} is the power injected into the line at n_i in the *direction* of n_j, and *vice versa*; we therefore assume that for $n_i \in \mathcal{N}_m$ the direction of power flows with respect to other measured nodes is *known*, which in turn introduces a tacit assumption on knowledge of the topology of the system. For example, consider the system shown in Fig. 1 and the problem of calculating P_{ie}^{path} between nodes n_i and n_e; we need to know whether P_{ec} or P_{er} is the relevant line power injection in the sum (where c and r are intermediate, internal nodes). Likewise, to compute P_{ek}^{path} requires to know whether the direction from n_e to n_k is along (e, c) or (e, r). Therefore,

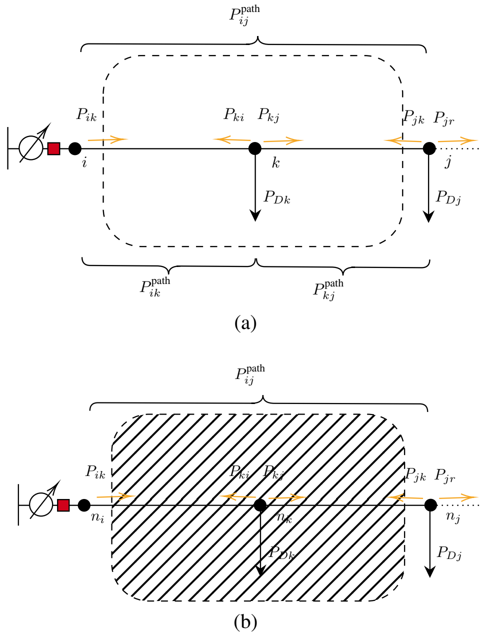

Fig. 4. Power flows into lines in the cases that the connectivity is (a) known and (b) unknown.

preliminary topology identification from data [24], [36] may be required.

The value $S_{ij}^{\text{path}} = P_{ij}^{\text{path}} + \jmath Q_{ij}^{\text{path}}$ accounts for any consumption or generation along the path from n_i to n_j. Even when n_i and n_j are not connected by a line this value provides relevant information on the network with respect to control. For example, assuming n_i and n_j are connected by a path, if the value of S_{ij}^{path} small, then the section in between is near balance, further suggesting that additional control actions are not necessary along that path. On the other hand, if the value is high, this suggests control action (power injections or extractions) could be beneficial.

We propose to enhance the information on network connectivity and phase information provided by the Pearson correlation coefficients with information provided by these power balances along paths. In particular, we weight the Pearson coefficient for (i, j) by the maximum *difference* in P_{ij}^{path} and Q_{ij}^{path} over a time window of observations:

$$
\begin{aligned}
\Delta P_{ij}^{\text{path}}(t_k, t_{k+1}) \coloneqq & \max_{t\in[t_k,t_{k+1}]} [P_{ij}^{\text{path}}(t_k, t_{k+1})] \\
& - \min_{t\in[t_k,t_{k+1}]} [P_{ij}^{\text{path}}(t_k, t_{k+1})], \\
\Delta Q_{ij}^{\text{path}}(t_k, t_{k+1}) \coloneqq & \max_{t\in[t_k,t_{k+1}]} [Q_{ij}^{\text{path}}(t_k, t_{k+1})] \\
& - \min_{t\in[t_k,t_{k+1}]} [Q_{ij}^{\text{path}}(t_k, t_{k+1})].
\end{aligned}
$$

The (i, j) element of the proposed matrices M^P and M^Q is then defined as

$$
M_{ij}^{P}(t_k, t_{k+1}) \coloneqq \Delta P_{ij}^{\text{path}} \mathcal{Z}\left(\rho\left(V_i(t_k, t_{k+1}), V_j(t_k, t_{k+1})\right)\right) \tag{13}
$$

$$
M_{ij}^{Q}(t_k, t_{k+1}) \coloneqq \Delta Q_{ij}^{\text{path}} \mathcal{Z}\left(\rho\left(V_i(t_k, t_{k+1}), V_j(t_k, t_{k+1})\right)\right) \tag{14}
$$

where the function $\mathcal{Z}(\cdot)$ is the Fisher z-transformation [33]

$$\mathcal{Z}(\rho) = \operatorname{arctanh}(\rho) \tag{15}$$

which, when applied to the Pearson correlation value, recovers an approximately normal distribution of coefficients and enhances the values that show higher correlations. In our case, this helps to more clearly distinguish those nodes that are highly correlated with the reference or perturbation point.

The value of M_{ij}^P (M_{ij}^Q) is largest when the voltages V_i and V_j are highly correlated (indicating phase and topological connectivity between n_i and n_j) and, simultaneously, the variation in net active (reactive) power between n_i and n_j is large; this is indicative that the large power fluctuations in this path are causing the voltage variations, and control of power injections locally could positively impact voltage. The value is, on the other hand, small if either the voltages are uncorrelated or the power variations are small, in which case control of power injections locally would have minimal effect. (If, for example, path (i, j) has a large value of P_{ij}^{path} but small $\Delta P_{ij}^{\text{path}}$, then it is indicated that voltage variations between i and j are not caused by the presence of this net power and the voltage variation, if present, is explained by some other effect; therefore, manipulation of power injections locally may have minimal effect on voltages.)

To illustrate this idea and potential usefulness of these metrics, we revisit the simple 123-node example with a perturbation at node 85.C. Figure 5 indicates the resulting paths with a values of M^P and M^Q higher than 0.5. This path connects the nodes in which the post-perturbation voltage variation is higher than 0.03 pu. The figure indicates how the effect of the power injection propagates through the distribution system in the form of variations to voltage.

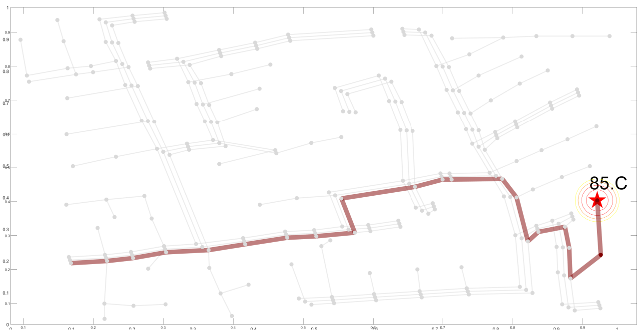

Fig. 5. Distribution of M^P values over the distribution system in presence of high perturbation at node 85, phase C.

Conceivably the proposed metrics can be calculated from time-series data collected following power injections made at different locations in the network, facilitating the identification of those nodes that are most able to impact the system voltage and therefore which nodal power injections can be included as *inputs* from a control perspective. This was explored in Part II of this paper [22].

IV. Output Analysis: Inferring the Network State from Observed Voltages

The final step is to determine which system variables could be informative *outputs* in a control-oriented network model. Considering that the aim is to maintain a satisfactory voltage profile, the question that arises is which nodal voltages are the critical ones in the network, such that if these are measured and regulated, it can be inferred that network voltages *as a whole* are satisfactory.

The motivating idea behind the developments here is the notion of *electrical distance* between nodes. How correlated two nodal voltages are is related to the *electrical distance* between them: if a voltage variation is observed at some node i, then the variation at node j can be inferred with some level of uncertainty based on the electrical distance. The traditional measure of electrical distance—calculated from sensitivities—quantifies the width of that uncertainty band [37], and makes it possible to 'trace' voltage variations across electrically close nodes in the network. The challenge, however, is to estimate the electrical distances between different nodes in the network from measured data; unfortunately, quantifying the electrical distance requires real-time determination of impedances or voltage sensitivities at multiple discrete locations throughout the network [37]. As a practical alternative, therefore, we seek a proxy for electrical distance that can be computed from available voltage measurements yet provide a similar insight. For this we propose to use the covariance between nodal voltages, which measures the joint variability of the random variables represented by the time-series voltage measurement [38]. The covariance sign shows the linear relationship between the variables, representing the distinction between voltage phases. For a pair of time-series voltage measurements (V_i, V_j) (representing two jointly distributed real random variables with finite second moments), the covariance is given by the expected value of the product of their deviations from their expected values:

$$\operatorname{cov}(V_i, V_j) = \mathrm{E}\left[(V_i - \mathrm{E}[V_i])(V_j - \mathrm{E}[V_j])\right] \tag{16}$$

where $\mathrm{E}[V_i]$ and $\mathrm{E}[V_j]$ are the expected values of V_i and V_j, respectively. A covariance matrix Σ (known as dispersion matrix or variance–covariance matrix) is constructed, where the (i, j) element of the matrix is

$$\Sigma_{i,j} = \operatorname{cov}(V_i, V_j). \tag{17}$$

This matrix is square, symmetric, positive semi-definite—thus meets the axioms of a valid electrical distance metric [37]—and its diagonal contains variances (i.e., the covariance of each element with itself). Column j of Σ gives the covariance between the voltage measurement at node j and each of the other measured nodes. Interestingly, $\Sigma_{i,j}$ can be alternatively expressed [24] as

$$\begin{aligned}\operatorname{cov}(V_i, V_j) = \mathrm{E}[&(R_i(P_i - \mathrm{E}[P_i]) + (X_i(Q_i - \mathrm{E}[Q_i]))\\ &(R_j(P_j - \mathrm{E}[P_j]) + (X_j(Q_j - \mathrm{E}[Q_j]))].\end{aligned} \tag{18}$$

Therefore, Σ contains information regarding the topology and impedance of the grid (encoded in R_i, R_j, X_i and X_j), further suggesting its suitability as a proxy measure of electrical distance. A detailed investigation on the use of covariance as a proxy measure of electrical distance, and hence a useful metric for identifying critical voltages for observation, are presented in the second part of this work [22]. We show that the covariance requires normalisation and averaging to provide useful information on how nodal voltages respond to perturbations.

V. Discussion

The metrics proposed aim to characterise the spatial-temporal variations in distribution system voltage from limited measurements, with the ultimate aim of identifying which nodes are most important for observation and influential for control. The novel metrics M^P and M^Q are calculated from available time series measurements of nodal voltages and power injections. The voltage covariance matrix is obtained only from time series voltage measurements. The aim of these metrics is to allow extraction of the most relevant characteristics of the system, such as the nodes most affected by a perturbation (or control action) and the nodes most critical to monitor. Since the time-series measurements used to calculate these metrics include the effects of consumers and generators, the proposed metrics can potentially capture the stochastic behaviour of the system. In terms of model building, since the most effective nodes for locating control actions can be identified from M^P and M^Q, and electrically close nodes can be identified from large covariance values, this potentially allows identification of the most critical nodes for control (which nodal power injections should be included in the control input vector u) and observation (which nodal voltages should be included in the measurement vector y), reducing the complexity of the model compared to a whole-system one that tries to capture every node and line. For example, nodes with controllable power injections—*e.g.* from inverter-based devices—and large M^P/M^Q values should be considered for inclusion in the input vector u, while nodes with highest average normalised covariance values should be considered for inclusion in the measurement vector y.

Future work will address how, especially in the case of a partially observable network with real stochastic behaviour, the key variables for observation and control can be identified, included in a data-driven model, and used for voltage control.

VI. Conclusions

In this paper, we investigated means of using measured data to provide information on the controllability and observability of voltages in a distribution system; in particular, which nodal voltages are most impacted by power injections or perturbations, and which voltages are electrically close and can be considered similar in terms of measurement. We proposed new metrics M^P and M^Q which allow an identification and quantification of voltage perturbations at nodes following a power injection or consumption; these require nodal voltage and injected line power measurements to construct. We proposed a (normalised and averaged) covariance matrix of nodal voltages as a potentially useful proxy measure of electrical distance and, in turn, the identification of nodes which are "electrically close" and therefore do not all require observation to gain an estimate of the system voltages.

The second part of this work [22] will investigate the use of these metrics on a IEEE 123-bus model of a distribution network, with representative load and RG profiles, and assess their potential for identifying key nodes for measurement and control.

Acknowledgment

This work was sponsored by the University of Sheffield Department of Automatic and Control System Engineering Ph.D. fund, and Departamento Administrativo de Ciencia, Tecnología e Innovación (Colciencias).

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Appendix C

Paper submitted: Distribution Systems Modelling by Data-Driven Voltage Characterisation for Control Applications - Part II: Case studies

Distribution Systems Modelling by Data-Driven Voltage Characterisation for Control Applications Part II: Case Studies

Carlo Viggiano, Paul Trodden, Eduardo Caicedo, and Wilfredo Alfonso

***Abstract*—This is the second part about voltage characterisation for distribution system modelling for control applications. The general problem formulation and the proposed data-based metrics have been presented in the first part (C. Viggiano, P. Trodden, E. Caicedo, and W. Alfonso, "Distribution Systems Modelling by Data-Driven Voltage Characterisation for Control Applications—Part I: Input Analysis," IEEE Transactions on Power Systems, 2022.). In this part, the proposed metrics, based on real-time data from distribution network measurements, are extensively investigated with the aim of validating their capability for identifying the critical nodes of the network for observation and control. Simulation results are obtained and analysed for the unbalanced IEEE 123-node test distribution under representative and realistic loading and renewable energy provision scenarios.**

***Index Terms*—Distribution System Modelling, Voltage Fluctuations, Electrical Distances, Nodes Clustering, Voltage Control.**

I. Introduction

DATA-DRIVEN approaches are becoming a new trend for system modelling in voltage control applications at both transmission and distribution systems level. The high penetration of renewables and a better understanding of customers require flexible schemes that adapt according to the system's reality. This task is more challenging in distribution systems because of the limited observability, and most methods rely on classical non-scalable physical-based models [1]–[3].

Many data-driven approaches to power system modelling and estimation assume that the system is fully observable, which in turn implies that the measured data reflects the time evolution of the modes to be analysed [4], [5]. Correspondingly, in many power system control approaches the assumption of full controllability is made, which in turn implies the manipulable inputs in the system are able excite all modes of interest [6]–[9]. An alternative, more practically realistic perspective, was considered in Part I of this paper: considering limited knowledge of the system topology and parameters, and limited availability of measurements, what information can be extracted with regard to the controllability and observability of the distribution network? Which nodes are most useful for observation and control of the system voltage?

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Sponsored by the University of Sheffield Department of Automatic and Control System Engineering Ph.D. fund, and Departamento Administrativo de Ciencia, Tecnología e Innovación (Colciencias)

Manuscript received July XX, 2022; revised October XX, 2022.

Part I [10] proposed metrics constructed from time-series nodal voltage and power injection data, and intimated how the proposed metrics can provide information on (i) how perturbations or control actions propagate through the distribution network and (ii) how electrically close nodes are, and in turn how similar and correlated their voltages will be. This part presents the results of calculating and analysing the proposed metrics under different types of perturbations. We discuss the potential use of the new metrics to obtain spatial–temporal characteristics of distribution systems, and highlight how the metrics are potentially useful for identifying suitable variables of interest and candidates for inclusion in a reduced-order model of the system for voltage control purposes. The metrics are calculated from time-series measurements of system data such as power injections into lines and nodal voltage in nodes, obviating the need for a physics-based model and parameter estimation. Moreover, the model-free, data-driven approach paves the way for capturing the effects of difficult-to-model, exogenous variables such as renewable power injections and load profiles. Additionally, a proposed algorithm for the modelling based on the available data is presented. The major contributions of this work are:

1) We demonstrate the use and investigate the efficacy of the metrics proposed in Part I [10] via simulations on an unbalanced distribution system (IEEE 123-node test network) under various different scenarios.
2) We discuss the interpretation of the new metrics for the spatial-temporal description of the distribution systems and potential use in developing models in control applications.

This paper is organized as follows: first, the analysis of data obtained from measuring power transmitted through lines and the proposed use of measurable power and nodes' connectivity are discussed in Section III. Evaluation of node proximity electrical distance concept, the alternative of using covariance information to describe the distance and cluster the nodes, and the simulation validations are presented in Section IV. A discussion regarding the advantages of these metrics for modelling and control and a possible way to use the simplified measured data and build control models is discussed in Section V. Finally, Section VI presents the conclusions.

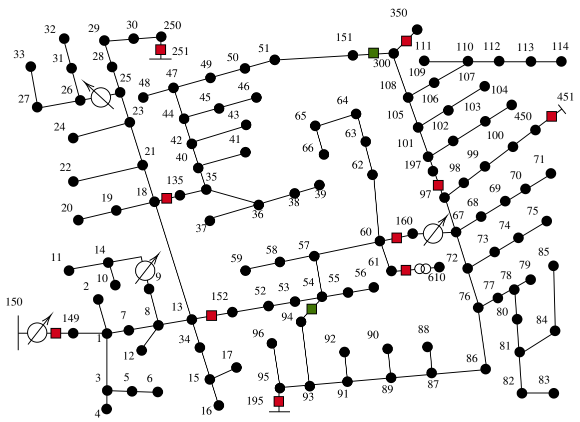


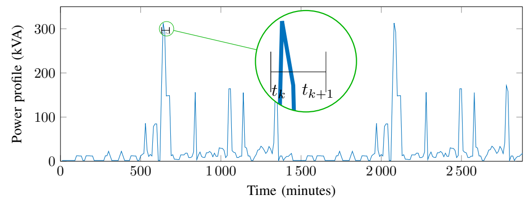
Fig. 1. IEEE 123-node unbalanced distribution system.

II. Definition and Description of Test Network and Scenarios

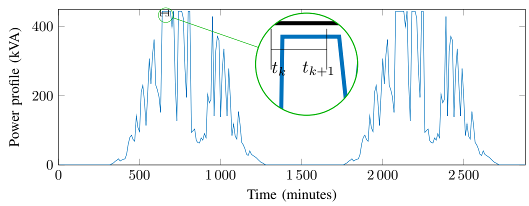
The simulations depicted in this paper consider the IEEE 123-node test network, an unbalanced distribution system with a total of 269 phases. This is shown in Fig. 1, including the positioning of voltage regulators and the states of switches in the network (where green denotes an open switch and red a closed switch). The CREST Demand Model [11] was used to create 24-hour long scenarios of critical yet realistic diurnal residential load and solar radiation profiles, the latter using the location of Sheffield, UK. These scenarios are critical in the sense that the load/supply perturbations are they contain lead to significant overvoltage events at some nodes at certain times during the day. Scenarios involving other nodes and smaller perturbations are not presented since they were found to cause less critical voltage responses.

- S1 Single-phase perturbation at node 85, phase C. Load consumption with a rated power of 400 kW and 200 kVAr.
- S2 Single-phase perturbation at node 85, phase C. Photovoltaic generation with rated power of 400 kVA at unity p. factor.
- S3 Single-phase perturbation at node 66, phase C. Load consumption with a rated power of 400 kW and 200 kVAr.
- S4 Two-phase pert. at nodes 82, phase A and 85, phase C. Load consumption with rated power of 400 kW and 200 kVAr.
- S5 Three-phase perturbation at node 48. Load consumption with a rated power of 400 kW and 200 kVAr.
- S6 Single-phase perturbations at nodes 66, phase C and 85, phase C (synchronized). Load consumption with a rated power of 400 kW and 200 kVAr.

Simulations of these scenarios over ten days were performed using OpenDSS. Each perturbation lasts for one day and is repeated over the ten days of simulation. As an illustration of some of the scenarios investigated and data obtained, Fig. 2 shows the time-series data of power injections; Fig. 2a shows the residential load demand at node 85.C (Scenario S1) and Fig. 2b the power injection from PVs at the same node (Scenario S2). For all scenarios, nodal voltage and power injection measurements were sampled at a resolution of 10 minutes, making 1440 measurements of each variable.

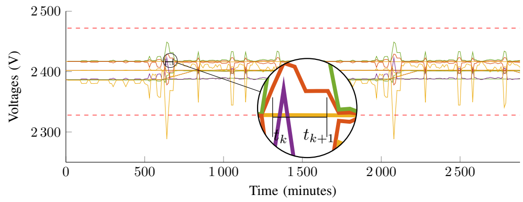


(a) Scenario 1: Load consumption, node 85 phase C.

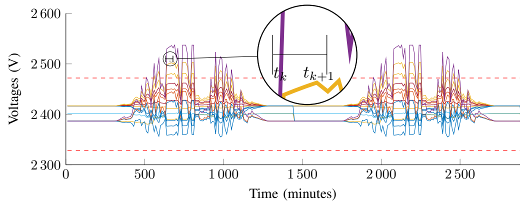


(b) Scenario 2: Photovoltaic generation, node 85 phase C.

Fig. 2. Power profiles at node 85 phase C over ten days, scenarios S1 and S2.



(a) Scenario S1 (Load perturbation).



(b) Scenario S2 (PV injection).

Fig. 3. Voltages at all network nodes during ten simulated days of scenarios S1 and S2. The $\pm 3\%$ off-nominal voltage limits are indicated by dashed lines.

III. Input Analysis: Determining the Impact of Power Injections

A. *Inferring the voltage–power characteristic from data*

A common assumption employed in approaches to control of low-voltage distribution networks is that $R \gg X$, meaning that active power is the focus and means for achieving effective voltage control. To query this assumption and attempt to expose the R/X ratio for the test network during the scenarios defined in the previous section, the nodal voltages and line power injections were measured during each of the described perturbations, and correlations between nodal voltage variations and line power dissipations/storages were examined.

First, the voltage profiles for scenarios S1 and S2 are presented in Fig. 3a and Fig. 3b, respectively. The action–reaction effect of the power–voltage relation is clearly observed in both results when compared with the applied power perturbations shown in Fig. 2. In particular, it can be seen that in Scenario S2, wherein a significant amount of power is injected by PVs at node 85.C, the network experiences a significant[1] overvoltage event at more that one node; conversely, and as expected, significant undervoltages are observed during Scenario S1.

These perturbations are deliberately large to maximise the impact on the network, and represent critical scenarios for voltage control. It is typical in real systems that several small perturbations occur simultaneously throughout the network. However, these are automatically or naturally mitigated and the power across the system remains (largely) balanced. The focus of this paper is on critical scenarios where the perturbation requires additional mitigation via control actions to avoid voltages becoming excessively high or low. These scenarios approximate a regular operation where one part of the system is showing a high imbalance in the power–voltage relation.

To analyse the simulation results further, the power and voltage data are time-windowed to extract only those corresponding to significant voltage events. Let $e_{t_k} := [t_k, t_{k+1}]$ denote the time window starting at $t = t_k$ and extending to $t = t_{k+1}$. The corresponding windows of interest are indicated in Fig. 2 and Fig. 3: in Scenario S1, for example, $t_k = 640$ minutes, while in Scenario S2 $t_k = 690$ minutes. In both cases $t_{k+1} - t_k = 60$ minutes, *i.e.* each window is one-hour long and –considering that the data are sampled every ten minutes– contains six samples. This choice achieves a reasonable balance between capturing the dynamics of interest and data storage requirements for the scenarios under consideration.

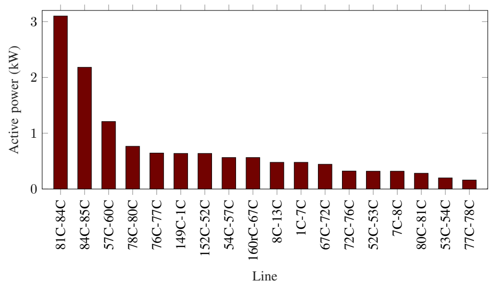
Figure 4 then shows, for Scenario S1, the real power dissipated and reactive power stored in lines during the significant undervoltage event starting at $t_k = 640$ min. Lines are sorted in descending order of magnitude of the observed power dissipated or stored, and only the top 18 lines are shown. Similarly, Fig. 5a shows, for the same scenario, the 16 nodes that experienced the largest voltage variation (compared with the nominal value) during the event e_k. For Scenario S2, similar distributions of line power losses/storages were obtained but the voltage variations are positive, consistent with PV injections (see Fig. 5b). Of course, it can be seen that the most affected nodes in terms of voltages are also the start or end nodes in the lines that dissipate or store the most power; for example, nodes 85C, 84C are the two most impacted nodes and also feature in the most affected lines. It can also be observed that for each line the active power dissipated and reactive power stored are similar in magnitude; since, as pointed out in Part I [10],

$$S^{\text{line}} = \tilde{V}^{\text{line}} \tilde{I}_r^* = (R_s + jX_s)\tilde{I}_r \tilde{I}_r^* = |I_r|^2 R_s + j|I_r|^2 X_s$$

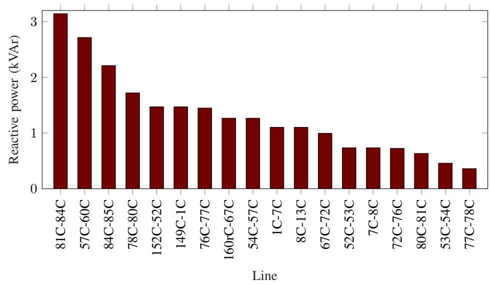
this indicates that for this network under these scenarios the R/X ratio may be around unity.

From this simple example, it can be concluded that a general assumption about the R/X ratio of a distribution network –and whether voltage control would be most effectively achieved by real or reactive power injections– should not be made without analysing information provided by measurements. On the other hand, the same example shows that measuring power dissipated or stored in lines and correlating with voltage measurements can provide some indication of the R/X ratio even without having system topology information.

[1]We consider a voltage variation as significant if it exceeds $\pm 3\%$ of nominal voltage [12].

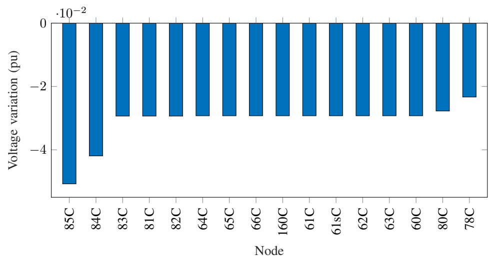


(a) Active power throughout lines.

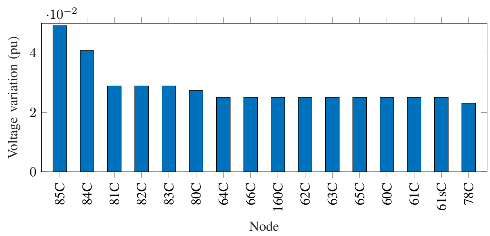


(b) Reactive power throughout lines.

Fig. 4. Power flowing throughout relevant lines of the system when there is a high perturbation at node 85 phase C (Scenario S1, $t_k = 640$min).



(a) Scenario S1 ($t_k = 640$min).



(b) Scenario S2 ($t_k = 690$min).

Fig. 5. Voltage variations at selected nodes during significant events.

B. Investigation and validation of the proposed M^P and M^Q metrics

In Part I [10], we proposed new metrics M^P and M^Q that enhance the information that the Pearson correlation coefficients between nodal voltages provides on network connectivity and phase with path power dissipation and storage values. The idea is that M_{ij}^P (M_{ij}^Q) provide information about potential sites for voltage control actions: the metrics are largest when the voltages V_i and V_j are highly correlated –indicating that nodes n_i and n_j are connected by a path– and, simultaneously, large power dissipation/storage fluctuations are seen in this path, indicating that the additional power injections made along this path could positively affect the voltages. The metrics are:

$$M_{ij}^{P}(t_k, t_{k+1}) \coloneqq \Delta P_{ij}^{\text{path}} \mathcal{Z}\left(\rho\left(V_i(t_k, t_{k+1}), V_j(t_k, t_{k+1})\right)\right) \tag{1}$$

$$M_{ij}^{Q}(t_k, t_{k+1}) \coloneqq \Delta Q_{ij}^{\text{path}} \mathcal{Z}\left(\rho\left(V_i(t_k, t_{k+1}), V_j(t_k, t_{k+1})\right)\right), \tag{2}$$

where $V_i(t_k, t_{k+1})$ is the voltage sampled at node n_i during event $e_k = [t_k, t_{k+1}]$, $\rho(\cdot, \cdot)$ is the Pearson correlation coefficient between the time series of two nodal voltages, $\mathcal{Z}(\cdot)$ is the Fisher z-transformation, and $\Delta P_{ij}^{\text{path}}$ (respectively $\Delta Q_{ij}^{\text{path}}$) is the maximum difference observed in P_{ij}^{path} (Q_{ij}^{path}) during the specified time window:

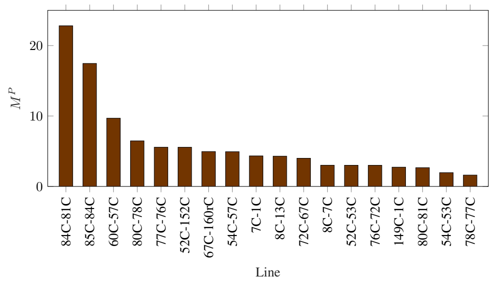
$$\Delta P_{ij}^{\text{path}}(t_k, t_{k+1}) \coloneqq \max_{t \in [t_k, t_{k+1}]} [P_{ij}^{\text{path}}(t_k, t_{k+1})] - \min_{t \in [t_k, t_{k+1}]} [P_{ij}^{\text{path}}(t_k, t_{k+1})],$$

with a similar definition for $\Delta Q_{ij}^{\text{path}}$ in terms of reactive power.

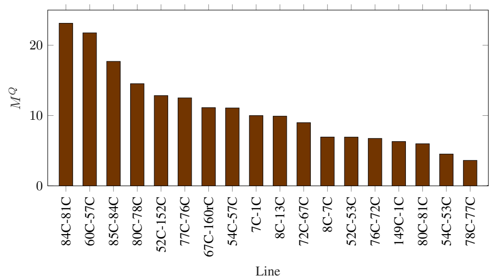
Figure 6 indicates the node pairs with the largest values of M^P and M^Q observed for Scenario S1 during the 60-minutes undervoltage event starting at $t_k = 640$ minutes. Firstly, note that Fig. 6 is a version of Fig. 4 enhanced with the connectivity and correlation information offered by the transformed Pearson coefficients: Fig. 6 performs a reweighting and reordering of the lines that experienced significant power dissipation or storage in Fig. 4, ranking higher those that have highly correlated end voltages. The most notable example of this is line 149–1, close to the feeder, which sees significant power activity but moves to a lower rank when voltage correlations are taken into account; indeed, neither node 1C nor node 149C appear in the list of nodes that experience significant voltage variations during the perturbation event (Fig. 5a).

Considering that Scenario S1 corresponds to a load consumption at node 85, phase C, it can be seen that four of the top six lines in terms of magnitude of M^P or M^Q –lines 84-81, 85-84, 80-78, 77-76– are graphically close to the perturbation node and, in particular, are in the radial branch emanating from node 76. All involve nodes that experience significant voltage perturbations (Fig. 5a). The other notable observation is the group of lines along a path that contains voltage regulator at node 160; lines 60-57, 52-152, 67-160, 54-57, 67-72 all rank highly in terms of M^P and M^Q and indicate an area of the network that could benefit from power injection as a control action in response to the large consumption event at node 85.

Figure 7 shows the corresponding M^P and M^Q values for Scenario S2, wherein power is injected to node 85C. Similar observations may be made, albeit in the opposite direction: the high M^P and M^Q values are found in lines along paths that link nodes with significant overvoltages (Fig. 5b) and indicate areas of the network where power extractions could be beneficial control actions.

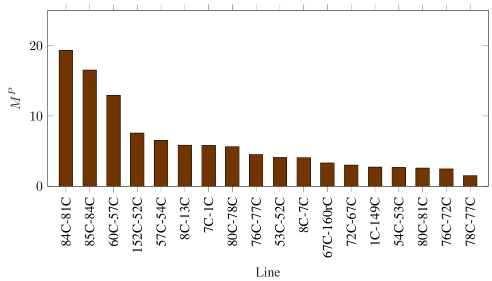


(a) Obtained M^P values.

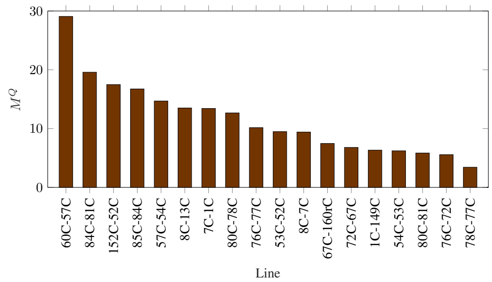


(b) Obtained M^Q values.

Fig. 6. Obtained relevant values M^P and M^Q for Scenario S1 ($t_k = 640$min).



(a) Obtained M^P values.



(b) Obtained M^Q values.

Fig. 7. Obtained relevant values M^P and M^Q for Scenario S2 ($t_k = 690$min).

IV. Analysis of Observed Voltage

Section III explores the characterisation of inputs –effective nodes for power injections or extractions– from information available in power through path connecting nodes and their connectivity. In this section we explore the characterisation of possible *outputs* –effective nodes for voltage measurements– by studying the voltage variations and propagations caused by a perturbation in the system.

Recall that in Part I we hypothesized that the electrical distance between nodes was the determining factor in how voltage perturbations propagate through the system. If a voltage variation is observed at some node i, then the variation at node j can be inferred with some level of uncertainty based on the electrical distance; in terms of characterising possible sites for voltage measurement, it may therefore suffice to measure the voltage at just one node among a collection of electrically close nodes, from which the rest may be inferred. In Part I, however, to circumvent the practical difficulty of calculating electrical distance, we proposed to use a normalised covariance matrix as a proxy for electrical distance. In this section, we investigate the efficacy of electrical distance and the proposed proxy of normalised covariance as metrics for determining critical outputs.

A. *Evaluation of electrical distance*

First we investigate the electrical distance as a predictor of how voltage variations propagate through the network. Two definitions of electrical distance are compared: the first is simply the electrical impedance between nodes, while the second definition is the following electrical distance metric developed in [13]:

$$D(i,j) = D(j,i) = -\ln(\alpha_{ij}\alpha_{ji}) \tag{3}$$

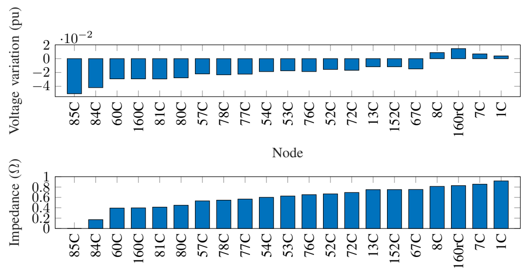
where α_{ij} is the attenuation at node i of a voltage perturbation at node j

$$\Delta V_i = \alpha_{ij}\Delta V_j$$

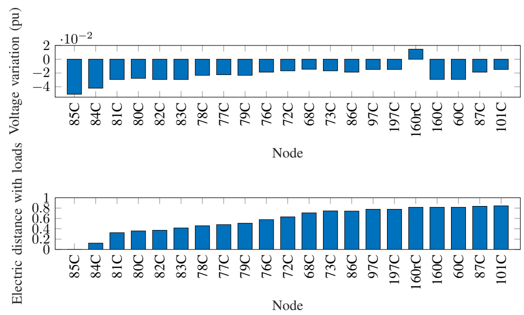
and may be obtained from the impedance matrix or the voltage–power sensitivity matrix [13]. The advantage of this definition over basic impedance is that it is a true distance metric in the mathematical sense –it satisfies the properties of symmetry, positivity, nullity and the triangular inequality– making it a more useful tool for analysis.

Figures 8 and 9 show, for scenarios S1 and S2 respectively, a comparison of nodes sorted by (a) the impedance between nodes as the measure of electrical distance and (b) the voltage distance metric (3). In each case, (a) and (b), the actual voltage variations observed at the same nodes is shown as a basis for comparison. The electrical distances are calculated with respect to the perturbation node, 85C; therefore, the distance indicated for 85C is zero, and the closest node (according to both definitions of distance) is 84C.

In can be observed that both electrical distance measures do a reasonable job at predicting voltage variation: smaller electrical distances *generally* correspond with larger voltage variations after perturbation. The differences in the ranked orders can be explained by the information taken into account in each electrical distance calculation: the impedance method focuses on the magnitudes of voltage variations, but does not properly account for the topology of the network; the voltage electric distance metric considers the voltage variation and the system's topology. This can be seen, for example, with node 60C: this node ranks third (in scenario S1) when sorted by impedance-based electrical distance, but only 19th when sorted by voltage electrical distance metric; Fig. 5a ranks the voltage variation as the 14th largest in the system following the perturbation. However, node 60C is located on the other side of a voltage regulator to the perturbation at 85C, which has a misleading effect on the impedance calculation. The voltage distance metric is more able to filter out this effect and

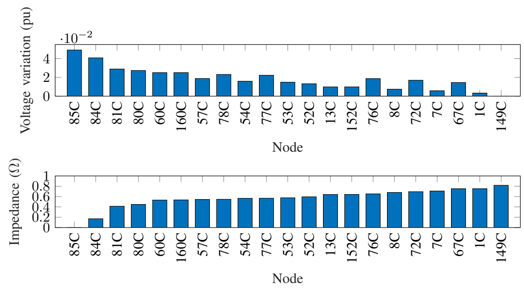


(a) Electrical distance and sorted voltages by measuring only impedance between nodes.

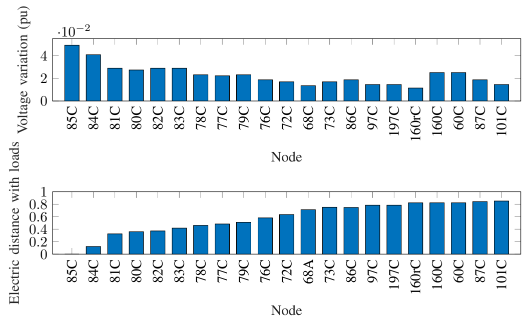


(b) Voltage electrical distance and sorted voltages according to (3) .

Fig. 8. Electric distances and voltages sorted when there is a high perturbation at node 85, phase C (scenario S1, $t_k = 640$min).

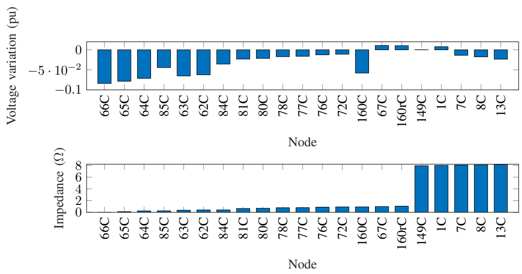


(a) Electrical distance and sorted voltages by measuring only impedance between nodes.

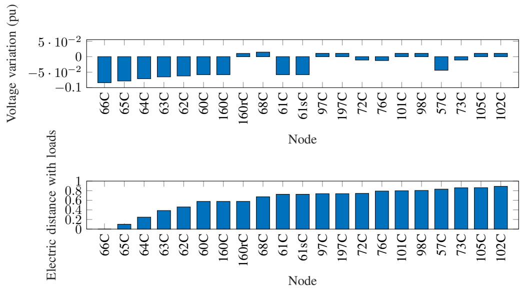


(b) Voltage electrical distance and sorted voltages according to (3).

Fig. 9. Electric distances and voltages sorted when there is a high perturbation at node 85, phase C (scenario S2, $t_k = 690$min).



(a) Electrical distance and sorted voltages by measuring only impedance between nodes.



(b) Voltage electrical distance and sorted voltages according to (3).

Fig. 10. Electric distances and voltages sorted when there is two high perturbations at nodes 66 and 85, phase C (scenario S6).

determine the nodes that are truly electrically close.

This information is crucial if clustering of nodes is required to develop the model of the system for control: only nodes that are electrically close to should be clustered together into a single 'node' whose voltage is measured –in practice, the voltage is measured at one of the nodes in the cluster, and the voltages elsewhere in the cluster may then be inferred from the electrical distance.

Scenarios S3, S4, and S5 exhibited similar results to these, and are not shown here. On the other hand, Scenario S6, in which *two* synchronised perturbations occurred, at nodes 66 and 85 (both phase C), provided a different result; Figure 10 shows the sorting of nodes according to the two different calculations of electrical distance concept. Electrical distances are calculated with respect to node 66C. It can be seen that the sorting of nodes by the voltage distance metric (3) identifies a set of nodes that are electrically close to 66C but that does not extend to the branch that includes 85C; the impedance-based calculation, on the other hand, includes nodes in both sections of the network—those close to 66C and those close to 85C. It can be concluded that for two perturbations that occur simultaneously it would be difficult to identify electrically close nodes to each perturbation without further analysis.

B. Use of covariance of voltage measurements

In Part I it was proposed to use the nodal voltage covariance, which measures the joint variability of two or more random variables [14], as a proxy for electrical distances. The main advantage is that the voltage covariance matrix can be calculated from available time-series measurements of nodal voltages, without requiring the line power injections and/or line impedance properties need to calculated electrical distance.

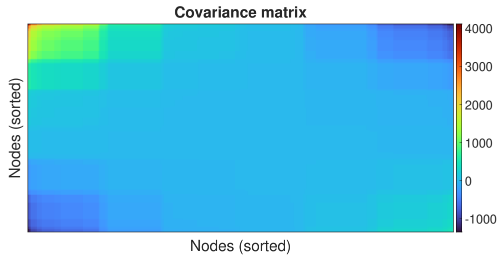


Fig. 11. Covariance surface obtained from voltage measurements when there is a high perturbation at node 85, phase C (scenario S1, $t_k = 640$min).

We assume that voltage measurements are available at a number, n, of the distribution system nodes. Then a covariance matrix $\mathbf{\Sigma}$ (known as dispersion matrix or variance–covariance matrix) is obtained from computing the covariance between each nodal measurement pair. For the measurement points $\{1, 2, \ldots, , i, \ldots, j, \ldots, n\}$, the (i, j) entry of the covariance matrix Σ is the covariance between voltages V_i and V_j:

$$\Sigma_{i,j} = \text{cov}\left(V_i, V_j\right) \tag{4}$$

The matrix Σ is square, symmetric, positive semi-definite, and its diagonal contains variances (i.e., the covariance of each element with itself). Moreover, $\Sigma_{i,j}$ can be expressed as [15]:

$$\begin{aligned}\text{cov}(V_i, V_j) = \mathrm{E}[(R_i(P_i - \mathrm{E}[P_i]) + (X_i(Q_i - \mathrm{E}[Q_i]))\\ (R_j(P_j - \mathrm{E}[P_j]) + (X_j(Q_j - \mathrm{E}[Q_j]))]\end{aligned} \tag{5}$$

Therefore, the covariance matrix contains information regarding the topology of the grid, which is encoded in R_i, R_j, X_i and X_j. However, the absolute magnitude of the covariance obtained in this way lacks physical meaning and insight, and therefore in Part I a normalisation procedure was proposed to allow comparison of the columns or rows of Σ and, ultimately, identification of electrically close nodes.

For the purpose of examining the efficacy the covariance as a proxy for electrical distance, in the current study we assumed availability of measurements at every node in the network. Figure 11 shows the biggest values generated by the (raw values of) matrix Σ under scenario S1 (a large load consumption at node 85C). The columns that exhibit the largest range of values correspond to those nodes closest to the perturbation node. Figure 12 shows the same results after the applying the normalisation procedure described in Part I. Table I shows the corresponding numerical values of the covariances and normalised covariances w.r.t. node 85C; that is, the column of Σ and its normalised counterpart corresponding to node 85C. Nodes close to the perturbation point show similar results.

Table I shows that the largest covariance values obtained are for nodes close to the perturbation point. Below the highest operational limit (in this case, 3% of rated voltage), the nodes are sorted according to this variation. Some of the presented nodes are close to the perturbation point, which is still contemplating the voltage electric distance presented before. From Fig. 12, it is shown that the values of covariance

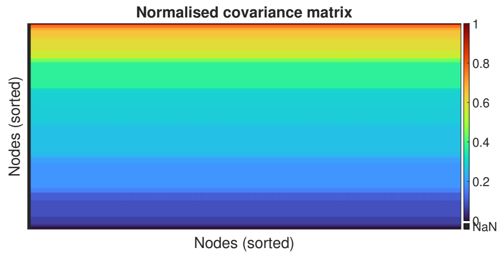


Fig. 12. Normalised covariance surface obtained from voltage measurements when there is a high perturbation at node 85, phase C (scenario S1, t_k = 640min).

TABLE I
VOLTAGE COVARIANCE VALUES OBTAINED FROM A LARGE PERTURBATION AT NODE 85, PHASE C (SCENARIO S1).

Measured node (Node 85, Phase C)			Measured voltage	
$\Sigma_{i,j}$	Norm. $\Sigma_{i,j}$	Sorted node	Ranked nodes	Variation
1835.11	1.00	85, phase C	85, phase C	−5.08%
1490.11	0.87	84, phase C	84, phase C	−4.19%
1148.20	0.74	64, phase C	83, phase C	−2.94%
1148.20	0.74	65, phase C	81, phase C	−2.94%
1148.20	0.74	66, phase C	82, phase C	−2.94%
1148.19	0.74	160, phase C	64, phase C	−2.93%
1148.19	0.74	63, phase C	65, phase C	−2.93%
1148.19	0.74	61, phase C	66, phase C	−2.93%
1148.19	0.74	61s, phase C	160, phase C	−2.93%
1148.19	0.74	62, phase C	61, phase C	−2.93%
1148.19	0.74	60, phase C	61s, phase C	−2.93%
999.17	0.69	83, phase C	62, phase C	−2.93%
999.17	0.69	81, phase C	63, phase C	−2.93%

obtained for each node are around the same range, which can give a consistent sense of position when they are compared.

Since these results only reflect the system's perception from a specific node, it is proposed to average the obtained normalised covariance over each node (*i.e.* each row of the normalised Σ is averaged across all columns). Table II shows the results of this for Scenario S1. The average normalised covariances higher than 0.85 correspond to nodes affected under the same voltage perturbation and can be considered the closest (and would be candidates for clustering as one node for the purpose of identifying a system model and determining which nodal voltages should be measured). The nodes that still are close enough to be impacted correspond to those with normalised covariance higher than 0.65. There are some nodes—such as node 64, phase C—which are highly ranked even though they are spatially far from the perturbation point. This is an effect of the voltage regulator in between, which via the action of the tap changer is modifying the equivalent electrical distance. The voltage variation is an effect of the power balance in the node plus the electric distance from the perturbation analysed.

Since, in Table II, the averaged covariances follow a similar rank order to that of voltage variation per phase, it is suggested that the voltage covariance provides information closely related to the electrical distance between nodes, and appears to be an acceptable proxy for the latter. Scenarios S2, S3, S4, and S5 showed a similar set of results; for example, Fig. 13 illustrates the covariance matrix, which exhibit a similar distribution and pattern of values as for scenario S1. Therefore,

TABLE II
AVERAGE NORMALISED COVARIANCE VALUES OBTAINED FROM A LARGE PERTURBATION AT NODE 85, PHASE C (SCENARIO S1).

Voltage variation	Rank nodes	Average norm. $\Sigma_{i,j}$	Rank nodes
−5.08%	85, phase C	0.99	85, phase C
−4.19%	84, phase C	0.86	84, phase C
−2.94%	83, phase C	0.75	64, phase C
−2.94%	81, phase C	0.75	65, phase C
−2.94%	82, phase C	0.75	66, phase C
−2.93%	64, phase C	0.75	160, phase C
−2.93%	65, phase C	0.75	63, phase C
−2.93%	66, phase C	0.75	61, phase C
−2.93%	160, phase C	0.75	61s, phase C
−2.93%	61, phase C	0.75	62, phase C
−2.93%	61s, phase C	0.75	60, phase C
−2.93%	62, phase C	0.67	83, phase C
−2.93%	63, phase C	0.67	81, phase C
−2.93%	60, phase C	0.67	82, phase C

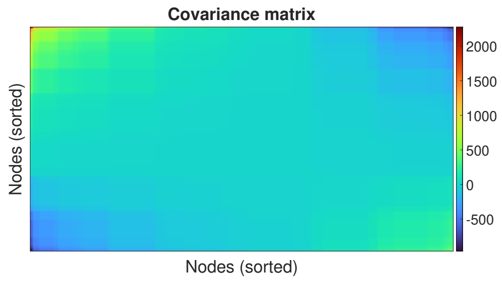


Fig. 13. Covariance surface obtained from voltage measurements when there is a high perturbation at node 85, phase C (scenario S2, t_k = 690min).

the average normalised covariance provided an acceptable proxy for electrical distance in the event of a single perturbation of either power injection or extraction.

On the other hand, we observed that for situations in which the perturbation (be it generation or consumption) is small or moderate (in the sense that voltages remained within bounds; scenarios that are milder than S1–S6), the covariance surface did not exhibit significant variations, indicating balance within the system. The use of the average normalised covariance approach only has relevant meaning in *critical* scenarios (*i.e.,* when the voltage profile surpasses the operational limits).

To validate the covariance results, a Principal Component Analysis (PCA) was performed on the voltage measurements obtained under different scenarios. The largest eigenvalues for scenario S1 are presented in Table III, shows that nearly 99% of the variance is explained by the first two principal components; details of the eigenvectors are presented in Table IV.

TABLE III
PCA FOR VOLTAGE MEASUREMENTS WHEN A HIGH PERTURBATION OCCURS AT NODE 85, PHASE C (SCENARIO S1)

Number	Eigenvalue	Score
1	31598.98	89.29%
2	3022.70	8.54%
3	768.01	2.17%

The first eigenvector is sorted by using the weight of each component. The list and rank order of nodes is similar

TABLE IV
SORTED EIGENVECTORS ASSOCIATED WITH THE FIRST TWO EIGENVALUES OF THE PCA FOR SCENARIO S1

Eigenvector 1			Eigenvector 2		
Weight	Rank buses	Voltage variation	Weight	Rank buses	Voltage variation
0.24	85, phase C	-5.08%	0.15	160r, phase C	1.45%
0.20	84, phase C	-4.19%	0.14	105, phase C	-1.48%
0.15	64, phase C	-2.93%	0.14	108, phase C	-1.48%
0.15	65, phase C	-2.93%	0.14	67, phase C	-1.48%
0.15	66, phase C	-2.93%	0.14	197, phase C	-1.48%
0.15	160, phase C	-2.93%	0.14	97, phase C	-1.48%
0.15	63, phase C	-2.93%	0.14	100, phase C	-1.48%
0.15	61, phase C	-2.93%	0.14	104, phase C	-1.48%

to that shown in Table II, which were sorted using the average normalised covariance values. The second eigenvector obtained could not be explained using any apparent physical representation, and it is not providing any special information that can be used in this analysis. The top-ranked node is where there is a voltage regulator installed.

C. Impact of increasing the number of perturbations in the distribution system (scenario S6)

To investigate the limitations of the proposed metrics, two simultaneous perturbations were performed (scenario S6). The observed voltage variations (ranked in descending order of magnitude) is presented in Fig. 14, the corresponding surface from the covariance matrix is presented in Fig. 15, and the summarised results with the normalised covariance values are shown in Table V. The PCA test was again performed to compare the covariance analysis results, and the results of first eigenvalues are presented in Tables VI and VII.

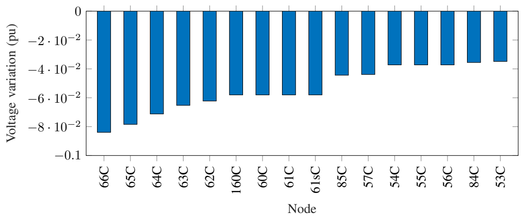


Fig. 14. Voltage variation over each node when there are high perturbations at nodes 66 and 85, phase C (scenario S6, $t_k = 640$min).

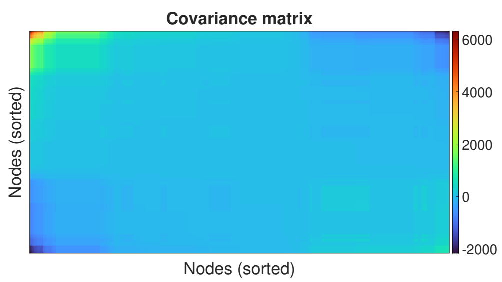


Fig. 15. Covariance surface obtained from voltage measurements when there are high perturbations at nodes 66 and 85, phase C (scenario S6, $t_k = 640$min).

As observed with the electrical distance calculations for scenario S6, the ranking of nodes by voltage variations and average normalised covariances predominately determined by

TABLE V
AVERAGE NORMALISED COVARIANCE VALUES OBTAINED FROM HIGH PERTURBATIONS AT NODES 66 AND 85, PHASE C (SCENARIO S6)

Voltage variation	Rank nodes	Average norm. $\Sigma_{i,j}$	Rank nodes
-8.39%	66, phase C	0.99	66, phase C
-7.84%	65, phase C	0.94	65, phase C
-7.12%	64, phase C	0.88	64, phase C
-6.52%	63, phase C	0.83	63, phase C
-6.22%	62, phase C	0.80	62, phase C
-5.80%	160, phase C	0.77	160, phase C
-5.80%	60, phase C	0.77	61, phase C
-5.80%	61, phase C	0.77	61s, phase C
-5.80%	61s, phase C	0.77	60, phase C
-4.43%	85, phase C	0.64	57, phase C
-4.39%	57, phase C	0.62	85, phase C

TABLE VI
PCA FOR VOLTAGE MEASUREMENTS WHEN HIGH PERTURBATIONS OCCUR AT NODES 66 AND 85, PHASE C (SCENARIO S6)

Number	Eigenvalue	Score
1	76153.45	92.38%
2	5751.30	6.98%
3	528.01	0.64%

TABLE VII
SORTED EIGENVECTORS FROM THE FIRST 2 EIGENVALUES OF THE PCA, CASE PERTURBATIONS AT NODES 66 AND 85, PHASE C (SCENARIO S6)

Eigenvector 1			Eigenvector 2		
Weight	Rank buses	Voltage variation	Weight	Rank buses	Voltage variation
0.299	66, phase C	-8.39%	0.137	160r, phase A	-1.46%
0.268	65, phase C	-7.84%	0.135	112, phase A	1.47%
0.243	64, phase C	-7.12%	0.135	108, phase A	1.47%
0.223	63, phase C	-6.52%	0.135	111, phase A	1.47%
0.213	62, phase C	-6.22%	0.135	197, phase A	1.47%
0.199	160, phase C	-5.80%	0.135	67, phase A	1.47%
0.198	61, phase C	-5.80%	0.135	71, phase A	1.47%
0.198	61s, phase C	-5.80%	0.135	97, phase A	1.47%
0.198	60, phase C	-5.80%	0.135	70, phase A	1.47%
0.150	57, phase C	-4.39%	0.135	100, phase A	1.47%
0.135	85, phase C	-4.43%	0.135	101, phase A	1.47%

just one of the perturbations—the one with the highest voltage variation. The other perturbation effect is still presented in the sorted nodes, but it can not directly inform anything about the electrical distance; however, it is well known measuring the node impedance is not a good indicator of electrical distance when multiple perturbations occurs at the same time [13], [15]. The normalised covariance matrix roughly considers the nodes' electrical distance for the worst of the two perturbations. This means that a detailed analysis of the topology must be done, or previous information is required, to make concrete conclusions around electrical distances in the event of two perturbations.

D. Impact of reducing the number of measurement points

The last scenario for this methodology evaluated the performance to characterise the voltage when the number of measured nodes is reduced. Since the covariance matrix relies on the magnitude measured, the values and how values are sorted are the same for the fully observable case exposed before only if the maximum voltage variation is sensed in the measurement.

The normalised values will use the same reference, a product from the vector with the highest voltage variation.

Sometimes this maximum variation cannot be measured, but some measuring units are installed in the surrounding nodes, which will impact the covariance matrix obtained. Nevertheless, the dynamics associated with the voltage variation could be still detected. To investigate this idea, the same analysis was applied for scenario S1 but reducing 50 measurement points (including the measurement at node 85, which is the node with the highest voltage variation). Tables VIII and IX show the covariance values obtained and adjusted according to the available measurement. The PCA was also done to validate the obtained results, as shown in Table X and Table XI.

The dynamic is still observed in the measurement is close enough to the perturbation point. The difference is that the nodes considered close to the perturbation will be referred according to the obtained normalised covariance values. Therefore, it will be slightly different from the actual connection scheme, but the model is still accurate enough. The only drawback from this methodology is the sensor's proximity to this perturbation point, which will require additional information if a complete analysis is required. Normally, sensors are placed in the system's critical points and can catch the most relevant voltage variation. These are complemented by the measurement of renewable energy units installed into the grid that increase the system's observability.

TABLE VIII
VOLTAGE COVARIANCE VALUES FROM A HIGH PERTURBATION AT NODE 85, PHASE C (SCENARIO S1), WITH REDUCED MEASUREMENTS

Measured node (Node 84, Phase C)			Measured voltage	
Covariance mag.	Normalised values	Sorted nodes	Ranked nodes	Variation
1213.76	1.00	84, phase C	84, phase C	-4.19%
919.47	0.85	65, phase C	83, phase C	-2.94%
919.47	0.85	66, phase C	81, phase C	-2.94%
919.47	0.85	63, phase C	65, phase C	-2.93%
919.47	0.85	61, phase C	66, phase C	-2.93%
919.47	0.85	62, phase C	61, phase C	-2.93%
820.52	0.79	83, phase C	62, phase C	-2.93%
820.52	0.79	81, phase C	63, phase C	-2.93%
769.83	0.77	80, phase C	80, phase C	-2.77%
693.78	0.73	57, phase C	78, phase C	-2.33%
631.26	0.69	78, phase C	77, phase C	-2.24%
602.83	0.68	77, phase C	57, phase C	-2.21%

TABLE IX
AV. NORMALISED COVARIANCE VALUES OBTAINED FROM A HIGH PERTURBATION (SCENARIO S1), WITH REDUCED MEASUREMENT.

Voltage variation	Rank nodes	Average norm. $\Sigma_{i,j}$	Rank nodes
-4.19%	84, phase C	0.99	84, phase C
-2.94%	83, phase C	0.87	65, phase C
-2.94%	81, phase C	0.87	66, phase C
-2.93%	65, phase C	0.87	63, phase C
-2.93%	66, phase C	0.87	61, phase C
-2.93%	61, phase C	0.87	62, phase C
-2.93%	62, phase C	0.78	83, phase C
-2.93%	63, phase C	0.78	81, phase C
-2.77%	80, phase C	0.75	80, phase C
-2.33%	78, phase C	0.74	57, phase C
-2.24%	77, phase C	0.68	54, phase C
-2.21%	57, phase C	0.68	55, phase C

TABLE X
PCA FOR SCENARIO S1 WITH REDUCED MEASUREMENTS

Number	Eigenvalue	Score
1	22716.84	88.47%
2	2364.542	9.21%
3	596.6255	2.32%

TABLE XI
SORTED EIGENVECTORS FROM THE FIRST 2 EIGENVALUES OF THE PCA(SCENARIO S1), WITH REDUCED MEASUREMENTS

Eigenvector 1			Eigenvector 2		
Weight	Rank buses	Voltage variation	Weight	Rank buses	Voltage variation
0.22983	84, phase C	-4.19%	0.17	66, phase C	-2.93%
0.17463	65, phase C	-2.93%	0.17	65, phase C	-2.93%
0.17463	66, phase C	-2.93%	0.17	61, phase C	-2.93%
0.17463	63, phase C	-2.93%	0.17	62, phase C	-2.93%
0.17463	61, phase C	-2.93%	0.17	63, phase C	-2.93%
0.17463	62, phase C	-2.93%	0.13	57, phase C	-2.21%

V. DISCUSSION AND CHALLENGES

The purpose of this analysis was to understand the maximum amount of information extracted from data when there is only power and voltage measured from the distribution system. A model can be done using these metrics as inputs since they describe spatially and temporally the dynamics of the system. This can be enriched when it is provided more information about the system. For example, the critical node voltage can be reconstructed when the topology for the distribution system is known (at least, the connectivity of nodes). Unfortunately, detailed information of the system is not always available nor updated. The magnitude of the Fisher z-transformation gives tentative information about the perturbation location by analysing M^P and M^Q. This approach explains more about the distribution of power and the impact of voltage across the circuit. Additionally, the power transmitted is changing all the time, which changes the impedance values around the distribution grid. One of the biggest advantages of the analysis presented before was the use of measurement available in the system. Some limitations using measurement were presented, following the information entropy limit. Nevertheless, it was also concluded that it is not required to have complete knowledge of the system (i.e., the whole picture of voltage sensibilities around the system).

A Perturbation-Compensation (Actuator/Observation) approach for building voltage control models could be proposed using the information within the values of M^P and M^Q for the actuation vector, while values such as the average normalised covariance of the measured nodes can represent spatial characteristics of the system. Additional exogenous variables such as solar irradiance (in case of photovoltaic injections) and consumed power can be used to enrich the model approach. The output could be the prediction of voltages/desired voltage to be controlled, which can be related in the time-series. After analysing the data and finding the linearity of the event under study, variables can be related by using Autoregressive based approaches (such as Auto Regressive Exogenous (ARX), Auto Regressive Moving Average with Exogenous Inputs Model (ARMAX) or Nonlinear Auto Regressive Moving

Average with Exogenous Inputs Model (NARMAX)), Koopman operator based approaches, or computational intelligence based approaches, e.g. through Artificial Neural Networks (ANNs).

Part of future works corresponds to develop a model based on these approaches and validate its stability and performance.

VI. Conclusions

In Part I [16], a data-driven approach for analysing the voltage variations and the power transmitted between nodes was proposed. In this paper, the proposed approach was tested for different types of power/voltage fluctuations. Simulation results were consistent for the proposed procedure. Additionally, the results showed how to maximise the available data to describe the distribution system in real-time. There are key data required to build a model, such as maximum voltage variation during a defined perturbation.

As some of the proposed scenarios with limited measured data shown, additional data inputs are required to develop an accurate model. The proposed data-driven approach showed a remarkable potential to reduce model complexity and catch the required dynamics by defining a criterion for system clustering and then being integrated with multiple input/output regression methods to define control models. Several approaches for modelling use techniques to reduce the order (degree of complexity) that brings no physical meaning. The primary motivation is to enable researchers to define a reference on the characterisation of key parameters relevant to construct time-series control models without losing the distribution system's physical interpretation.

Acknowledgment

This work is supported by the University of Sheffield Department of Automatic and Control System Engineering Ph.D. fund, and Departamento Administrativo de Ciencia, Tecnología e Innovación (Colciencias).

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Appendix D

Paper under preparation: Data-Driven Time-Series-based approach for voltage prediction in distribution systems with renewable energy sources

Data-Driven Time-Series-based approach for voltage prediction in distribution systems with renewable energy sources

Carlo Viggiano, Paul Trodden, Eduardo Caicedo, and Wilfredo Alfonso

***Abstract*—The increased capacity of hosting renewable energy sources in distribution systems requires real-time monitoring and control by applying active network management approaches. These rely on previous knowledge of the distribution system topology and parameters used to build physics-based models that adequately capture system behaviour. Additionally, modelling in distribution systems incorporating several distributed generation sources becomes complex because of the system's size and its partially observable/controllable condition. One of the main goals to ease the integration of renewables in the distribution system corresponds to building empirical data-based models from time-series measurements of system variables that result in simple, low-order models. This paper presents the use of empirical spatial-temporal characteristics of the distribution system to catch the most relevant dynamics. After the transformation of variables using statistical approaches, it is possible to reduce the complexity of time-series models and give a better description of the obtained model using conventional linear modelling approaches such as auto-regressive or Koopman operator-based models.**

***Index Terms*—Distribution System Modelling, Voltage Fluctuations, Electrical Distances, Nodes Clustering, Voltage Control.**

I. Introduction

THE implementation of Active Network Management (ANM) systems eases the process of using real-time data on monitoring and control [1]. Nevertheless, ANM systems rely on physical-based models, which are challenging to keep always up-to-date. Additionally, they forecast the behaviour of the system based on partial measurements available in the system. In general, keeping updated the system model and installing measurement around the system is expensive and even challenging for distribution system operators [2].

The information provided by any metrics traditionally used (e.g., electric parameters) and any other measurable information to describe the distribution system is changing in time, which requires the use of time-series analysis tools. Time-series analysis extracts meaningful statistics and relevant characteristics of a dynamic system [3], [4], which subsequently can propose a model for control purposes. The participation of Distributed Energy Resources (DERs) in distribution systems has increased considerably and nowadays has become a reality in the distribution system operation. Uncertainties and high variability associated with renewable energy sources have increased the interest in analysing the statistical behaviour of time-series data obtained from available measurements, including the traditional probability density function (PDF) associated with the load consumption [5].

Using time-series measurements of system variables to construct models for control has seen widespread use and validation in industrial applications outside of the power domain [6]–[9]. While time-series analysis has found use in power distribution network modelling and analysis, particularly in support of power flow analysis considering the presence of renewables [5], topology detection [10]–[12] and reactive power control [13]. However, these analyses do not consider the identification of *broad* dynamics of a distribution system from limited available time-series data, considering the effects and time-evolution of uncontrollable exogenous variables. These "dynamics" differ subtly from the traditional notion of power system dynamics because they are not limited to just those of traditional assets but are expected to capture the dynamic effects of loads and renewable inputs on system variables such as voltage.

The analysis required to produce these models should be divided into two parts: the first by extracting relevant variables using statistical analysis; the second by generating the model based on regression techniques. It is common to define the selected explanatory variables in the modelling and their relevant time lags [14]–[16]. Research done in transmission systems intuitively integrates this concept [16], [17], and other applications considering time lags are used to predict electricity price, which is a strong field studied in economics [18], [19]. Developing causal analysis in time-series modelling is a challenging task [4], [20]–[22], for which is not required a deep "causation" study in the context of power systems. The main question for this task should be, is it possible to predict a variable due to its interaction with another (measurable) explanatory variable in different time lags?

Regarding using regression techniques to predict variables, most of applications are focused on load forecasting using statistical models [21], [23]–[32]. These regressions are highly impacted with the load type or size. There was also an attempt of directly model voltage PDF based on knowledge of topology according to [33] or evaluating different variables such as rated power in transformers and lines [34]. Additionally,

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Sponsored by the University of Sheffield Department of Automatic and Control System Engineering Ph.D. fund, and Departamento Administrativo de Ciencia, Tecnología e Innovación (Colciencias)

Manuscript received Nov XX, 2022; revised Feb XX, 2023.

computational learning-based methods are also used [15], [35]–[40] to fit a regression that represent the data. However, it does not explain anything about the nature that produces the distribution function. These methods are directly applied to predict the desired parameter, but the model gives a wide approximation of the variable for a portion of the distribution system. However, the model also should consider spatial representations of the variables. Therefore, a previous analysis of all variables is required to define which variables can better explain the desired parameter's dynamics. Accepting this reality, an alternative question and perspective contemplated in this paper is, considering only measurable variables (including endogenous and exogenous variables), is it possible to produce pure data-based models considering the measurements of system variables that *are* available?

Proposed variables are presented in [41], [42] and used as a start point to produce the desired models. We proposed a methodology to select the relevant data to be considered in the modelling approach. The objective is to develop a model that predicts voltage and can integrate exogenous variables and control inputs. Since several variables could explain same dynamics, they should be removed and grouped to simplify the model (colinearity problem). This revision includes also checking relevant properties, such as stationary, heteroscedasticity, and normality. With the data "cleaned", relevant lags are revised using the Granger-causality concept. With relevant variables and lags selected, data regression models are performed using different techniques, some of them based on classic representations such as Auto-Regressive Exogenous Model (ARX), Auto-Regressive-Moving-Average with Exogenous Inputs Model (ARMAX) and others based on Koopman operator representations, e.g., Dynamic Mode Decomposition (DMD). A comparison of performance using statistical tools explains the model's validity. Finally, distinct types of model configuration are evaluated, i.e., multiple-input and single-output (MISO), multiple-input and multiple-output (MIMO). Using the information available, we considered an unbalanced network with an arbitrary penetration level from renewable power sources and assumed nothing about its topology and parameters. We investigated the efficacy and validity of the proposed methodology via case study simulations on a 123-bus test network.

This paper presents an approach based purely on measured data that helps construct a reduced-order model of an unbalanced distribution system for voltage control. The main contributions of this paper are:

1) We contrasted response analysis of static and time-variant responses to define relevant lags, using cross-correlation analysis and contrasted with Granger-causality analysis;
2) We proposed a *data-driven* approach to get a reduced-order linear representation of the distribution systems that consider exogenous variables to get one-step voltage ahead; and
3) We verified some general assumptions in the statistical approach and presented a methodology to improve the response based on the analysis of time-series data.

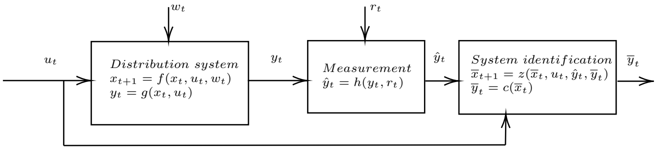


Fig. 1. Description of the modelling approach scheme

II. Problem statement

A. Motivation

A general representation of the problem is presented in Fig. 1. We consider a broad distribution network wherein the voltage–power dynamics are assumed to be governed by Differential–algebraic equations (DAEs):

$$x_{t+1} = f(x, u, w), \tag{1a}$$
$$y_t = g(x, u, r). \tag{1b}$$

These DAEs capture the physics of the electrical network and the non-deterministic, time-varying and dynamic actions of consumers and producers. In (1), t denotes time, x is a vector of (internal) states, whose time evolution is described by (1a), u is a input vector that contains exogenous variables (and potential control inputs), which in this case are active/reactive power injections at nodes that can be measured and/or controlled, the irradiance, and the new metric proposed in [41], [42] y is a vector collecting the voltages at each node $i \in \{1, \dots, N\}$, and w is a vector of uncertain variables affecting the state evolution.

Our main idea is to perform voltage predictions that can control the distribution network without knowledge about its dynamics presented in (1). Moreover, the system should comprise many unmeasured states, i.e., only a subset of the nodal voltages is measured, and other subset of nodal power injections is available for measuring (and control) purposes. This paper aims to perform a *system identification* to construct a simple yet sufficiently accurate model of the power–voltage dynamics at the timescale of interest for voltage regulation according to the DAEs:

$$\bar{x}_{t+1} = f(\bar{x}_t, u_t, \hat{y}_t, \bar{y}_t) \tag{2a}$$
$$\bar{y}_t = c(\bar{x}_t) \tag{2b}$$

In (2), $t+1$ denotes one-step ahead, $\overline{x}$ is a vector of (internal) states, whose time evolution is described by (2a) and represent the reduced order model of the original system in (1). $\overline{y}$ is a vector collecting the predicted voltages at measured nodes.

B. Specific paper setting and objectives

We consider an unbalanced radial network composed of N nodes. The topology and parameters of the system are unknown, as the composition and nature of the loads. Renewable generation is present in the network in the form of uncontrollable power injections at the relevant nodes. We assume that measurements of voltages are available at the feeder and specific nodes in the network, but it may or may not be known exactly where these nodes are relative to others.

It is well known that system voltages and the power flows lie on the manifold characterised by the nonlinear power flow equations, i.e. $\mathcal{M} = \{p, q, v : h(p, q, v) = 0\}$. In practice, voltages and flows may be confined to only a small region of the manifold around the operating point and determined by permitted operational limits. That motivates and justifies the use of linearisation to describe voltage–power relationships. In [43], linearisation of the power flow equation for radial distribution systems leads to the voltage–power relation,

$$\bar{V} = \mathbf{1} + \bar{R}\bar{P} + \bar{X}\bar{Q} \tag{3}$$

where $\bar{V}$ is the vector of voltages for nodes under analysis, $\bar{P}$ and $\bar{Q}$ are matrices of active and reactive power, and $\bar{R}$ and $\bar{X}$ are matrices of sensitivities of nodal voltages to active and reactive power injections, respectively; for the voltage at node i considering power injections at node j

$$R_{ij} = \frac{\partial V_i}{\partial P_j} \tag{4}$$

$$X_{ij} = \frac{\partial V_i}{\partial Q_j}. \tag{5}$$

Without loss of generality, we assumed that the voltage at the substation is 1 pu. Several methods exist to calculate/update the sensitivity matrices using real system voltage and power measurements, including those considering prior knowledge of system topology [44], [45] and direct measurement and estimation [46]–[48]. Conventional radial network analysis is then typically performed using (3), by assuming one slack node (at the feeder) and all downstream nodes are loads (PQ buses). Where distributed generation is present in the network, (3) is easily modified to account for those nodes (denoted g) providing power and those that constitute loads (denoted d):

$$\bar{V} = \mathbf{1} + \bar{R}\bar{P}^g + \bar{X}\bar{Q}^g - \bar{R}\bar{P}^d - \bar{X}\bar{Q}^d. \tag{6}$$

This expression provides a simple linear model suitable for, *inter alia*, centralised voltage control and time-varying voltage droop determination via multiple linear regressions [49]. However, regardless of the relationship that represents traditional quasi-static load flows, the dynamics identified in a modern distribution system are governed by individual and combined dynamic behaviours. Thus, the electrical system, loads, and non-conventional generation interact with the consumers' actions during and across days and the daily variations due to solar and wind availability. The network dynamics are therefore determined not just by the well-defined physics of the electrical system but also by the complex environment in which it operates. Therefore, an alternative approach is necessary to adequately respond to the interactive dynamics.

The system is described according to the number of measurements available. Figure 2 illustrates the general scenario at the distribution systems with partial observability. Only the active power is presented to illustrate the idea, but this applies similarly to reactive power. There are available measurements at the beginning of the feeder n_i (parent) and some sections of the system. Some of them can be separated by a line, which is the case of nodes n_k and n_j. It could be the case in which the measurement available is within a section in which the connection with other nodes or measured points is unknown (e.g. node n_e). Therefore, the direction of the power coming/leaving the node is unknown. This approach requires knowing the direction to/from which the power flows and how the measurements are related. The system's topology must be known or estimated for a whole or partially observed system using the information within the voltage measurements [50], [51].

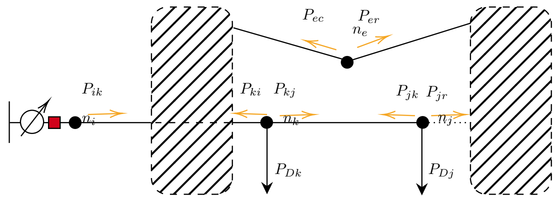


Fig. 2. Representation of measurements for a distribution system

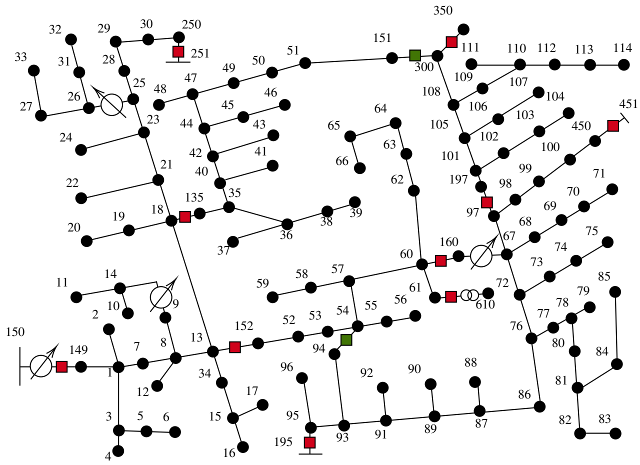
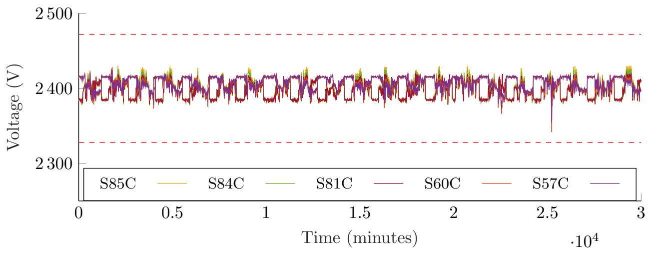


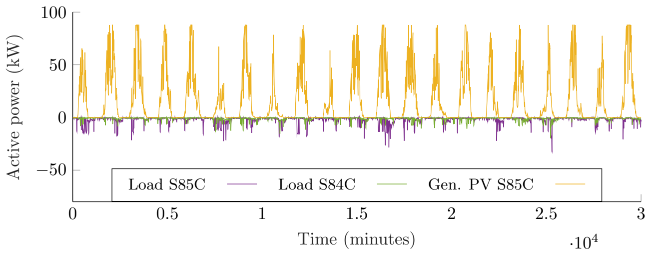
Fig. 3. IEEE 123-node unbalanced distribution system

III. Checking of data input in the modelling approach

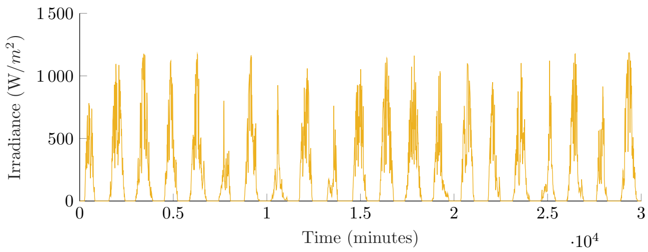
Before presenting the system identification process, we checked the general characteristics of the data. Time-series simulations were done using OpenDSS, and their results were processed with MATLAB. Fig. 3 shows the IEEE 123-node system used as the reference, an unbalanced distribution system, including the action of the voltage regulator and the position of switches (green for an open–switch and red for a closed switch). A model from [52] called the CREST Demand Model was used to implement time-series simulations for the residential load profile and solar radiation profile using the location of Sheffield, UK. Locations of power injections and the assignation of generation/consumption profiles are assumed to follow the same procedure presented in this section. We established a fixed amount of renewable penetration at 30% of the total rated power of loads (17 PV generation units randomly assigned, one of the located at node 85, phase C). The units installed are presented in Table I. An arbitrary portion of the data is presented in Figures 4 and 5, which represent a simulation of typical 1000 summer/weekday days. The sampling time for measurements is 10 minutes.



(a) Voltage profiles of measured nodes

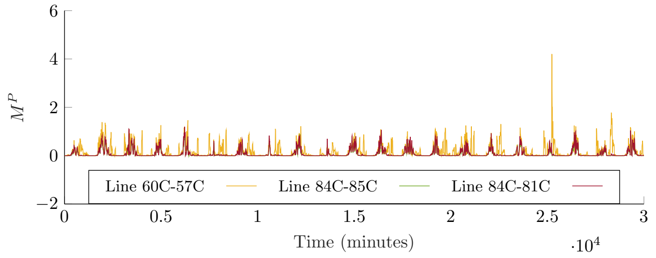


(b) Active power profiles of measured nodes

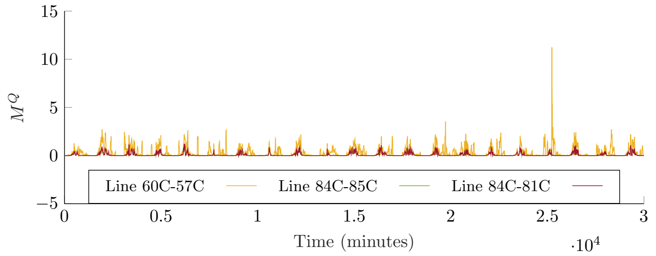


(c) Radiation profile

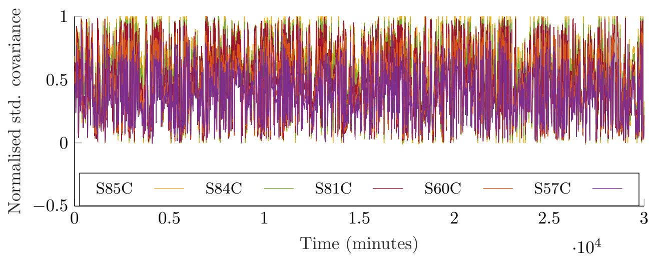
Fig. 4. Arbitrary selection of data results after simulation with a penetration level of 30%



(a) Profile obtained for metric M^P nodes



(b) Profile obtained for metric M^Q



(c) Profile obtained for metric normalised standard covariance

Fig. 5. Metrics obtained from arbitrary selection of data results

TABLE I
ASSIGNATION OF PV UNITS INSTALLED ACROSS THE SYSTEM

Name and location of PV unit	Size (kVA)
PV S85.C	87.77
PV S38.B	87.77
PV S49.A	52.61
PV S100.C	87.77
PV S4.C	61.89
PV S7.A	87.76
PV S80.B	45.72
PV S111.A	87.77
PV S76.A	50.80
PV S76.B	50.97
PV S53.A	81.93
PV S68.A	87.77
PV S65.A	5.68
PV S65.C	5.61
PV S42.A	87.77
PV S59.B	68.55
PV S99.B	87.77

An exploration of critical measurable point is required to understand the capacity of the proposed approach. The measurement points selection is based on location in the system (end and middle of feeder), where they are normally located in real distribution systems. Responses over different nodes or lines in different phases will not change considerably the modelling methodology approach tested in this chapter. The optimal location of measurement points is not part of this thesis scope. Therefore, we assume the IEEE 123-node system has voltage measurement units accessible only at nodes 57, 60, 81, 84 and 85, all in phase C. Equivalently, power measurements over lines 60-57, 81-84, and 85-84 are the only available measurements. The power measured in the system corresponds to load consumption at nodes 84 and 85, phase C, and the power injected for a photovoltaic generation unit at node 85, phase C. Additionally, the irradiance level was measured. The input vector u includes the time-series data of exogenous variables of consumed/injected power, the irradiance levels and the proposed new metrics (M^P,M^Q and the average normalised covariance). The measured vector $\hat{y}$ corresponds to time-series data of the voltages from vector y.

When creating time-series models, it is assumed stationarity of data [22]. Thus, the data must present an autocorrelation structure and constant mean and variance. To understand how the suggested model approach should be constructed, a revision of this statement is required in this context.

There are several approaches to deal with this. One of the simplest is data differencing [22], which means that a data value D at time t is differenced in order one, as indicated in the expression:

$$\Delta D_t^{(1)} = D_t - D_{t-1} \tag{7}$$

The data trend has been removed after differencing and is now stationary. This ease the model creation considerably since it will not have any AutoRegressive Integrated Moving Average (ARIMA) structure but a shape of a regression model in difference with Auto-Regressive-Moving-Average Model (ARMA) errors. In order to use this structure, it is required that all data used must be differenced in the same way as indicated in (7).

IV. Proposed methodology for time-series data modelling

The proposed methodology considers five steps, in which all measured data were revised, selected, organised, and prepared to use a linear regression approach. We verified the model to know if it is acceptable for predicting and controlling through the statistical assumption; in this case, the voltage over each node. The algorithm 1 summarises the procedure. This algorithm should run anytime that is required to get a representation of the critical nodes of the distribution system (i.e., when measured or historical data gives insights of measured nodes can presents operational limit issues). For real time applications, it can be re-evaluated every time sampling or a predefined model according to available historical data. To build the model, the minimum amount of data required will be the one to produce the proposed metric in [41], [42], and it was set for this paper that each window is thirty-minutes long and—considering that the data are sampled every ten minutes—contains three samples. Nevertheless, this algorithm relies on having enough amount of data to improve the model performance. To illustrate the application of the algorithm, it is assumed that measurements introduced previously will be critical nodes that are the only ones to be monitored (and potentially controlled), and there is historical data based on the one thousand days previously introduced.

For linear regression, it is desired that the estimators used as input follow a normal distribution since they help to obtain optimal response and produce results that can be easily analysed (e.g., the definition of a prediction interval), which is hard to obtain [53]. The most relevant assumption after building the model is that the obtained residual follows a white noise structure. Then, normality must be checked over residuals to validated a Gaussian distribution function of these random variables. Additionally, heteroscedasticity should be also checked, to confirm that is not present in the residuals, i.e., the variance is equal over the range of measured values.

Figure 6 summarises the proposed approach to getting models (steps 1-3 in algorithm 1). The input data at time t is introduced (control variables, exogenous variables, and the output voltage to be predicted). The next step corresponds to pre-processing data to select the relevant ones for the modelling approach. When the relevant measurements are selected (assuming that the data was detrended or it is stationary), a collinearity analysis is done to avoid multi-collinearity issues (i.e., increasing variance unnecessarily due to presence of redundant inputs) [53]. Also, the relevant lags to obtain a better response are obtained by contrasting results from cross-correlation analysis and Granger-causality analysis [22]. With the pre-processed data, the next stage is to select data for training and validation purposes. In this case, we split data at 50% for training purposes, and the other half for validation. Finally, the linear regression is done using any relevant technique, such as polynominal-based [54], [55] or Koopman-operator-based regressions [56], [57], following the structure:

$$\overline{y}_{t+1} = \overline{y}_t + \overline{\Delta y}_{t+1} \tag{8}$$

where the term $\overline{\Delta y}_{t+1}$ corresponds to the variation obtained

Algorithm 1: Data-driven time-series modelling approach

Input: Historical data: V^n, P_D^K, P_G^L, $Irradiance$, M^P, M^Q, $Av.norm.cov$,
Output: Model representation (State-Space), Predicted V^n
initialization
Step 1 - Data revision and pre-processing
while *Data stationary==false* **do**
  Difference data according to (7)
end
Step 2 - Data processing and selection
Selection of critical data to be modelled
Check balance of training/validation datasets
Check normality properties of data
if *Data == normal distribution* **then**
  Do nothing
else
  Transform to normal distribution using Box-cox transformation
end
Check collinearity in used data
if *Data collinearity == true* **then**
  Remove redundant data
else
  Do nothing
end
Check relevant lags (model order) using cross-correlation analysis and Granger causality test
Step 3 - Creation of Linear time-invariant (LTI) model using revised data
Select I/O relationship (MISO, MIMO)
Apply regression method (Autoregressive-based, Koopman-based, etc)
Step 4 - Checking validity of assumptions
Check residuals properties (Autocorrelation, Heteroscedasticity, Normality)
if *Residual == white noise* **then**
  The model is completed, and it is fully explained statistically speaking
else
  More data/info is required to explain the dynamics/ increase horizon of prediction
end
Step 5 - Obtaining prediction interval for the time-series modelling
Calculating predicted voltages according to (8)

from the LTI system model obtained in State-Space form:

$$\overline{x}_{t+1} = A\overline{x}_t + B\Delta u_t + w_t \tag{9a}$$

$$\overline{\Delta y}_t = C\overline{x}_t + D\Delta u_t + e_t \tag{9b}$$

where w_t and e_t are assumed to be white noise for process and measurement. The matrices A, B, C, and D define the dynamics, the effect of actuation, the sensing strategy, and the effect of actuation feed-through, respectively. When the prediction $\overline{\Delta y}_{t+1}$ is done using $\overline{x}_{t+1}$, it is assumed that the current information of the plant is required for prediction. We have implicitly assumed that the input cannot affect the output at the same time. Thus, $D = 0$ in the plant model.

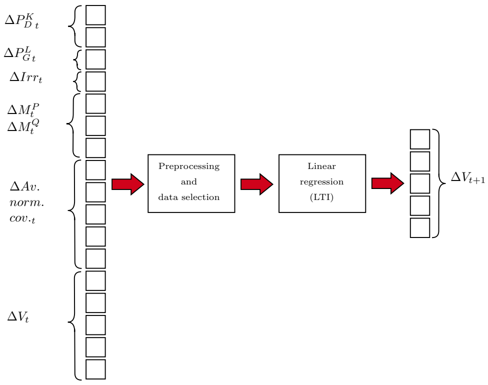


Fig. 6. Proposed modelling approach for voltage prediction (steps 1-3 in algorithm 1)

A. Data revision and preprocessing

The first step in this methodology corresponds to data revision and pre-processing. The algorithm for this step is summarised in the first step of the algorithm 1.

As we mentioned earlier, data must be checked for stationarity. This could be checked visually, using Autocorrelation Function (ACF) and Partial Autocorrelation Function (PACF). Figure 7 shows the corresponding voltage profiles and their corresponding ACF and PACF. There are high correlation levels for all lags, a common behaviour in non-stationary systems. For higher-order lags, the data show how autocorrelation patterns periodically fluctuate and resemble a sinusoidal wave, indicating seasonality.

The analytical way to check the non-stationary condition corresponds to applying the Augmented Dickey-Fuller (ADF) test, which is a statistical significance test and indicates a failure to reject the null hypothesis that a unit root is present [4], [22], [53]. The unit root is a property of a non-stationary time series that can lead to a wrong inference as a consequence of spurious regressions. As a result, a p-value helps infer the time series' stationarity. The testing procedure for the ADF test is applied to the model:

$$\Delta y_t = \alpha + \beta t + \gamma y_{t-1} + \delta_1 \Delta y_{t-1} + \cdots + \delta_{p-1}\Delta y_{t-p+1} + \varepsilon_t, \tag{10}$$

where α is a constant, β is the coefficient on a time trend, and p is the lag order of the autoregressive process. A random walk is modelled by setting the constraints $\alpha = 0$ and $\beta = 0$, and making only $\beta = 0$ corresponds to modelling a random walk with a drift. Higher-order autoregressive processes are allowed when lags of the order p are included in the ADF formulation. Different ways of testing then include testing down from high orders lag length p and examine the t-values on coefficients or examining information criteria such as the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC).

The unit root test is then conducted under the null hypothesis $\gamma = 0$ against the alternative hypothesis of $\gamma < 0$. The test statistic is computed and compared with the relevant critical value for the Dickey-Fuller test, which follows a specifically known distribution as the Dickey–Fuller table for critical values.

If the calculated test statistic is less than the critical value, then the null hypothesis $\gamma = 0$ is rejected and no unit root is present.

The results of applying the test over the data are shown in Table II. The test statistic was the one sample t-test and the critical values were for left-tail probabilities. It confirms the non-stationarity of data. Therefore, all input data must be differenced in order one.

1) First regression attempt and exploring of all data: From results obtained in Table II, it is concluded that the data obtained requires to be differenced to make it stationary. Normally, applying data differencing of order one is enough to become stationary [22]. It can be an iterative process for several order until stationarity is achieved. However, a good revision of the data and the model would be suggested to give an interpretation to the obtained models and results.

The data presented before is now differenced and not absolute values. Once this data is stationary, it is desired to build a "good" LTI model from the statistical point of view. We assumed (and desired) that the input data follows characteristics such

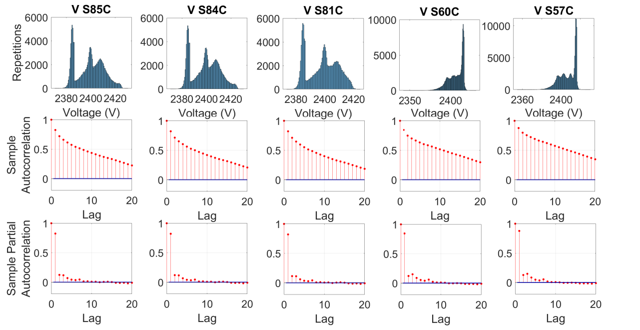
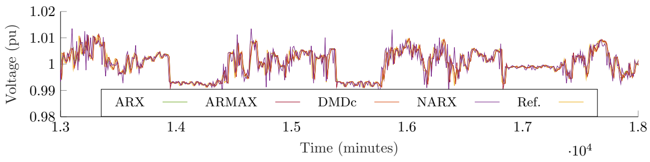


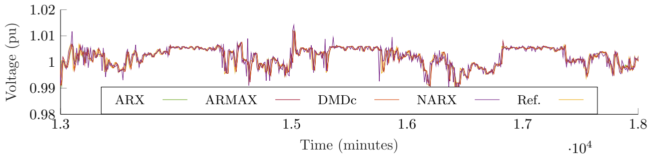
Fig. 7. Distribution shape, ACF and PACF results of voltage distributions obtained from the reference case, showing non-Gaussian shapes and non-stationarity

TABLE II
TESTS RESULTS FROM MEASURED VOLTAGES

Node	Test rejection	p-values	Test statistics	Critical values
S85.C	Failure to reject H_0	0.4545	-0.5392	-1.9416
S84.C	Failure to reject H_0	0.4635	-0.5143	-1.9416
S81.C	Failure to reject H_0	0.4761	-0.4801	-1.9416
S60.C	Failure to reject H_0	0.5016	-0.4104	-1.9416
S57.C	Failure to reject H_0	0.5276	-0.3395	-1.9416

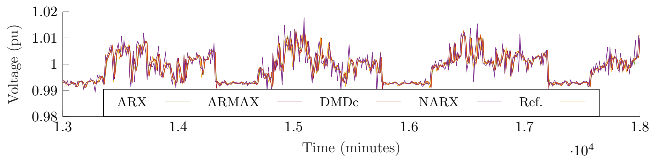


(a) Node S85C

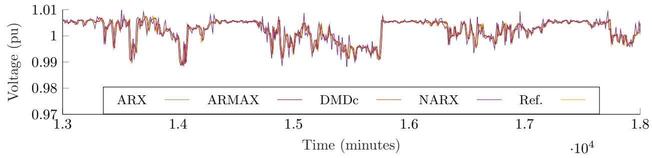


(b) Node S60C

Fig. 8. Portion of voltage predictions 1 step ahead using raw training dataset



(a) Node S85C



(b) Node S60C

Fig. 9. Portion of voltage predictions 1 step ahead using raw validation dataset

as normality in the distribution's functions (a straightforward way to prove independence between variables).

A first preliminary regression is done to explore the residuals. The techniques that were explored in this project are linear autoregressive models (ARX and ARMAX), Koopman-operator-based models (Dynamic Mode Decomposition with Control (DMDc)), Subspace identification models (Observed/Kalman Filter Identification and Eigensystem Realization Algorithm (OKID-ERA)) and Non-Linear regression (Nonlinear Auto-Regressive-Moving-Average with Exogenous Inputs Model (NARMAX)). The previous linear models can be represented in state-space form, which is the main goal of this project. This representation has advantages, even if there is no unique way to make this conversion (in the case of a linear autoregressive model) [55]. If it is not stated something different, all obtained models will be presented in their state-space form, as presented in (9).

A MIMO structure is assumed to integrate inputs and outputs in this part of the approach. A portion of the results obtained from the first guess and the predicted voltages are presented in Figs. 8 and 9 from the 50% of data used for training and the other 50% for validation, respectively. Table III summarised general characteristics of the models obtained on each case, and Tables IV and V show the performance for training and validation, respectively. To make all models comparable, ARX and ARMAX are presented in their state-space (SS) representation. The autoregressive structures ARX, ARMAX and Nonlinear Auto-Regressive Model with Exogenous Inputs Model (NARX) consider output delays up to lag 7, and internal input delay up to lag 3. The first matrix for DMDc is defined according to the matrix order equivalent of the ARX state-space representation in the exploration process. Then, the process reduces the matrix by up to the number of outputs. The OKID-ERA approach showed the best performance when the number of Markov parameters was set up to 20.

These results show that most of the methods for system identification used were suitable for the problem and the variables used in modelling. The worst performance was obtained from the OKID-ERA algorithm, which is quite sensitive during the tuning of parameters (in this case, the balance between the observer Markov parameter dimension and the identified system order). For this reason, the results from OKID-ERA were not plotted in Figs. 8 and 9. The best performance from linear approaches was obtained from DMDc from all features; for instance, the dimension of obtained

TABLE III
OBTAINED MODELS DIMENSIONS FOR VOLTAGE PREDICTION USING RAW TRAINING DATASET

Characteristics	ARX (SS)	ARMAX (SS)	DMDc	OKID-ERA	NARX
Dimension A	40x40	40x40	5x5	40x40	-
Dimension B	40x15	40x15	5x15	40x15	-
Dimension C	5x40	5x40	5x5	5x40	-
Dimension D	5x15	5x15	5x15	5x15	-
Comp. time (s)	124.94	46.84	0.77	740.03	252.46

TABLE IV
RESULTS OF MODELS FOR VOLTAGE PREDICTION USING RAW TRAINING DATASET

Characteristics	ARX (SS)	ARMAX (SS)	DMDc	OKID-ERA	NARX
R^2 S85C	0.67	0.67	0.68	-254.13	0.77
R^2 S84C	0.66	0.66	0.67	-284.03	0.79
R^2 S81C	0.66	0.66	0.67	-325.23	0.80
R^2 S60C	0.70	0.70	0.71	-302.73	0.83
R^2 S57C	0.76	0.76	0.77	-246.06	0.87
NRMSE S85C	0.11	0.11	0.11	2.98	0.09
NRMSE S84C	0.11	0.11	0.11	3.27	0.09
NRMSE S81C	0.12	0.12	0.12	3.82	0.10
NRMSE S60C	0.06	0.06	0.06	1.82	0.04
NRMSE S57C	0.06	0.06	0.05	1.80	0.04
AIC	-3.789e5	-3.789e5	-3.8e5	-1.654e5	-3.946e5
BIC	-3.789e5	-3.789e5	-3.8e5	-1.654e5	-3.945e5

TABLE V
RESULTS OF MODELS FOR VOLTAGE PREDICTION USING RAW VALIDATION DATASET

Characteristics	ARX (SS)	ARMAX (SS)	DMDc	OKID-ERA	NARX
R^2 S85C	0.66	0.66	0.67	-265.98	0.77
R^2 S84C	0.66	0.66	0.67	-298.46	0.78
R^2 S81C	0.65	0.65	0.67	-343.79	0.79
R^2 S60C	0.69	0.69	0.70	-320.59	0.83
R^2 S57C	0.76	0.75	0.76	-261.24	0.87
NRMSE S85C	0.11	0.11	0.10	2.99	0.09
NRMSE S84C	0.11	0.11	0.11	3.29	0.09
NRMSE S81C	0.12	0.12	0.12	3.90	0.10
NRMSE S60C	0.08	0.08	0.07	2.47	0.06
NRMSE S57C	0.07	0.07	0.07	2.34	0.05
AIC	-3.784e5	-3.783e5	-3.7950e5	-1.641e5	-3.946e5
BIC	-3.784e5	-3.782e5	-3.7945e5	-1.640e5	-3.945e5

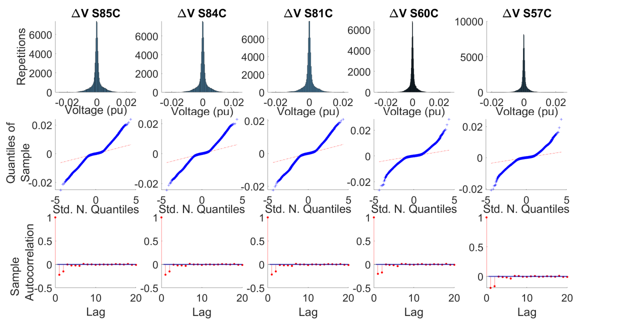


Fig. 10. Histogram, Q-Q plot and ACF of residuals from voltages predictions using DMDc technique and raw training dataset

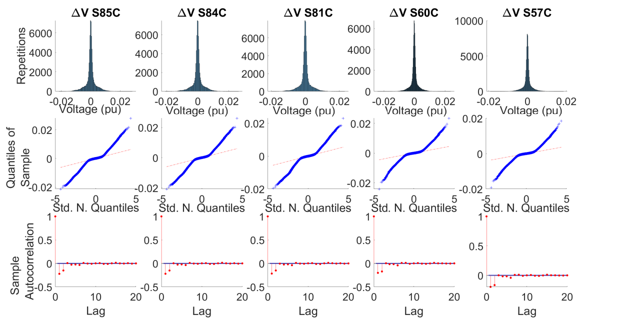


Fig. 11. Histogram, Q-Q plot and ACF of residuals from voltages predictions using DMDc technique and raw validation dataset

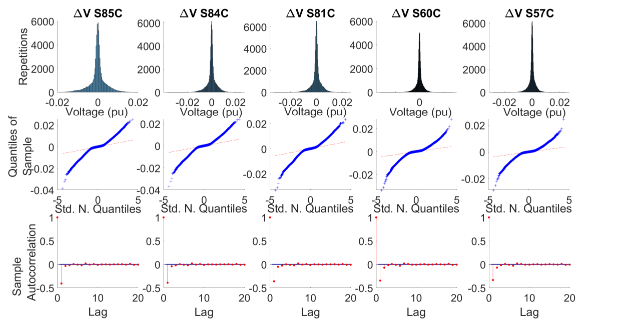


Fig. 12. Histogram, Q-Q plot and ACF of residuals from voltages predictions using NARX technique and raw training dataset

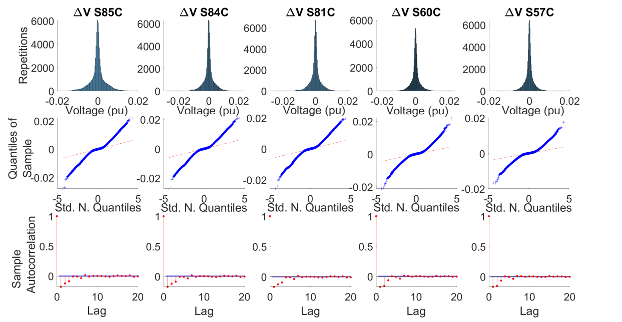


Fig. 13. Histogram, Q-Q plot and ACF of residuals from voltages predictions using NARX technique and raw validation dataset

matrices is smaller for ARX and ARMAX. Additionally, computation time was significantly shorter and its performance indicators were the most favourable of the linear approaches. It was expected that NARX shows a better performance, which is why it is used as a reference in this work to evaluate a "theoretical possibility" for linear approaches. The main disadvantage of this method is that it is not possible to use any feature that describes the sytem's internal dynamic, which is desired in traditional linear control approaches. Additionally, computation time is expensive, potentially making it difficult to integrate it into a real-time control approach.

2) Evaluating the residuals after first regressions: For a linear model in standard conditions, a good regression produces residuals that follow a normal distribution function, no autocorrelation, and no heteroscedasticity components [22], [53]. Following these assumptions, we checked the residuals obtained after the first approximation. Figures 10 and 11 present the histogram, the Q-Q plot, and ACF components of the residuals for training and validation of DMDc, which showed the best performance in overall from the linear modelling approaches. Comparable results were obtained for the other methods. Also, Figures 12 and 13 present the results for the residuals of NARX to compare the performance.

It is shown for both methods graphically that the distribution residuals are heavy-tailed, non-Gaussian with autocorrelation components, which means that the error obtained is still depending on previous values. These were not part of the initial assumptions. These characteristics are explored using different techniques to make a more rigorous analysis. The

TABLE VI
TESTS OF RESIDUALS FROM VOLTAGES PREDICTIONS USING DMDc TECHNIQUE AND RAW TRAINING DATASET

Evaluation	ΔV S85C	ΔV S84C	ΔV S81C	ΔV S60C	ΔV S57C
Anderson-Darling test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Lilliefors test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
One-sample Kolmogorov-Smirnov test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Durbin-Watson test	Reject H_1	Reject H_1	Reject H_1	Reject H_1	Reject H_1
Durbin-Watson coefficient d	2.44	2.44	2.43	2.40	2.39
Ljung-Box Q-test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Engle's Autoregressive Conditional Heteroskedasticity (ARCH) test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Ljung-Box Q-test using squared residuals	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1

TABLE VII
TESTS OF RESIDUALS FROM VOLTAGES PREDICTIONS USING DMDc TECHNIQUE AND RAW VALIDATION DATASET

Evaluation	ΔV S85C	ΔV S84C	ΔV S81C	ΔV S60C	ΔV S57C
Anderson-Darling test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Lilliefors test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
One-sample Kolmogorov-Smirnov test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Durbin-Watson test	Reject H_1	Reject H_1	Reject H_1	Reject H_1	Reject H_1
Durbin-Watson coefficient d	2.44	2.44	2.43	2.40	2.39
Ljung-Box Q-test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Engle's ARCH test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Ljung-Box Q-test using squared residuals	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1

selected tests and their results are summarised in Tables VI and VII. For the DMDc approach and Tables VIII and IX for NARX approach.

It is confirmed now that the results obtained so far can be improved. One of the most critical conditions that must be checked in the residuals are the presence of autocorrelation. It is shown that both test over training and validation dataset in the linear approach showed the presence of this condition. Nevertheless, the Durbin-Watson coefficient d around 2.4 shows that the value is not critical (values of d above four show critical condition [22]. The models can be refined by evaluating the

TABLE VIII
TESTS OF RESIDUALS FROM VOLTAGES PREDICTIONS USING NARX TECHNIQUE AND RAW TRAINING DATASET

Evaluation	ΔV S85C	ΔV S84C	ΔV S81C	ΔV S60C	ΔV S57C
Anderson-Darling test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Lilliefors test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
One-sample Kolmogorov-Smirnov test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Durbin-Watson test	Reject H_1	Reject H_1	Reject H_1	Reject H_1	Reject H_1
Ljung-Box Q-test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Engle's ARCH test	Reject H_1	Reject H_1	Reject H_1	Reject H_1	Reject H_1
Ljung-Box Q-test using squared residuals	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1

TABLE IX
TESTS OF RESIDUALS FROM VOLTAGES PREDICTIONS USING NARX TECHNIQUE AND RAW VALIDATION DATASET

Evaluation	ΔV S85C	ΔV S84C	ΔV S81C	ΔV S60C	ΔV S57C
Anderson-Darling test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Lilliefors test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
One-sample Kolmogorov-Smirnov test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Durbin-Watson test	Reject H_1	Reject H_1	Reject H_1	Reject H_1	Reject H_1
Ljung-Box Q-test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Engle's ARCH test	Reject H_1	Reject H_1	Reject H_1	Reject H_1	Reject H_1
Ljung-Box Q-test using squared residuals	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1

variables used in the regression. The following steps focus on processing and selecting relevant inputs for modelling approach.

B. Data processing and selection

At this stage, a first model can be used as a reference to compare and improve modelling performance. Nevertheless, the variables used as inputs in modelling are not analysed yet to improve explaining the model from the statistical point of view. The second step corresponds to the selection of relevant data. For instance, we can simplify the model by analysing collinearity between explanatory variables or evaluating their impact/improvement by adding responses at different time lags. Therefore, this model can explain the model's dynamics more concisely, which will help predict the voltage to be controlled. We must check the model since the different characteristics of the system will not be close to ideal conditions.

The results presented so far consider the complete dataset of 1000 days, which can be reduced only to critical values. The purpose of the model is to predict voltage behaviour under non-desired operational conditions, so we selected only the days in which any voltage variation exceeds $\pm 1.15\%$, which reduces the number of days considerably up to 120 and remains in the range of $\pm 3\%$, according to [58]. The rest days are part of the "most probably" case scenario, where minimum prediction and control actions are required. Under this reduction, the predicted voltages and the predictors used are analysed to simplify the model complexity.

For predicting dynamics, correlated predictors can still be computed without needing to separate the effects of the predictors. However, it becomes a problem if the scenarios consider the relationships between predictors and some historical analysis of the contributions of various predictors. This idea is quite close to multicollinearity, which occurs when similar information is provided by two or more of the predictor variables in a multiple regression [59]–[61]. However, this does not affect the predictive power but the individual predictor variable's impact on the response variable (this can

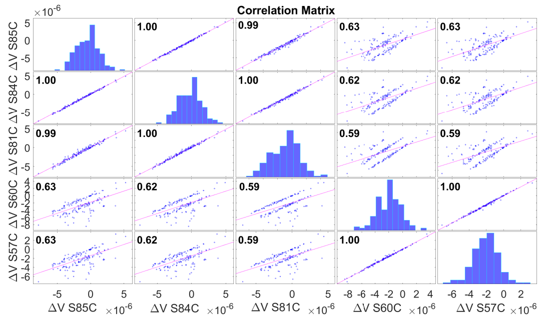


Fig. 14. Histogram and correlations of observed voltages (only days for critical values)

be interpreted as excessive inflation of variance). Therefore, it is desired to reduce this effect, at least in the exogenous variables used in the model.

As the first approach, we check exogenous data that achieve critical values at lag 0, which variables are important or improve the observation of the phenomenon to be modelled. It is important to highlight that this is not a causality analysis since the task in time-series modelling is hard and not desired to solve. Only the data around values close to the critical scenarios will be considered in this case. It is important to mention that causation is different from correlation, nor causation and forecasting [22], [53]. Later, we need to know if a variable x is useful to predict a variable y. That does not mean that x is causing y. In time-series problem is complex to give any causality relationship between variables. It could be the presence of confounding (a variable that influences both predictor and response variable) that makes it difficult to determine if it is related to causation with others. However, it could not necessarily affect the prediction. Nevertheless, correlations are useful for predicting, even when there is a confounding or no causal relationship between the two variables.

After reducing the dataset to only 120 days with 160 critical values, we performed a collinearity analysis with these remaining data. The idea is to check which variables are highly correlated in a regression model structure, which reduces the precision of the estimated coefficients [53]. Figure 14 shows the results of computing correlation analysis of the remaining data. Here, the voltages at nodes 81, 84, and 85 are highly correlated, which is explained using the electric distance concept embedded into the covariance relationship between voltages, such as indicated [50]. For this purpose, the modelling can consider only one of these three nodes (in this case, the node showing higher voltage variation). The others two will follow the same response (assuming a radial topology, a common distribution system in most cases). The same applies for nodes 57 and 60, which are also highly correlated.

We performed the same analysis for the variables used as regressors. These consist of regressors used as potential signals in the control approach and other exogenous variables. The contribution of these potential control signals is useful in the model, and they are not required to reduce the number of delays. However, the exogenous variables must be processed

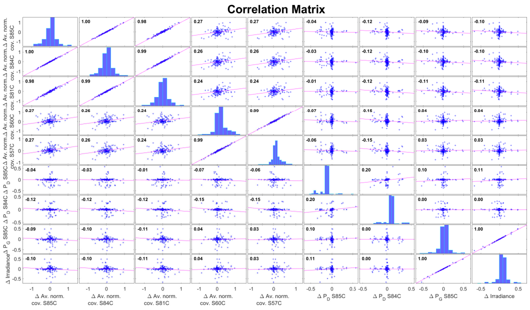


Fig. 15. Histogram and correlations of exogenous inputs (only for critical values)

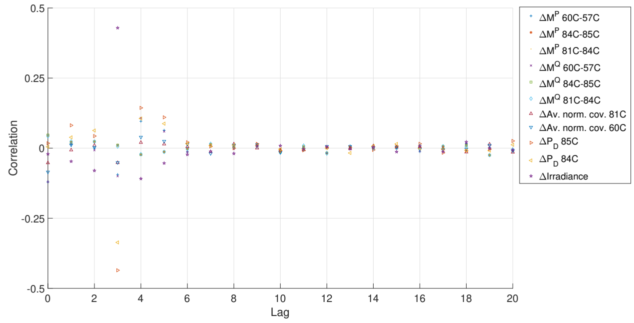
since we desire to reduce the variance. In this case, the input signal for controlling are the metrics M^P and M^Q, while the input signals are the average normalised covariance, consumed/injected power injections and the solar irradiance.

Figure 15 shows the results of computing correlation analysis of these variables. Notice that the average normalised covariance at nodes 81, 84, and 85 are highly correlated similarly to the previous case for voltage values. The same applies for node 57 and 60, which are also highly correlated. The power consumed in both nodes is not correlated, while the power injected due to both renewable and irradiance levels are also highly correlated. In this case, irradiance is chosen as the variable to be used in the model.

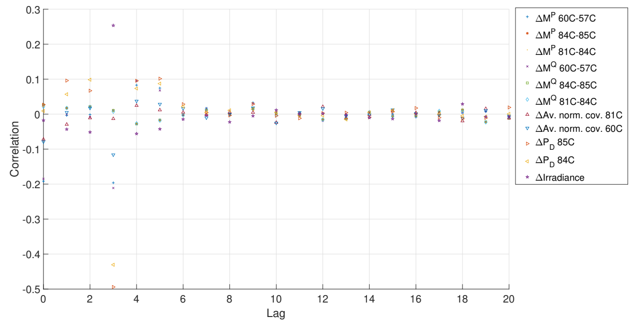
We checked the normal distribution in order to transform data through Box-Cox transformation [53], [62]. However, it was not required to transform any of the selected variables, and all of them were used directly in the new model generation. Thus, we selected the corresponding lags using a combination of cross-correlation analysis and Granger-causality analysis in the time-series data of regressors previously selected. The first tool is mainly static analysis (because it does not consider information from previous time steps) and measures the similarity of two time-series as a function of the lag of one concerning the other. Figure 16 shows the results obtained after applying this procedure.

How the correlation is selected depends on the size of the series, which in this case, is high. It would select irrelevant lags due to their limits depending on the inverse of the amount of data $1/\sqrt{n}$, making every correlation relevant. Here, we proposed to use Granger-causality analysis to complement this analysis by providing a much more stringent criterion for causation than simply observing a high correlation with some lag-lead relationship. Therefore, both static responses captured in the cross-correlation analysis and the dynamical response obtained from the Granger-causality analysis are contrasted for selecting the best lags [22], [53].

The Granger-causality analysis is an alternative to avoid thinking about causality in time-series analysis. This statistical hypothesis test determines whether one time series is useful in predicting another. An evolving-time variable $x\left(t\right)$ "Granger-causes" another variable $y\left(t\right)$ if predictions of $y\left(t\right)$ based on its own past values and on the past values of $x\left(t\right)$ are better than predictions of $y\left(t\right)$ based purely on its own past values, i.e., $x\left(t\right)$ helps to predict $y\left(t\right)$.



(a) First lags node S85C



(b) First lags node S60C

Fig. 16. Cross-correlation analysis for relevant regressors

We analysed this by fitting two Vector Autoregressive Models (VARs) to the time series. Granger causality is performed by fitting the VAR models with q time lags as follows:

$$y(t) = \gamma_0 + \sum_{\tau=1}^{q} \gamma_\tau y(t-\tau) + e(t) \tag{11a}$$

$$y(t) = \alpha_0 + \sum_{\tau=1}^{q} \alpha_\tau y(t-\tau) + \sum_{\tau=1}^{q} \beta_\tau x(t-\tau) + \varepsilon(t) \tag{11b}$$

where $e\left(t\right)$ and $\varepsilon\left(t\right)$ are white Gaussian random vectors. A time series $x\left(t\right)$ is called a Granger cause of another time series $y\left(t\right)$, if at least one of the elements β_τ for $\tau = 1, \ldots, q$ is significantly larger than zero (in absolute value). For the test statistic implies that the model in (11a) does not add information or provides a better model of $y\left(t\right)$, when comparing it to the model in (11b). Intuitively, the null hypothesis requires that $\forall\tau, \beta_\tau = 0$.

We used F-test to assess the null hypothesis considering both regressions with a significance level of α. Results after applying this test are shown in Table X, in which relevant time lags are presented for the analysed variables with respect of the analysed voltage nodes.

Contrasting the results obtained in both Figure 16 and Table X, we concluded that the relevant lags are 3 and 4, which means that the previous 30 and 40 minutes will help on predicting voltage in the next step ahead (10 minutes). The selected regressors can combine the results obtained in both analyses. After this, we can perform another reduction by removing redundant signals with backward elimination [22].

TABLE X
RELEVANT LAGS HIGHLIGHTED AFTER APPLYING GRANGER-CAUSALITY ANALYSIS

	ΔV S85C	ΔV S60C
ΔM^P60C-57C	3,4,5	3,4
ΔM^P84C-85C	6,7	7,8,9
ΔM^P81C-84C	6,7	7,8,9
ΔM^Q60C-57C	3,4,5	3,4
ΔM^Q84C-85C	6,7	7,8,9
ΔM^Q81C-84C	6,7	7,8,9
ΔAv. norm. cov. S81C	–	–
ΔAv. norm. cov. S60C	–	3,6
ΔP_D S85C	3,4,5	1,5,6
ΔP_D S84C	3,4,5	3,5,6
ΔIrradiance	2,3,4	3,4,5

TABLE XI
TESTS OF RESIDUALS FROM VOLTAGES PREDICTIONS USING DMDC TECHNIQUE AND TRAINING DATASET OF SELECTED REGRESSORS IN MIMO STRUCTURE

Evaluation	ΔV S85C	ΔV S60C
Anderson-Darling test	Failure to reject H_1	Failure to reject H_1
Lilliefors test	Failure to reject H_1	Failure to reject H_1
One-sample Kolmogorov-Smirnov test	Failure to reject H_1	Failure to reject H_1
Durbin-Watson test	Reject H_1	Reject H_1
Durbin-Watson coefficient d	2.45	2.36
Ljung-Box Q-test	Failure to reject H_1	Failure to reject H_1
Engle's ARCH test	Failure to reject H_1	Failure to reject H_1
Ljung-Box Q-test using squared residuals	Failure to reject H_1	Failure to reject H_1

To summarise, after this analysis, the voltages observed in the five nodes can be reduced to only two. Thus, the total of 15 possible regressors was reduced by up to 3 relevant regressors, in which one considers the action of two different lags. This reduction has several advantages for model stability and complexity reduction.

C. Checking validity of assumptions

In order to validate the assumptions for the linear model approaches, the next step corresponds to see if there is any improvement in the residuals obtained. Ideally, the obtained residual should represent white noise (normal distribution, no autocorrelation, and no heteroscedasticity). Therefore, it is required to see the characteristics of the residuals obtained after the regressor analysis. Figures 17 and 18 present the histogram, Q-Q plot, and ACF components of the residuals for training and validation of DMDc for MIMO approach. Figures 19 and 19 presents the results for the residuals of NARX. Even if the residuals obtained are not following a normal distribution, the heavy-tailed shape is improved. These results are confirmed using the approach presented in section IV-A2 in tables XI and XII for the MIMO DMDc approach, and tables XIII and XIV for the MIMO NARX approach.

We made several improvements even though we obtained distributed residuals with heavy-tailed, non-Gaussian shapes, and autocorrelation components. The latter was considerably reduced in the DMDc model; this means that the selected regressors explained in a better way the system concerning the

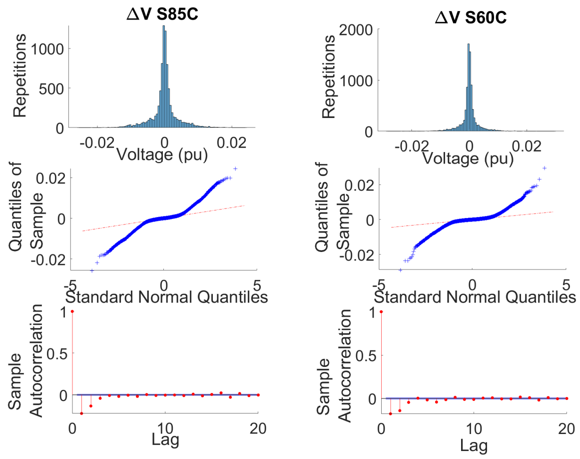


Fig. 17. Histogram, Q-Q plot and ACF of residuals from voltages predictions using DMDc technique and training dataset of selected regressors in MIMO structure

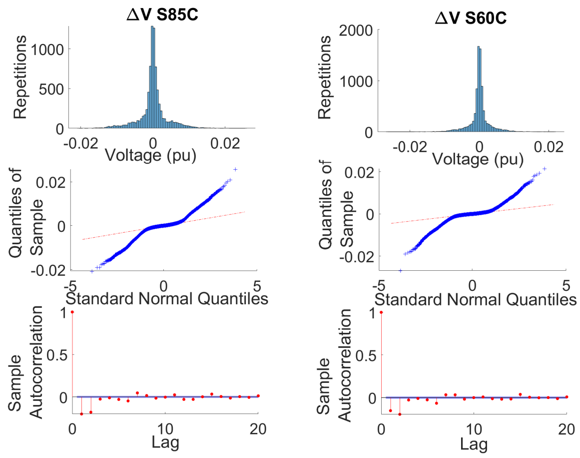


Fig. 18. Histogram, Q-Q plot and ACF of residuals from voltages predictions using DMDc technique and validation dataset of selected regressors in MIMO structure

TABLE XII
TESTS OF RESIDUALS FROM VOLTAGES PREDICTIONS USING DMDC TECHNIQUE AND VALIDATION DATASET OF SELECTED REGRESSORS IN MIMO STRUCTURE

Evaluation	ΔV S85C	ΔV S60C
Anderson-Darling test	Failure to reject H_1	Failure to reject H_1
Lilliefors test	Failure to reject H_1	Failure to reject H_1
One-sample Kolmogorov-Smirnov test	Failure to reject H_1	Failure to reject H_1
Durbin-Watson test	Reject H_1	Reject H_1
Durbin-Watson coefficient d	2.41	2.31
Ljung-Box Q-test	Failure to reject H_1	Failure to reject H_1
Engle's ARCH test	Failure to reject H_1	Failure to reject H_1
Ljung-Box Q-test using squared residuals	Failure to reject H_1	Failure to reject H_1

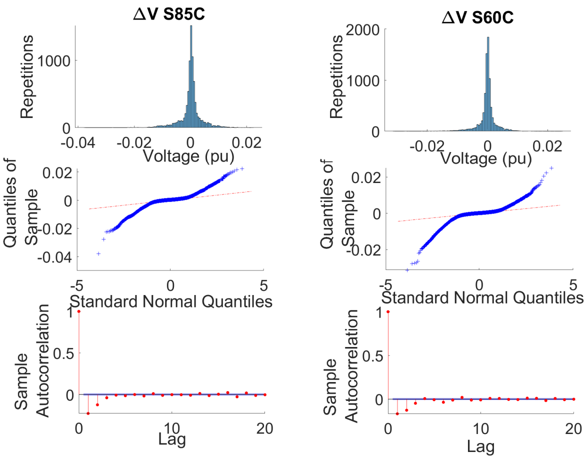


Fig. 19. Histogram, Q-Q plot and ACF of residuals from voltages predictions using NARX technique and training dataset of selected regressors in MIMO structure

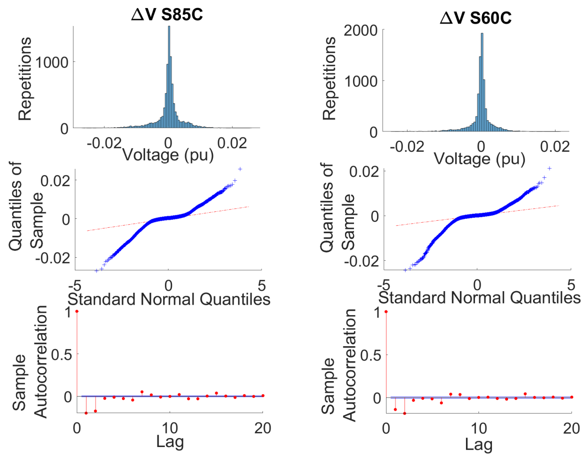


Fig. 20. Histogram, Q-Q plot and ACF of residuals from voltages predictions using NARX technique and validation dataset of selected regressors in MIMO structure

TABLE XIII
TESTS OF RESIDUALS FROM VOLTAGES PREDICTIONS USING NARX TECHNIQUE AND TRAINING DATASET OF SELECTED REGRESSORS IN MIMO STRUCTURE

Evaluation	ΔV S85C	ΔV S60C
Anderson-Darling test	Failure to reject H_1	Failure to reject H_1
Lilliefors test	Failure to reject H_1	Failure to reject H_1
One-sample Kolmogorov-Smirnov test	Failure to reject H_1	Failure to reject H_1
Durbin-Watson test	Reject H_1	Reject H_1
Durbin-Watson coefficient d	2.45	2.33
Ljung-Box Q-test	Failure to reject H_1	Failure to reject H_1
Engle's ARCH test	Failure to reject H_1	Failure to reject H_1
Ljung-Box Q-test using squared residuals	Failure to reject H_1	Failure to reject H_1

first approach with no regressor selection analysis. Additionally, even if the heteroscedasticity tests failed to reject the alternative

TABLE XIV
TESTS OF RESIDUALS FROM VOLTAGES PREDICTIONS USING NARX TECHNIQUE AND TRAINING DATASET OF SELECTED REGRESSORS IN MIMO STRUCTURE

Evaluation	ΔV S85C	ΔV S60C
Anderson-Darling test	Failure to reject H_1	Failure to reject H_1
Lilliefors test	Failure to reject H_1	Failure to reject H_1
One-sample Kolmogorov-Smirnov test	Failure to reject H_1	Failure to reject H_1
Durbin-Watson test	Reject H_1	Reject H_1
Durbin-Watson coefficient d	2.40	2.28
Ljung-Box Q-test	Failure to reject H_1	Failure to reject H_1
Engle's ARCH test	Failure to reject H_1	Failure to reject H_1
Ljung-Box Q-test using squared residuals	Failure to reject H_1	Failure to reject H_1

hypothesis, in the time series representation for all cases, the voltages residuals remained bounded at constant variance.

In the case of the obtained responses of NARX models, they also showed no relevant improvement in revising these assumptions. For the case of autocorrelation, one of the lags seems to be increased slightly compared to the first regression. That means that the Artificial Neural Network (ANN) structure used is not improving the non-linear behaviour obtained by this input simplification. However, a more complex structure is required (i.e., the number of neurons/layers implied in the construction of model).

After this analysis, we concluded that the selected regressors could not fully explain the system. Nevertheless, this is only required if the model must develop long-term voltage predictions. However, the obtained models are still doing a good job of getting one step ahead, and they are stable with all the advantages of a reduced-order linear representation.

D. *Obtaining prediction interval for the time-series modelling*

After analysis, previous steps obtained a linear representation of the voltage dynamics based on the selected regressors. Usually, time-series representations come with a prediction interval that gives a statistical boundary in which the obtained values lie with a specified probability [22]. According to (8) and (9), the prediction interval is not for the predicted voltage but the constructed linear model that relates the differenced regressors and voltages.

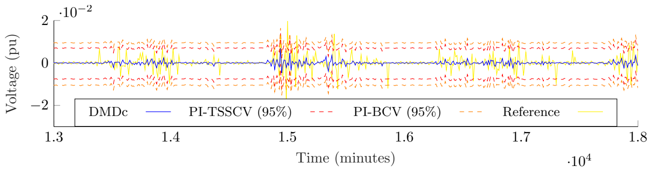
A prediction interval gives an interval within which the predicted value $\overline{\Delta y}(t_{k+1})$ from (9) is expected to lie with a specified probability. This value is commonly given for a 95% prediction interval for the h-step horizon [22].

Here, we used a Time-Series Split Cross-Validation (Time-Series Split Cross-Validation (TSSCV)) [63] and Blocked Cross-Validation (Blocked Cross-Validation (BCV)) [64] to produce the prediction intervals.

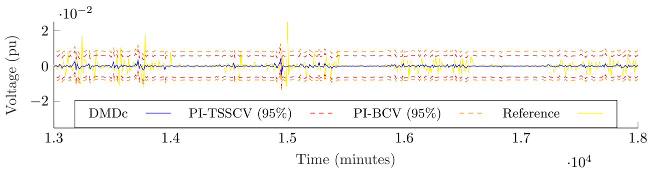
In order to produce the residuals for both methods, we considered the full dataset (i.e., 1000 days) as a reference with B amount of repetitions. Results are summarised in Table XV. A representative portion of data results are presented in Figure 21.

TABLE XV
PREDICTION INTERVALS AND COMPUTATION TIMES OBTAINED FOR THE MODEL DMDC IN MIMO STRUCTURE

	TSSCV		BCV	
	ΔV S85C	ΔV S60C	ΔV S85C	ΔV S60C
B = 10000	[-0.0075 , 0.0070]	[-0.0062 , 0.0058]	[-0.0105 , 0.0094]	[-0.0079 , 0.0084]
Time$_{B_{10000}}$ (min)	83.41		73.55	
B = 1000	[-0.0076 , 0.0070]	[-0.0062 , 0.0058]	[-0.0105 , 0.0095]	[-0.0078 , 0.0084]
Time$_{B_{1000}}$ (min)	8.82		7.82	



(a) ΔV S85C



(b) ΔV S60C

Fig. 21. Portion of voltage variation predictions 1 step ahead and prediction intervals using selected regressors in MIMO structure

These results show that the actual values remain within the boundaries defined in the prediction intervals on each structure. The margin obtained from BCV is wider than the one obtained from TSSCV, and both results remain in the 95% of confidence, while the computational time for BCV is slightly lower than TSSCV. Both methods showed similar results in the obtained prediction intervals.

V. DISCUSSION

The results showed that data could be used to describe spatial-temporal perturbations in the distribution system. The use of M_P and M_Q and the covariance can define relevant characteristics of the system, such as the size of perturbation and the distance and impacted nodes. Since only closer nodes to the perturbation can be considered (by defining covariance threshold), these characteristics are extracted only for relevant nodes, reducing the model's complexity. Also, voltage magnitude analysis provides valuable information due to the unbalanced electromagnetic compensation in all three phases. These components can be potentially used in constructing control models as the input vector u and the measured voltage from selected nodes as the output vector y.

The proposed methodology showed that the analysis of measurable data helps build a good state-space model based on a data-driven approach. The flexibility of this methodology allows using different regressions approaches and model structures.

Figure 21 can help to better understand the obtained results after the proposed method. Unfortunately for the selected regressors, it is not possible yet to predict a big swing of power-voltage change, which is reflected in the moment when the model cannot follow the substantial change in the voltage from the reference case. Nevertheless, under the previous assumption of constant variance (failed in the test but observed graphically) after analysing residuals, it is shown that even these extreme cases are still within the prediction interval boundaries. As stated before, one solution is exploring other possible regressors that help detect these dynamics quicker than the one modelled in this approach. Another possible and compatible solution would be integrating another model that helps explain some of the dynamics to be modelled and predicted.

Since models are obtained in state-space representation, suitable applications can be implemented to produce a linear control approach. Additionally, this linear state-space representation can be integrated with Kalman filtering approaches that can increase the performance of the prediction by filtering and smoothing the responses. For this, the assumption of independent and identically distributed random variables and normality in the inputs would be required to explore more carefully. An alternative could be the integration of Extended Kalman Filter (EKF) and Unscented Kalman Filter (UKF), which consider a non-optimised linear model and non-Gaussian variables.

Future work suggested after this research includes the integration of different exogenous variables that helps improve the explanation of the obtained linear model (and the assumption in the residuals). Additionally, the proof-of-concept for implementating this approach in a control strategy that catches relevant dynamics in the voltage control problem is suggested to be the next step and validate its effectiveness in a real-time model application.

VI. CONCLUSIONS

This paper proposed a data-driven approach to augment the analysis of the time-series measured data by modelling approach. Here, we contrast response analysis of static and time-variant responses to define relevant lags, using cross-correlation analysis and contrasted with Granger-causality analysis. Later, we propose a linear *data-driven* approach to get reduced-order representation of the distribution systems considering exogenous variables to predict voltage one step ahead.

A deep analysis of the general case study scenario and a discussion of measurable variables are presented and their meaning to catch spatial-temporal characteristics of the dynamics associated with the voltage control problem. These dynamics represent the interaction between the electric system, the load consumption behaviour, and the energy generation behaviour, which constantly evolves.

Nevertheless, some scenarios with limited measured data were hard to deal with, and additional inputs are required to develop an accurate control model. The proposed data-driven technique can reduce model complexity by defining a criterion for system clustering and then being integrated with multiple input/output regression methods to define control models. Several approaches for modelling use techniques to reduce the order (degree of complexity) that brings no physical meaning. There are hard to understand in a simple way for distribution system operators. The primary motivation is to enable researchers to define a reference on the characterisation of critical parameters relevant to constructing time-series control models without losing the distribution system's physical interpretation.

ACKNOWLEDGMENT

This work was sponsored by the University of Sheffield Department of Automatic and Control System Engineering Ph.D. fund, and Departamento Administrativo de Ciencia, Tecnología e Innovación (Colciencias).

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Appendix E

IEEE 123-nodes Feeder - Reference data

Rated voltage (line-to-line): 4160V

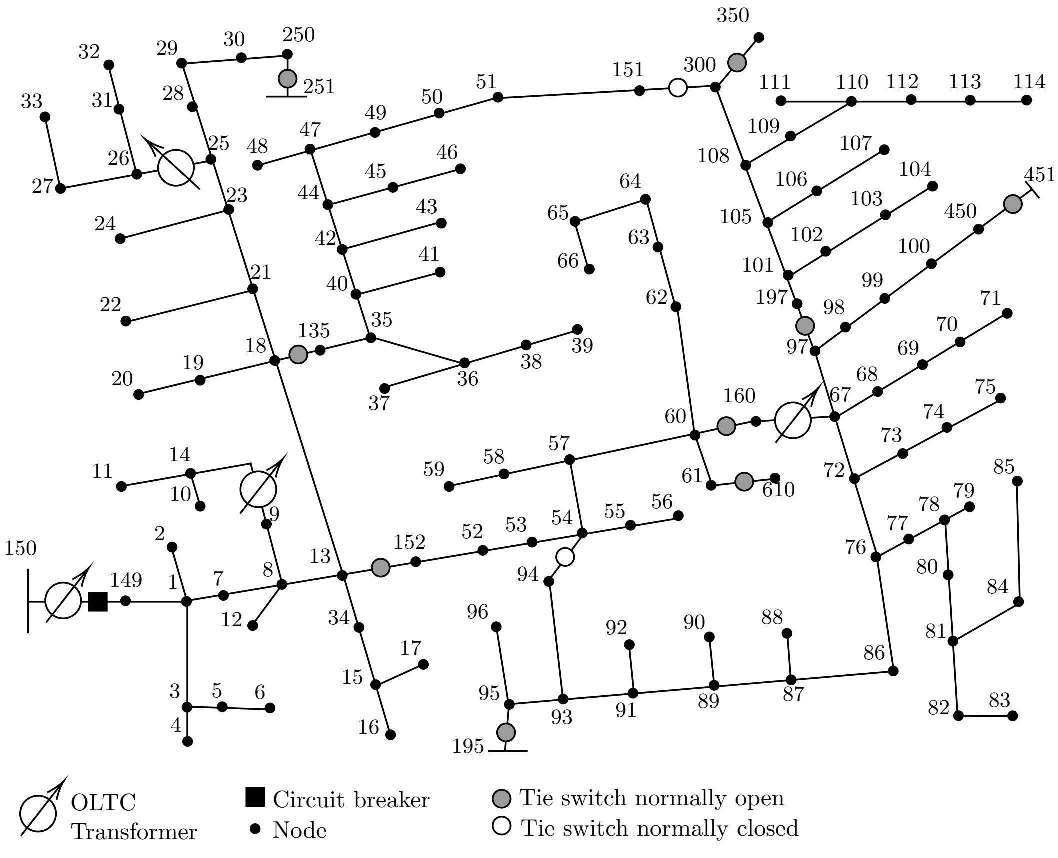

Figure E.1: IEEE 123-node unbalanced distribution system used as reference for this thesis

Table E.1: Line Segment Data

Node 1	Node 2	Length (ft.)	Config.	Node 1	Node 2	Length (ft.)	Config.
1	2	175	10	60	61	550	5
1	3	250	11	60	62	250	12
1	7	300	1	62	63	175	12
3	4	200	11	63	64	350	12
3	5	325	11	64	65	425	12
5	6	250	11	65	66	325	12
7	8	200	1	67	68	200	9
8	12	225	10	67	72	275	3
8	9	225	9	67	97	250	3
8	13	300	1	68	69	275	9
9	14	425	9	69	70	325	9
13	34	150	11	70	71	275	9
13	18	825	2	72	73	275	11
14	11	250	9	72	76	200	3
14	10	250	9	73	74	350	11
15	16	375	11	74	75	400	11
15	17	350	11	76	77	400	6
18	19	250	9	76	86	700	3
18	21	300	2	77	78	100	6
19	20	325	9	78	79	225	6
21	22	525	10	78	80	475	6
21	23	250	2	80	81	475	6
23	24	550	11	81	82	250	6
23	25	275	2	81	84	675	11
25	26	350	7	82	83	250	6
25	28	200	2	84	85	475	11
26	27	275	7	86	87	450	6
26	31	225	11	87	88	175	9
27	33	500	9	87	89	275	6
28	29	300	2	89	90	225	10
29	30	350	2	89	91	225	6
30	250	200	2	91	92	300	11
31	32	300	11	91	93	225	6

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Node 1	Node 2	Length (ft.)	Config.	Node 1	Node 2	Length (ft.)	Config.
34	15	100	11	93	94	275	9
35	36	650	8	93	95	300	6
35	40	250	1	95	96	200	10
36	37	300	9	97	98	275	3
36	38	250	10	98	99	550	3
38	39	325	10	99	100	300	3
40	41	325	11	100	450	800	3
40	42	250	1	101	102	225	11
42	43	500	10	101	105	275	3
42	44	200	1	102	103	325	11
44	45	200	9	103	104	700	11
44	47	250	1	105	106	225	10
45	46	300	9	105	108	325	3
47	48	150	4	106	107	575	10
47	49	250	4	108	109	450	9
49	50	250	4	108	300	1000	3
50	51	250	4	109	110	300	9
51	151	500	4	110	111	575	9
52	53	200	1	110	112	125	9
53	54	125	1	112	113	525	9
54	55	275	1	113	114	325	9
54	57	350	3	135	35	375	4
55	56	275	1	149	1	400	1
57	58	250	10	152	52	400	1
57	60	750	3	160	67	350	6
58	59	250	10	197	101	250	3

Table E.2: Three Phase Switches

Node A	Node B	Normal
13	152	closed
18	135	closed
60	160	closed

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Node A	Node B	Normal
61	610	closed
97	197	closed
150	149	closed
250	251	open
450	451	open
54	94	open
151	300	open
300	350	open

Table E.3: Overhead Line Configurations

Config.	Phasing	Phase Cond. (ACSR)	Neutral Cond. (ACSR)	Spacing (ID)
1	A B C N	336,400 26/7	4/0 6/1	500
2	C A B N	336,400 26/7	4/0 6/1	500
3	B C A N	336,400 26/7	4/0 6/1	500
4	C B A N	336,400 26/7	4/0 6/1	500
5	B A C N	336,400 26/7	4/0 6/1	500
6	A C B N	336,400 26/7	4/0 6/1	500
7	A C N	336,400 26/7	4/0 6/1	505
8	A B N	336,400 26/7	4/0 6/1	505
9	A N	1/0	1/0	510
10	B N	1/0	1/0	510
11	C N	1/0	1/0	510

Table E.4: Underground Line Configuration

Config.	Phasing	Cable	Spacing (ID)
12	A B C	1/0 AA, CN	515

Table E.5: Transformer Data

	kVA	kV-high	kV-low	R - %	X - %
Substation	5,000	115 - D	4.16 Gr-W	1	8
XFM - 1	150	4.16 - D	.480 - D	1.27	2.72

Table E.6: Shunt Capacitors

Node	Ph-A (kVAr)	Ph-B (kVAr)	Ph-C (kVAr)
83	200	200	200
88	50	0	0
90	0	50	0
92	0	0	50
Total	250	250	250

Table E.7: Spot Load Data

Node	Load Model	Ph-1 (kW)	Ph-1 (kVAr)	Ph-2 (kW)	Ph-2 (kVAr)	Ph-3 (kW)	Ph-3 (kVAr)
1	Y-PQ	40	20	0	0	0	0
2	Y-PQ	0	0	20	10	0	0
4	Y-PQ	0	0	0	0	40	20
5	Y-PQ	0	0	0	0	20	10
6	Y-PQ	0	0	0	0	40	20
7	Y-PQ	20	10	0	0	0	0
9	Y-PQ	40	20	0	0	0	0
10	Y-PQ	20	10	0	0	0	0
11	Y-PQ	40	20	0	0	0	0
12	Y-PQ	0	0	20	10	0	0
16	Y-PQ	0	0	0	0	40	20
17	Y-PQ	0	0	0	0	20	10
19	Y-PQ	40	20	0	0	0	0
20	Y-PQ	40	20	0	0	0	0
22	Y-PQ	0	0	40	20	0	0
24	Y-PQ	0	0	0	0	40	20
28	Y-PQ	40	20	0	0	0	0
29	Y-PQ	40	20	0	0	0	0

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Node	Load Model	Ph-1 (kW)	Ph-1 (kVAr)	Ph-2 (kW)	Ph-2 (kVAr)	Ph-3 (kW)	Ph-3 (kVAr)
30	Y-PQ	0	0	0	0	40	20
31	Y-PQ	0	0	0	0	20	10
32	Y-PQ	0	0	0	0	20	10
33	Y-PQ	40	20	0	0	0	0
34	Y-PQ	0	0	0	0	40	20
35	D-PQ	40	20	0	0	0	0
37	Y-PQ	40	20	0	0	0	0
38	Y-PQ	0	0	20	10	0	0
39	Y-PQ	0	0	20	10	0	0
41	Y-PQ	0	0	0	0	20	10
42	Y-PQ	20	10	0	0	0	0
43	Y-PQ	0	0	40	20	0	0
45	Y-PQ	20	10	0	0	0	0
46	Y-PQ	20	10	0	0	0	0
47	Y-PQ	35	25	35	25	35	25
48	Y-PQ	70	50	70	50	70	50
49	Y-PQ	35	25	70	50	35	20
50	Y-PQ	0	0	0	0	40	20
51	Y-PQ	20	10	0	0	0	0
52	Y-PQ	40	20	0	0	0	0
53	Y-PQ	40	20	0	0	0	0
55	Y-PQ	20	10	0	0	0	0
56	Y-PQ	0	0	20	10	0	0
58	Y-PQ	0	0	20	10	0	0
59	Y-PQ	0	0	20	10	0	0
60	Y-PQ	20	10	0	0	0	0
62	Y-PQ	0	0	0	0	40	20
63	Y-PQ	40	20	0	0	0	0
64	Y-PQ	0	0	75	35	0	0
65	D-PQ	35	25	35	25	70	50
66	Y-PQ	0	0	0	0	75	35
68	Y-PQ	20	10	0	0	0	0
69	Y-PQ	40	20	0	0	0	0

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Node	Load Model	Ph-1 (kW)	Ph-1 (kVAr)	Ph-2 (kW)	Ph-2 (kVAr)	Ph-3 (kW)	Ph-3 (kVAr)
70	Y-PQ	20	10	0	0	0	0
71	Y-PQ	40	20	0	0	0	0
73	Y-PQ	0	0	0	0	40	20
74	Y-PQ	0	0	0	0	40	20
75	Y-PQ	0	0	0	0	40	20
76	D-PQ	105	80	70	50	70	50
77	Y-PQ	0	0	40	20	0	0
79	Y-PQ	40	20	0	0	0	0
80	Y-PQ	0	0	40	20	0	0
82	Y-PQ	40	20	0	0	0	0
83	Y-PQ	0	0	0	0	20	10
84	Y-PQ	0	0	0	0	20	10
85	Y-PQ	0	0	0	0	40	20
86	Y-PQ	0	0	20	10	0	0
87	Y-PQ	0	0	40	20	0	0
88	Y-PQ	40	20	0	0	0	0
90	Y-PQ	0	0	40	20	0	0
92	Y-PQ	0	0	0	0	40	20
94	Y-PQ	40	20	0	0	0	0
95	Y-PQ	0	0	20	10	0	0
96	Y-PQ	0	0	20	10	0	0
98	Y-PQ	40	20	0	0	0	0
99	Y-PQ	0	0	40	20	0	0
100	Y-PQ	0	0	0	0	40	20
102	Y-PQ	0	0	0	0	20	10
103	Y-PQ	0	0	0	0	40	20
104	Y-PQ	0	0	0	0	40	20
106	Y-PQ	0	0	40	20	0	0
107	Y-PQ	0	0	40	20	0	0
109	Y-PQ	40	20	0	0	0	0
111	Y-PQ	20	10	0	0	0	0
112	Y-PQ	20	10	0	0	0	0
113	Y-PQ	40	20	0	0	0	0

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Node	Load Model	Ph-1 (kW)	Ph-1 (kVAr)	Ph-2 (kW)	Ph-2 (kVAr)	Ph-3 (kW)	Ph-3 (kVAr)
114	Y-PQ	20	10	0	0	0	0
Total		1420	775	915	515	1155	630

Appendix F

Results of simulations scenarios presented on Chapter 3 - Voltage magnitudes and Pearson coefficient calculations

F.0.1 Considering OLTCs connected without capacitors compensation

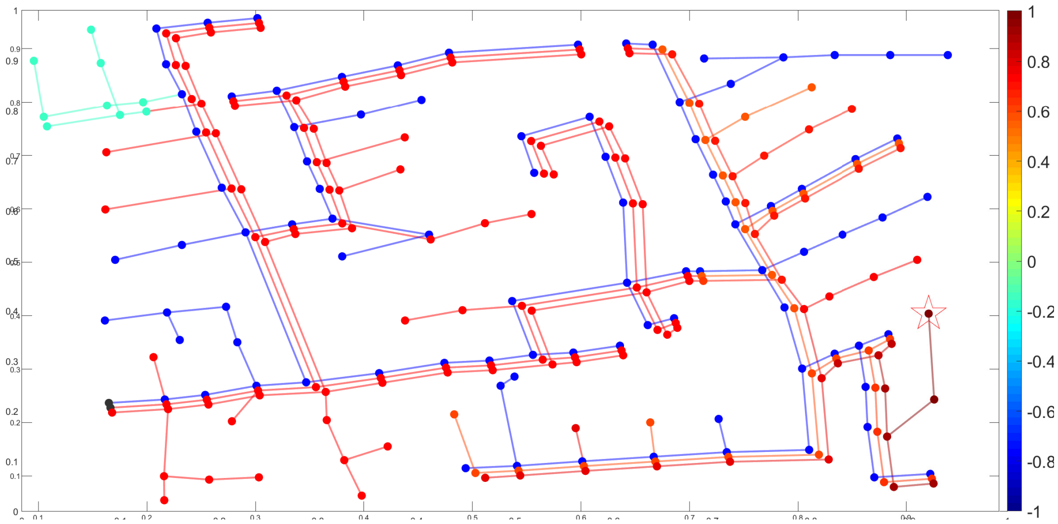

Figure F.1: Graphical representation of Pearson coefficients obtained for Single-phase perturbation at node 85, phase C. Load consumption with a rated power of 400 kW and 200 kVAr. (Scenario S1)

Table F.1: Voltage magnitudes and Pearson coefficient values obtained for Scenario S1

Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S149.A	1.006	1.006	1.006	1.006	1.006	1.006	1.006	NaN
S1.A	1.008	1.008	1.007	1.007	1.007	1.006	1.006	-0.97
S149.B	1.006	1.006	1.006	1.006	1.006	1.006	1.006	NaN
S1.B	1.006	1.006	1.006	1.006	1.006	1.006	1.006	0.96
S149.C	1.006	1.006	1.006	1.006	1.006	1.006	1.006	0.97
S1.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	0.97
S2.B	1.006	1.006	1.006	1.006	1.006	1.006	1.006	0.96
S3.C	1.002	1.003	1.004	1.004	1.004	1.006	1.006	0.97
S7.A	1.009	1.009	1.008	1.008	1.008	1.006	1.006	-0.97
S7.B	1.006	1.006	1.006	1.006	1.006	1.006	1.006	0.96
S7.C	0.999	1.000	1.003	1.003	1.003	1.006	1.006	0.97
S4.C	1.002	1.003	1.004	1.004	1.004	1.006	1.006	0.97
S5.C	1.002	1.003	1.004	1.004	1.004	1.006	1.006	0.97
S6.C	1.002	1.003	1.004	1.004	1.004	1.006	1.006	0.97
S8.A	1.010	1.010	1.008	1.008	1.008	1.006	1.006	-0.97
S8.B	1.005	1.006	1.006	1.006	1.006	1.006	1.006	0.96
S8.C	0.997	0.998	1.002	1.002	1.002	1.006	1.006	0.97
S12.B	1.005	1.006	1.006	1.006	1.006	1.006	1.006	0.96
S9.A	1.010	1.010	1.008	1.008	1.008	1.006	1.006	-0.97
S13.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.97
S13.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.96
S13.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.97
S9r.A	0.997	0.997	0.995	0.995	0.995	0.994	0.994	-0.97
S14.A	0.997	0.997	0.995	0.995	0.995	0.994	0.994	-0.97
S34.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.97
S18.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.97
S18.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.96
S18.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.97
S11.A	0.997	0.997	0.995	0.995	0.995	0.994	0.994	-0.97
S10.A	0.997	0.997	0.995	0.995	0.995	0.994	0.994	-0.97
S15.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.97
S16.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.97
S17.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.97
S19.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.97
S21.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.97
S21.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.96
S21.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.97
S20.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.97

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S22.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.96
S23.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.97
S23.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.96
S23.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.97
S24.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.97
S25.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.97
S25.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.96
S25.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.97
S25r.A	0.999	0.998	0.996	0.996	0.996	1.000	1.000	0.21
S26.A	0.999	0.998	0.996	0.996	0.996	1.000	1.000	0.21
S25r.C	1.000	1.001	1.001	1.001	1.001	1.000	0.999	-0.56
S26.C	1.000	1.001	1.001	1.001	1.001	1.000	0.999	-0.56
S28.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.97
S28.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.96
S28.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.97
S27.A	0.999	0.998	0.996	0.996	0.996	1.000	1.000	0.21
S27.C	1.000	1.001	1.001	1.001	1.001	1.000	0.999	-0.56
S31.C	1.000	1.001	1.001	1.001	1.001	1.000	0.999	-0.56
S33.A	0.999	0.998	0.996	0.996	0.996	1.000	1.000	0.21
S29.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.97
S29.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.96
S29.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.97
S30.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.97
S30.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.96
S30.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.97
S250.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.97
S250.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.96
S250.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.97
S32.C	1.000	1.001	1.001	1.001	1.001	1.000	0.999	-0.56
S35.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.97
S36.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.97
S35.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.96
S36.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.96
S35.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.97
S40.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.97
S40.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.96
S40.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.97
S37.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.97
S38.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.96
S39.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.96

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S41.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.97
S42.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.97
S42.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.96
S42.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.97
S43.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.96
S44.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.97
S44.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.96
S44.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.97
S45.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.97
S47.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.97
S47.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.96
S47.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.97
S46.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.97
S48.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.97
S48.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.96
S48.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.97
S49.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.97
S49.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.96
S49.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.97
S50.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.97
S50.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.96
S50.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.97
S51.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.97
S51.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.96
S51.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.97
S151.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.97
S151.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.96
S151.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.97
S52.A	1.013	1.013	1.009	1.009	1.009	1.007	1.007	-0.97
S53.A	1.014	1.013	1.010	1.010	1.010	1.007	1.007	-0.97
S52.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.96
S53.B	1.005	1.005	1.005	1.005	1.005	1.006	1.006	0.96
S52.C	0.990	0.991	0.999	0.999	0.999	1.006	1.006	0.97
S53.C	0.988	0.989	0.998	0.998	0.998	1.006	1.005	0.97
S54.A	1.014	1.014	1.010	1.010	1.010	1.007	1.007	-0.97
S54.B	1.005	1.005	1.005	1.005	1.005	1.006	1.006	0.96
S54.C	0.987	0.988	0.998	0.998	0.998	1.006	1.005	0.97
S55.A	1.014	1.014	1.010	1.010	1.010	1.007	1.007	-0.97
S55.B	1.005	1.005	1.005	1.005	1.005	1.006	1.006	0.96
S55.C	0.987	0.988	0.998	0.998	0.998	1.006	1.005	0.97

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S57.A	1.016	1.015	1.011	1.011	1.011	1.007	1.007	-0.97
S57.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	0.96
S57.C	0.983	0.985	0.996	0.996	0.996	1.005	1.005	0.97
S56.A	1.014	1.014	1.010	1.010	1.010	1.007	1.007	-0.97
S56.B	1.005	1.005	1.005	1.005	1.005	1.006	1.006	0.96
S56.C	0.987	0.988	0.998	0.998	0.998	1.006	1.005	0.97
S58.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	0.96
S60.A	1.020	1.019	1.012	1.012	1.012	1.007	1.007	-0.97
S60.B	1.003	1.003	1.005	1.005	1.005	1.006	1.006	0.96
S60.C	0.976	0.978	0.993	0.993	0.993	1.005	1.005	0.97
S59.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	0.96
S61.A	1.020	1.019	1.012	1.012	1.012	1.007	1.007	-0.97
S61.B	1.003	1.003	1.005	1.005	1.005	1.006	1.006	0.96
S61.C	0.976	0.978	0.993	0.993	0.993	1.005	1.005	0.97
S62.A	1.020	1.019	1.012	1.012	1.012	1.007	1.007	-0.97
S62.B	1.003	1.003	1.005	1.005	1.005	1.006	1.006	0.96
S62.C	0.976	0.978	0.993	0.993	0.993	1.005	1.005	0.97
S63.A	1.020	1.019	1.012	1.012	1.012	1.007	1.007	-0.97
S63.B	1.003	1.003	1.005	1.005	1.005	1.006	1.006	0.96
S63.C	0.976	0.978	0.993	0.993	0.993	1.005	1.005	0.97
S64.A	1.020	1.019	1.012	1.012	1.012	1.007	1.007	-0.97
S64.B	1.003	1.003	1.005	1.005	1.005	1.006	1.006	0.96
S64.C	0.976	0.978	0.993	0.993	0.993	1.005	1.005	0.97
S65.A	1.020	1.019	1.012	1.012	1.012	1.007	1.007	-0.97
S65.B	1.003	1.003	1.005	1.005	1.005	1.006	1.006	0.96
S65.C	0.976	0.978	0.993	0.993	0.993	1.005	1.005	0.97
S66.A	1.020	1.019	1.012	1.012	1.012	1.007	1.007	-0.97
S66.B	1.003	1.003	1.005	1.005	1.005	1.006	1.006	0.96
S66.C	0.976	0.978	0.993	0.993	0.993	1.005	1.005	0.97
S67.A	1.009	1.001	0.994	0.994	0.994	0.994	0.994	-0.90
S68.A	1.009	1.001	0.994	0.994	0.994	0.994	0.994	-0.90
S67.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	0.96
S67.C	0.991	1.006	1.004	1.003	1.003	1.005	1.005	0.76
S72.A	1.010	1.002	0.995	0.995	0.995	0.994	0.994	-0.92
S72.B	0.996	0.997	0.998	0.998	0.998	1.000	1.000	0.96
S72.C	0.988	1.003	1.002	1.002	1.002	1.005	1.005	0.85
S97.A	1.009	1.001	0.994	0.994	0.994	0.994	0.994	-0.90
S97.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	0.96
S97.C	0.991	1.006	1.004	1.003	1.003	1.005	1.005	0.76
S69.A	1.009	1.001	0.994	0.994	0.994	0.994	0.994	-0.90

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S70.A	1.009	1.001	0.994	0.994	0.994	0.994	0.994	-0.90
S71.A	1.009	1.001	0.994	0.994	0.994	0.994	0.994	-0.90
S73.C	0.988	1.003	1.002	1.002	1.002	1.005	1.005	0.85
S76.A	1.011	1.003	0.995	0.995	0.995	0.994	0.994	-0.93
S76.B	0.996	0.996	0.998	0.998	0.998	1.000	1.000	0.96
S76.C	0.986	1.001	1.001	1.001	1.001	1.005	1.005	0.89
S74.C	0.988	1.003	1.002	1.002	1.002	1.005	1.005	0.85
S75.C	0.988	1.003	1.002	1.002	1.002	1.005	1.005	0.85
S77.A	1.013	1.005	0.996	0.996	0.996	0.994	0.995	-0.95
S77.B	0.996	0.996	0.998	0.998	0.998	1.000	1.000	0.96
S77.C	0.982	0.998	1.000	1.000	1.000	1.005	1.004	0.94
S86.A	1.011	1.003	0.995	0.995	0.995	0.994	0.994	-0.93
S86.B	0.996	0.996	0.998	0.998	0.998	1.000	1.000	0.96
S86.C	0.986	1.001	1.001	1.001	1.001	1.005	1.005	0.89
S78.A	1.014	1.006	0.997	0.997	0.997	0.994	0.995	-0.95
S78.B	0.996	0.996	0.998	0.998	0.998	1.000	1.000	0.96
S78.C	0.981	0.997	0.999	0.999	0.999	1.005	1.004	0.95
S79.A	1.014	1.006	0.997	0.997	0.997	0.994	0.995	-0.95
S79.B	0.996	0.996	0.998	0.998	0.998	1.000	1.000	0.96
S79.C	0.981	0.997	0.999	0.999	0.999	1.005	1.004	0.95
S80.A	1.016	1.008	0.998	0.998	0.998	0.995	0.995	-0.96
S80.B	0.995	0.996	0.998	0.997	0.997	1.000	1.000	0.96
S80.C	0.977	0.993	0.997	0.997	0.997	1.004	1.004	0.97
S81.A	1.017	1.009	0.998	0.998	0.998	0.995	0.995	-0.97
S81.B	0.995	0.995	0.997	0.997	0.997	1.000	1.000	0.96
S81.C	0.975	0.991	0.996	0.996	0.996	1.004	1.004	0.98
S82.A	1.017	1.009	0.998	0.998	0.998	0.995	0.995	-0.97
S82.B	0.995	0.995	0.997	0.997	0.997	1.000	1.000	0.96
S82.C	0.975	0.991	0.996	0.996	0.996	1.004	1.004	0.98
S84.C	0.962	0.979	0.990	0.990	0.990	1.004	1.004	1.00
S83.A	1.017	1.009	0.998	0.998	0.998	0.995	0.995	-0.97
S83.B	0.995	0.995	0.997	0.997	0.997	1.000	1.000	0.96
S83.C	0.975	0.991	0.996	0.996	0.996	1.004	1.004	0.98
S85.C	0.953	0.971	0.986	0.986	0.986	1.004	1.003	1.00
S87.A	1.011	1.003	0.995	0.995	0.995	0.994	0.994	-0.93
S87.B	0.996	0.996	0.998	0.998	0.998	1.000	1.000	0.96
S87.C	0.986	1.001	1.001	1.001	1.001	1.005	1.005	0.89
S88.A	1.011	1.003	0.995	0.995	0.995	0.994	0.994	-0.93
S89.A	1.011	1.003	0.995	0.995	0.995	0.994	0.994	-0.93
S89.B	0.996	0.996	0.998	0.998	0.998	1.000	1.000	0.96

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S89.C	0.986	1.001	1.001	1.001	1.001	1.005	1.005	0.89
S90.B	0.996	0.996	0.998	0.998	0.998	1.000	1.000	0.96
S91.A	1.011	1.003	0.995	0.995	0.995	0.994	0.994	-0.93
S91.B	0.996	0.996	0.998	0.998	0.998	1.000	1.000	0.96
S91.C	0.986	1.001	1.001	1.001	1.001	1.005	1.005	0.89
S92.C	0.986	1.001	1.001	1.001	1.001	1.005	1.005	0.89
S93.A	1.011	1.003	0.995	0.995	0.995	0.994	0.994	-0.93
S93.B	0.996	0.996	0.998	0.998	0.998	1.000	1.000	0.96
S93.C	0.986	1.001	1.001	1.001	1.001	1.005	1.005	0.89
S94.A	1.011	1.003	0.995	0.995	0.995	0.994	0.994	-0.93
S95.A	1.011	1.003	0.995	0.995	0.995	0.994	0.994	-0.93
S95.B	0.996	0.996	0.998	0.998	0.998	1.000	1.000	0.96
S95.C	0.986	1.001	1.001	1.001	1.001	1.005	1.005	0.89
S96.B	0.996	0.996	0.998	0.998	0.998	1.000	1.000	0.96
S98.A	1.009	1.001	0.994	0.994	0.994	0.994	0.994	-0.90
S98.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	0.96
S98.C	0.991	1.006	1.004	1.003	1.003	1.005	1.005	0.76
S99.A	1.009	1.001	0.994	0.994	0.994	0.994	0.994	-0.90
S99.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	0.96
S99.C	0.991	1.006	1.004	1.003	1.003	1.005	1.005	0.76
S100.A	1.009	1.001	0.994	0.994	0.994	0.994	0.994	-0.90
S100.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	0.96
S100.C	0.991	1.006	1.004	1.003	1.003	1.005	1.005	0.76
S450.A	1.009	1.001	0.994	0.994	0.994	0.994	0.994	-0.90
S450.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	0.96
S450.C	0.991	1.006	1.004	1.003	1.003	1.005	1.005	0.76
S197.A	1.009	1.001	0.994	0.994	0.994	0.994	0.994	-0.90
S101.A	1.009	1.001	0.994	0.994	0.994	0.994	0.994	-0.90
S197.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	0.96
S101.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	0.96
S197.C	0.991	1.006	1.004	1.003	1.003	1.005	1.005	0.76
S101.C	0.991	1.006	1.004	1.003	1.003	1.005	1.005	0.76
S102.C	0.991	1.006	1.004	1.003	1.003	1.005	1.005	0.76
S105.A	1.009	1.001	0.994	0.994	0.994	0.994	0.994	-0.90
S105.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	0.96
S105.C	0.991	1.006	1.004	1.003	1.003	1.005	1.005	0.76
S103.C	0.991	1.006	1.004	1.003	1.003	1.005	1.005	0.76
S104.C	0.991	1.006	1.004	1.003	1.003	1.005	1.005	0.76
S106.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	0.96
S108.A	1.009	1.001	0.994	0.994	0.994	0.994	0.994	-0.90

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S108.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	0.96
S108.C	0.991	1.006	1.004	1.003	1.003	1.005	1.005	0.76
S107.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	0.96
S109.A	1.009	1.001	0.994	0.994	0.994	0.994	0.994	-0.90
S300.A	1.009	1.001	0.994	0.994	0.994	0.994	0.994	-0.90
S300.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	0.96
S300.C	0.991	1.006	1.004	1.003	1.003	1.005	1.005	0.76
S110.A	1.009	1.001	0.994	0.994	0.994	0.994	0.994	-0.90
S111.A	1.009	1.001	0.994	0.994	0.994	0.994	0.994	-0.90
S112.A	1.009	1.001	0.994	0.994	0.994	0.994	0.994	-0.90
S113.A	1.009	1.001	0.994	0.994	0.994	0.994	0.994	-0.90
S114.A	1.009	1.001	0.994	0.994	0.994	0.994	0.994	-0.90
S135.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.97
S135.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.96
S135.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.97
S152.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.97
S152.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.96
S152.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.97
S160r.A	1.007	1.000	0.993	0.993	0.993	0.994	0.994	-0.86
S160r.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	0.96
S160r.C	0.994	1.009	1.005	1.005	1.005	1.005	1.005	0.60
S160.A	1.020	1.019	1.012	1.012	1.012	1.007	1.007	-0.97
S160.B	1.003	1.003	1.005	1.005	1.005	1.006	1.006	0.96
S160.C	0.976	0.978	0.993	0.993	0.993	1.005	1.005	0.97
S61s.A	1.020	1.019	1.012	1.012	1.012	1.007	1.007	-0.97
S61s.B	1.003	1.003	1.005	1.005	1.005	1.006	1.006	0.96
S61s.C	0.976	0.978	0.993	0.993	0.993	1.005	1.005	0.97
S300 open.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.97
S300 open.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.96
S300 open.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.97
S94 open.A	1.014	1.014	1.010	1.010	1.010	1.007	1.007	-0.97

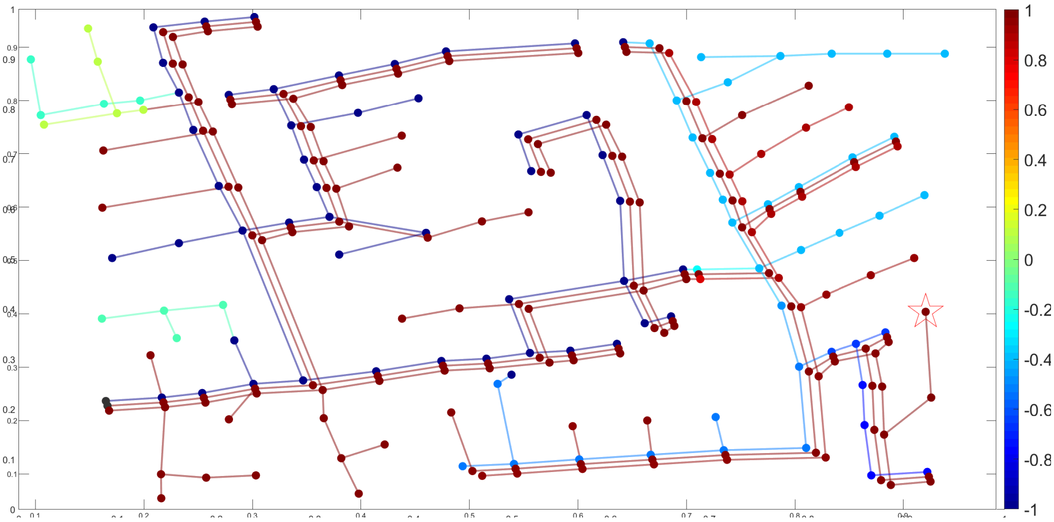

Figure F.2: Graphical representation of Pearson coefficients obtained for Single-phase perturbation at node 85, phase C. Photovoltaic generation with a rated power of 400 kVA at unity power factor. (Scenario S2)

Table F.2: Voltage magnitudes and Pearson coefficient values obtained for Scenario S2

Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
S149.A	1.006	1.006	1.006	1.006	1.006	1.006	1.006	NaN
S1.A	1.004	1.004	1.004	1.005	1.006	1.004	1.004	-0.99
S149.B	1.006	1.006	1.006	1.006	1.006	1.006	1.006	NaN
S1.B	1.007	1.007	1.007	1.007	1.006	1.007	1.007	0.93
S149.C	1.006	1.006	1.006	1.006	1.006	1.006	1.006	1.00
S1.C	1.011	1.010	1.011	1.009	1.008	1.011	1.011	1.00
S2.B	1.007	1.007	1.007	1.007	1.006	1.007	1.007	0.93
S3.C	1.011	1.010	1.011	1.009	1.008	1.011	1.011	1.00
S7.A	1.003	1.003	1.003	1.004	1.005	1.003	1.003	-0.99
S7.B	1.007	1.007	1.007	1.007	1.007	1.007	1.007	0.93
S7.C	1.014	1.013	1.014	1.011	1.009	1.014	1.014	1.00
S4.C	1.011	1.010	1.011	1.009	1.008	1.011	1.011	1.00
S5.C	1.011	1.010	1.011	1.009	1.008	1.011	1.011	1.00
S6.C	1.011	1.010	1.011	1.009	1.008	1.011	1.011	1.00
S8.A	1.002	1.002	1.001	1.004	1.005	1.002	1.002	-0.99
S8.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S8.C	1.017	1.015	1.016	1.012	1.009	1.017	1.017	1.00
S12.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S9.A	1.002	1.002	1.001	1.004	1.005	1.002	1.002	-0.99

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
S13.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S13.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S13.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S9r.A	0.995	0.996	0.995	0.997	0.999	0.995	0.995	-0.99
S14.A	0.995	0.996	0.995	0.997	0.999	0.995	0.995	-0.99
S34.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S18.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S18.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S18.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S11.A	0.995	0.996	0.995	0.997	0.999	0.995	0.995	-0.99
S10.A	0.995	0.996	0.995	0.997	0.999	0.995	0.995	-0.99
S15.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S16.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S17.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S19.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S21.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S21.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S21.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S20.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S22.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S23.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S23.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S23.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S24.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S25.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S25.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S25.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S25r.A	1.000	1.000	1.000	1.003	0.998	1.000	1.000	0.07
S26.A	1.000	1.000	1.000	1.003	0.998	1.000	1.000	0.07
S25r.C	1.001	0.999	1.001	1.001	0.998	1.001	1.001	0.69
S26.C	1.001	0.999	1.001	1.001	0.998	1.001	1.001	0.69
S28.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S28.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S28.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S27.A	1.000	1.000	1.000	1.003	0.998	1.000	1.000	0.07
S27.C	1.001	0.999	1.001	1.001	0.998	1.001	1.001	0.69
S31.C	1.001	0.999	1.001	1.001	0.998	1.001	1.001	0.69
S33.A	1.000	1.000	1.000	1.003	0.998	1.000	1.000	0.07
S29.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S29.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
S29.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S30.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S30.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S30.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S250.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S250.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S250.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S32.C	1.001	0.999	1.001	1.001	0.998	1.001	1.001	0.69
S35.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S36.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S35.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S36.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S35.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S40.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S40.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S40.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S37.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S38.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S39.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S41.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S42.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S42.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S42.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S43.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S44.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S44.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S44.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S45.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S47.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S47.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S47.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S46.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S48.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S48.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S48.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S49.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S49.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S49.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S50.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S50.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
S50.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S51.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S51.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S51.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S151.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S151.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S151.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S52.A	0.998	0.998	0.998	1.002	1.004	0.998	0.998	-0.99
S53.A	0.997	0.998	0.997	1.001	1.003	0.997	0.997	-0.99
S52.B	1.009	1.009	1.009	1.008	1.007	1.009	1.009	0.93
S53.B	1.009	1.009	1.009	1.008	1.007	1.009	1.009	0.93
S52.C	1.025	1.023	1.024	1.016	1.012	1.025	1.025	1.00
S53.C	1.027	1.025	1.027	1.018	1.013	1.027	1.027	1.00
S54.A	0.996	0.997	0.996	1.001	1.003	0.996	0.996	-0.99
S54.B	1.009	1.009	1.010	1.008	1.007	1.009	1.009	0.93
S54.C	1.029	1.026	1.028	1.019	1.013	1.029	1.029	1.00
S55.A	0.996	0.997	0.996	1.001	1.003	0.996	0.996	-0.99
S55.B	1.009	1.009	1.010	1.008	1.007	1.009	1.009	0.93
S55.C	1.029	1.026	1.028	1.019	1.013	1.029	1.029	1.00
S57.A	0.994	0.995	0.994	0.999	1.003	0.994	0.994	-0.99
S57.B	1.010	1.010	1.011	1.008	1.007	1.010	1.010	0.93
S57.C	1.033	1.030	1.032	1.021	1.014	1.033	1.033	1.00
S56.A	0.996	0.997	0.996	1.001	1.003	0.996	0.996	-0.99
S56.B	1.009	1.009	1.010	1.008	1.007	1.009	1.009	0.93
S56.C	1.029	1.026	1.028	1.019	1.013	1.029	1.029	1.00
S58.B	1.010	1.010	1.011	1.008	1.007	1.010	1.010	0.93
S60.A	0.990	0.991	0.990	0.997	1.001	0.990	0.990	-0.99
S60.B	1.011	1.012	1.012	1.009	1.008	1.011	1.011	0.94
S60.C	1.042	1.037	1.041	1.026	1.017	1.042	1.042	1.00
S59.B	1.010	1.010	1.011	1.008	1.007	1.010	1.010	0.93
S61.A	0.990	0.991	0.990	0.997	1.001	0.990	0.990	-0.99
S61.B	1.011	1.012	1.012	1.009	1.008	1.011	1.011	0.94
S61.C	1.042	1.037	1.041	1.026	1.017	1.042	1.042	1.00
S62.A	0.990	0.991	0.990	0.997	1.001	0.990	0.990	-0.99
S62.B	1.011	1.012	1.012	1.009	1.008	1.011	1.011	0.94
S62.C	1.042	1.037	1.041	1.026	1.017	1.042	1.042	1.00
S63.A	0.990	0.991	0.990	0.997	1.001	0.990	0.990	-0.99
S63.B	1.011	1.012	1.012	1.009	1.008	1.011	1.011	0.94
S63.C	1.042	1.037	1.041	1.026	1.017	1.042	1.042	1.00
S64.A	0.990	0.991	0.990	0.997	1.001	0.990	0.990	-0.99

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
S64.B	1.011	1.012	1.012	1.009	1.008	1.011	1.011	0.94
S64.C	1.042	1.037	1.041	1.026	1.017	1.042	1.042	1.00
S65.A	0.990	0.991	0.990	0.997	1.001	0.990	0.990	-0.99
S65.B	1.011	1.012	1.012	1.009	1.008	1.011	1.011	0.94
S65.C	1.042	1.037	1.041	1.026	1.017	1.042	1.042	1.00
S66.A	0.990	0.991	0.990	0.997	1.001	0.990	0.990	-0.99
S66.B	1.011	1.012	1.012	1.009	1.008	1.011	1.011	0.94
S66.C	1.042	1.037	1.041	1.026	1.017	1.042	1.042	1.00
S67.A	0.994	0.995	0.993	1.002	1.007	0.994	0.994	-0.99
S68.A	0.994	0.995	0.993	1.002	1.007	0.994	0.994	-0.99
S67.B	0.999	1.000	1.000	0.997	0.995	0.999	0.999	0.94
S67.C	1.007	1.002	1.006	0.996	0.993	1.007	1.007	0.99
S72.A	0.992	0.993	0.992	1.001	1.006	0.992	0.992	-0.99
S72.B	1.000	1.000	1.001	0.998	0.996	1.000	1.000	0.94
S72.C	1.011	1.005	1.009	0.998	0.994	1.011	1.011	0.99
S97.A	0.994	0.995	0.993	1.002	1.007	0.994	0.994	-0.99
S97.B	0.999	1.000	1.000	0.997	0.995	0.999	0.999	0.94
S97.C	1.007	1.002	1.006	0.996	0.993	1.007	1.007	0.99
S69.A	0.994	0.995	0.993	1.002	1.007	0.994	0.994	-0.99
S70.A	0.994	0.995	0.993	1.002	1.007	0.994	0.994	-0.99
S71.A	0.994	0.995	0.993	1.002	1.007	0.994	0.994	-0.99
S73.C	1.011	1.005	1.009	0.998	0.994	1.011	1.011	0.99
S76.A	0.991	0.992	0.990	1.000	1.006	0.991	0.991	-0.99
S76.B	1.000	1.001	1.002	0.998	0.996	1.000	1.000	0.94
S76.C	1.013	1.007	1.011	0.999	0.994	1.013	1.013	1.00
S74.C	1.011	1.005	1.009	0.998	0.994	1.011	1.011	0.99
S75.C	1.011	1.005	1.009	0.998	0.994	1.011	1.011	0.99
S77.A	0.988	0.990	0.987	0.999	1.005	0.988	0.988	-0.99
S77.B	1.001	1.002	1.002	0.998	0.996	1.001	1.001	0.94
S77.C	1.018	1.012	1.016	1.002	0.996	1.018	1.018	1.00
S86.A	0.991	0.992	0.990	1.000	1.006	0.991	0.991	-0.99
S86.B	1.000	1.001	1.002	0.998	0.996	1.000	1.000	0.94
S86.C	1.013	1.007	1.011	0.999	0.994	1.013	1.013	1.00
S78.A	0.987	0.989	0.987	0.998	1.005	0.987	0.987	-0.99
S78.B	1.001	1.002	1.003	0.998	0.996	1.001	1.001	0.94
S78.C	1.019	1.013	1.017	1.002	0.996	1.019	1.019	1.00
S79.A	0.987	0.989	0.987	0.998	1.005	0.987	0.987	-0.99
S79.B	1.001	1.002	1.003	0.998	0.996	1.001	1.001	0.94
S79.C	1.019	1.013	1.017	1.002	0.996	1.019	1.019	1.00
S80.A	0.984	0.986	0.983	0.996	1.004	0.984	0.984	-0.99

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
S80.B	1.002	1.003	1.004	0.999	0.996	1.002	1.002	0.94
S80.C	1.025	1.018	1.023	1.005	0.998	1.025	1.025	1.00
S81.A	0.983	0.985	0.982	0.996	1.003	0.983	0.983	-0.99
S81.B	1.002	1.003	1.004	0.999	0.996	1.002	1.002	0.94
S81.C	1.028	1.020	1.025	1.007	0.999	1.028	1.028	1.00
S82.A	0.983	0.985	0.982	0.996	1.003	0.983	0.983	-0.99
S82.B	1.002	1.003	1.004	0.999	0.996	1.002	1.002	0.94
S82.C	1.028	1.020	1.025	1.007	0.999	1.028	1.028	1.00
S84.C	1.044	1.035	1.042	1.016	1.004	1.044	1.044	1.00
S83.A	0.983	0.985	0.982	0.996	1.003	0.983	0.983	-0.99
S83.B	1.002	1.003	1.004	0.999	0.996	1.002	1.002	0.94
S83.C	1.028	1.020	1.025	1.007	0.999	1.028	1.028	1.00
S85.C	1.056	1.046	1.054	1.022	1.007	1.056	1.056	1.00
S87.A	0.991	0.992	0.990	1.000	1.006	0.991	0.991	-0.99
S87.B	1.000	1.001	1.002	0.998	0.996	1.000	1.000	0.94
S87.C	1.013	1.007	1.011	0.999	0.994	1.013	1.013	1.00
S88.A	0.991	0.992	0.990	1.000	1.006	0.991	0.991	-0.99
S89.A	0.991	0.992	0.990	1.000	1.006	0.991	0.991	-0.99
S89.B	1.000	1.001	1.002	0.998	0.996	1.000	1.000	0.94
S89.C	1.013	1.007	1.011	0.999	0.994	1.013	1.013	1.00
S90.B	1.000	1.001	1.002	0.998	0.996	1.000	1.000	0.94
S91.A	0.991	0.992	0.990	1.000	1.006	0.991	0.991	-0.99
S91.B	1.000	1.001	1.002	0.998	0.996	1.000	1.000	0.94
S91.C	1.013	1.007	1.011	0.999	0.994	1.013	1.013	1.00
S92.C	1.013	1.007	1.011	0.999	0.994	1.013	1.013	1.00
S93.A	0.991	0.992	0.990	1.000	1.006	0.991	0.991	-0.99
S93.B	1.000	1.001	1.002	0.998	0.996	1.000	1.000	0.94
S93.C	1.013	1.007	1.011	0.999	0.994	1.013	1.013	1.00
S94.A	0.991	0.992	0.990	1.000	1.006	0.991	0.991	-0.99
S95.A	0.991	0.992	0.990	1.000	1.006	0.991	0.991	-0.99
S95.B	1.000	1.001	1.002	0.998	0.996	1.000	1.000	0.94
S95.C	1.013	1.007	1.011	0.999	0.994	1.013	1.013	1.00
S96.B	1.000	1.001	1.002	0.998	0.996	1.000	1.000	0.94
S98.A	0.994	0.995	0.993	1.002	1.007	0.994	0.994	-0.99
S98.B	0.999	1.000	1.000	0.997	0.995	0.999	0.999	0.94
S98.C	1.007	1.002	1.006	0.996	0.993	1.007	1.007	0.99
S99.A	0.994	0.995	0.993	1.002	1.007	0.994	0.994	-0.99
S99.B	0.999	1.000	1.000	0.997	0.995	0.999	0.999	0.94
S99.C	1.007	1.002	1.006	0.996	0.993	1.007	1.007	0.99
S100.A	0.994	0.995	0.993	1.002	1.007	0.994	0.994	-0.99

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
S100.B	0.999	1.000	1.000	0.997	0.995	0.999	0.999	0.94
S100.C	1.007	1.002	1.006	0.996	0.993	1.007	1.007	0.99
S450.A	0.994	0.995	0.993	1.002	1.007	0.994	0.994	-0.99
S450.B	0.999	1.000	1.000	0.997	0.995	0.999	0.999	0.94
S450.C	1.007	1.002	1.006	0.996	0.993	1.007	1.007	0.99
S197.A	0.994	0.995	0.993	1.002	1.007	0.994	0.994	-0.99
S101.A	0.994	0.995	0.993	1.002	1.007	0.994	0.994	-0.99
S197.B	0.999	1.000	1.000	0.997	0.995	0.999	0.999	0.94
S101.B	0.999	1.000	1.000	0.997	0.995	0.999	0.999	0.94
S197.C	1.007	1.002	1.006	0.996	0.993	1.007	1.007	0.99
S101.C	1.007	1.002	1.006	0.996	0.993	1.007	1.007	0.99
S102.C	1.007	1.002	1.006	0.996	0.993	1.007	1.007	0.99
S105.A	0.994	0.995	0.993	1.002	1.007	0.994	0.994	-0.99
S105.B	0.999	1.000	1.000	0.997	0.995	0.999	0.999	0.94
S105.C	1.007	1.002	1.006	0.996	0.993	1.007	1.007	0.99
S103.C	1.007	1.002	1.006	0.996	0.993	1.007	1.007	0.99
S104.C	1.007	1.002	1.006	0.996	0.993	1.007	1.007	0.99
S106.B	0.999	1.000	1.000	0.997	0.995	0.999	0.999	0.94
S108.A	0.994	0.995	0.993	1.002	1.007	0.994	0.994	-0.99
S108.B	0.999	1.000	1.000	0.997	0.995	0.999	0.999	0.94
S108.C	1.007	1.002	1.006	0.996	0.993	1.007	1.007	0.99
S107.B	0.999	1.000	1.000	0.997	0.995	0.999	0.999	0.94
S109.A	0.994	0.995	0.993	1.002	1.007	0.994	0.994	-0.99
S300.A	0.994	0.995	0.993	1.002	1.007	0.994	0.994	-0.99
S300.B	0.999	1.000	1.000	0.997	0.995	0.999	0.999	0.94
S300.C	1.007	1.002	1.006	0.996	0.993	1.007	1.007	0.99
S110.A	0.994	0.995	0.993	1.002	1.007	0.994	0.994	-0.99
S111.A	0.994	0.995	0.993	1.002	1.007	0.994	0.994	-0.99
S112.A	0.994	0.995	0.993	1.002	1.007	0.994	0.994	-0.99
S113.A	0.994	0.995	0.993	1.002	1.007	0.994	0.994	-0.99
S114.A	0.994	0.995	0.993	1.002	1.007	0.994	0.994	-0.99
S135.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S135.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S135.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S152.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S152.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S152.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S160r.A	0.996	0.997	0.996	1.003	1.007	0.996	0.996	-0.99
S160r.B	0.999	0.999	1.000	0.997	0.995	0.999	0.999	0.94
S160r.C	1.003	0.998	1.002	0.993	0.992	1.003	1.003	0.98

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
S160.A	0.990	0.991	0.990	0.997	1.001	0.990	0.990	-0.99
S160.B	1.011	1.012	1.012	1.009	1.008	1.011	1.011	0.94
S160.C	1.042	1.037	1.041	1.026	1.017	1.042	1.042	1.00
S61s.A	0.990	0.991	0.990	0.997	1.001	0.990	0.990	-0.99
S61s.B	1.011	1.012	1.012	1.009	1.008	1.011	1.011	0.94
S61s.C	1.042	1.037	1.041	1.026	1.017	1.042	1.042	1.00
S300 open.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S300 open.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S300 open.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S94 open.A	0.996	0.997	0.996	1.001	1.003	0.996	0.996	-0.99

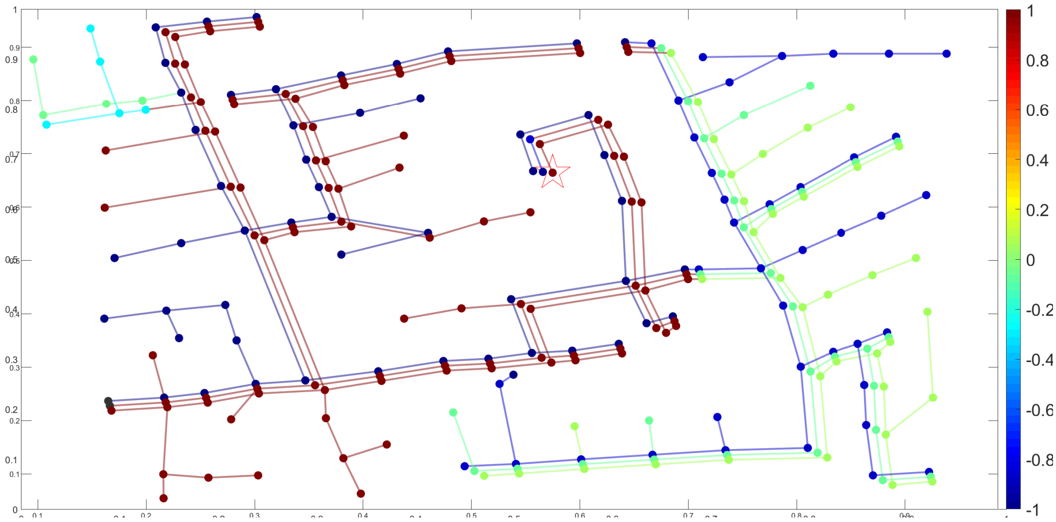

Figure F.3: Graphical representation of Pearson coefficients obtained for Single-phase perturbation at node 66, phase C. Load consumption with a rated power of 400 kW and 200 kVAr. (Scenario S3)

Table F.3: Voltage magnitudes and Pearson coefficient values obtained for Scenario S3

Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S149.A	1.006	1.006	1.006	1.006	1.006	1.006	1.006	NaN
S1.A	1.008	1.008	1.007	1.007	1.007	1.006	1.006	-1.00
S149.B	1.006	1.006	1.006	1.006	1.006	1.006	1.006	NaN
S1.B	1.006	1.006	1.006	1.006	1.006	1.006	1.006	1.00
S149.C	1.006	1.006	1.006	1.006	1.006	1.006	1.006	1.00
S1.C	1.002	1.003	1.004	1.004	1.004	1.006	1.006	1.00
S2.B	1.006	1.006	1.006	1.006	1.006	1.006	1.006	1.00
S3.C	1.002	1.003	1.004	1.004	1.004	1.006	1.006	1.00
S7.A	1.009	1.009	1.008	1.008	1.008	1.006	1.006	-1.00
S7.B	1.006	1.006	1.006	1.006	1.006	1.006	1.006	1.00
S7.C	0.999	1.000	1.003	1.003	1.003	1.006	1.006	1.00
S4.C	1.002	1.003	1.004	1.004	1.004	1.006	1.006	1.00
S5.C	1.002	1.003	1.004	1.004	1.004	1.006	1.006	1.00
S6.C	1.002	1.003	1.004	1.004	1.004	1.006	1.006	1.00
S8.A	1.010	1.010	1.008	1.008	1.008	1.006	1.006	-1.00
S8.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S8.C	0.997	0.998	1.002	1.002	1.002	1.006	1.006	1.00
S12.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S9.A	1.010	1.010	1.008	1.008	1.008	1.006	1.006	-1.00
S13.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-1.00
S13.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S13.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S9r.A	0.997	0.997	0.995	0.995	0.995	0.994	0.994	-1.00
S14.A	0.997	0.997	0.995	0.995	0.995	0.994	0.994	-1.00
S34.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S18.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-1.00
S18.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S18.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S11.A	0.997	0.997	0.995	0.995	0.995	0.994	0.994	-1.00
S10.A	0.997	0.997	0.995	0.995	0.995	0.994	0.994	-1.00
S15.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S16.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S17.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S19.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-1.00
S21.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-1.00
S21.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S21.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S20.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-1.00

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S22.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S23.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-1.00
S23.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S23.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S24.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S25.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-1.00
S25.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S25.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S25r.A	0.999	0.998	0.996	0.996	0.996	1.000	1.000	0.29
S26.A	0.999	0.998	0.996	0.996	0.996	1.000	1.000	0.29
S25r.C	1.001	1.002	1.001	1.001	1.001	1.000	0.999	-0.82
S26.C	1.001	1.002	1.001	1.001	1.001	1.000	0.999	-0.82
S28.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-1.00
S28.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S28.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S27.A	0.999	0.998	0.996	0.996	0.996	1.000	1.000	0.29
S27.C	1.001	1.002	1.001	1.001	1.001	1.000	0.999	-0.82
S31.C	1.001	1.002	1.001	1.001	1.001	1.000	0.999	-0.82
S33.A	0.999	0.998	0.996	0.996	0.996	1.000	1.000	0.29
S29.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-1.00
S29.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S29.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S30.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-1.00
S30.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S30.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S250.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-1.00
S250.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S250.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S32.C	1.001	1.002	1.001	1.001	1.001	1.000	0.999	-0.82
S35.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-1.00
S36.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-1.00
S35.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S36.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S35.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S40.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-1.00
S40.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S40.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S37.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-1.00
S38.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S39.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S41.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S42.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-1.00
S42.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S42.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S43.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S44.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-1.00
S44.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S44.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S45.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-1.00
S47.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-1.00
S47.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S47.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S46.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-1.00
S48.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-1.00
S48.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S48.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S49.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-1.00
S49.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S49.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S50.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-1.00
S50.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S50.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S51.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-1.00
S51.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S51.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S151.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-1.00
S151.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S151.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S52.A	1.013	1.013	1.009	1.009	1.009	1.007	1.007	-1.00
S53.A	1.014	1.013	1.010	1.010	1.010	1.007	1.007	-1.00
S52.B	1.005	1.005	1.005	1.005	1.005	1.006	1.006	1.00
S53.B	1.005	1.005	1.005	1.005	1.005	1.006	1.006	1.00
S52.C	0.991	0.992	0.999	0.999	0.999	1.006	1.006	1.00
S53.C	0.989	0.990	0.998	0.998	0.998	1.006	1.005	1.00
S54.A	1.014	1.014	1.010	1.010	1.010	1.007	1.007	-1.00
S54.B	1.004	1.005	1.005	1.005	1.005	1.006	1.006	1.00
S54.C	0.987	0.989	0.998	0.998	0.998	1.006	1.005	1.00
S55.A	1.014	1.014	1.010	1.010	1.010	1.007	1.007	-1.00
S55.B	1.004	1.005	1.005	1.005	1.005	1.006	1.006	1.00
S55.C	0.987	0.989	0.998	0.998	0.998	1.006	1.005	1.00

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S57.A	1.016	1.015	1.011	1.011	1.011	1.007	1.007	-1.00
S57.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S57.C	0.984	0.986	0.996	0.996	0.996	1.005	1.005	1.00
S56.A	1.014	1.014	1.010	1.010	1.010	1.007	1.007	-1.00
S56.B	1.004	1.005	1.005	1.005	1.005	1.006	1.006	1.00
S56.C	0.987	0.989	0.998	0.998	0.998	1.006	1.005	1.00
S58.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S60.A	1.020	1.019	1.012	1.012	1.012	1.007	1.007	-1.00
S60.B	1.003	1.003	1.005	1.005	1.005	1.006	1.006	1.00
S60.C	0.977	0.979	0.993	0.993	0.993	1.005	1.005	1.00
S59.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S61.A	1.020	1.019	1.012	1.012	1.012	1.007	1.007	-1.00
S61.B	1.003	1.003	1.005	1.005	1.005	1.006	1.006	1.00
S61.C	0.977	0.979	0.993	0.993	0.993	1.005	1.005	1.00
S62.A	1.020	1.019	1.013	1.013	1.013	1.007	1.007	-1.00
S62.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S62.C	0.972	0.975	0.991	0.991	0.991	1.005	1.005	1.00
S63.A	1.021	1.020	1.013	1.013	1.013	1.007	1.007	-1.00
S63.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S63.C	0.969	0.972	0.989	0.989	0.989	1.005	1.005	1.00
S64.A	1.021	1.020	1.013	1.013	1.013	1.007	1.007	-1.00
S64.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.97
S64.C	0.963	0.966	0.986	0.986	0.986	1.005	1.004	1.00
S65.A	1.023	1.021	1.014	1.014	1.014	1.007	1.007	-1.00
S65.B	1.007	1.007	1.006	1.006	1.006	1.006	1.006	-0.93
S65.C	0.955	0.958	0.983	0.983	0.983	1.004	1.004	1.00
S66.A	1.023	1.022	1.014	1.014	1.014	1.007	1.007	-1.00
S66.B	1.008	1.008	1.007	1.007	1.007	1.006	1.006	-0.99
S66.C	0.949	0.953	0.980	0.980	0.980	1.004	1.004	1.00
S67.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77
S68.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77
S67.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	1.00
S67.C	0.995	1.003	1.005	1.005	1.005	1.005	1.005	0.69
S72.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77
S72.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	1.00
S72.C	0.995	1.003	1.005	1.005	1.005	1.005	1.005	0.69
S97.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77
S97.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	1.00
S97.C	0.995	1.003	1.005	1.005	1.005	1.005	1.005	0.69
S69.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S70.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77
S71.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77
S73.C	0.995	1.003	1.005	1.005	1.005	1.005	1.005	0.69
S76.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77
S76.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	1.00
S76.C	0.995	1.003	1.005	1.005	1.005	1.005	1.005	0.69
S74.C	0.995	1.003	1.005	1.005	1.005	1.005	1.005	0.69
S75.C	0.995	1.003	1.005	1.005	1.005	1.005	1.005	0.69
S77.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77
S77.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	1.00
S77.C	0.995	1.003	1.005	1.005	1.005	1.005	1.005	0.69
S86.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77
S86.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	1.00
S86.C	0.995	1.003	1.005	1.005	1.005	1.005	1.005	0.69
S78.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77
S78.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	1.00
S78.C	0.995	1.003	1.005	1.005	1.005	1.005	1.005	0.69
S79.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77
S79.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	1.00
S79.C	0.995	1.003	1.005	1.005	1.005	1.005	1.005	0.69
S80.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77
S80.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	1.00
S80.C	0.995	1.003	1.005	1.005	1.005	1.005	1.005	0.69
S81.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77
S81.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	1.00
S81.C	0.995	1.003	1.005	1.005	1.005	1.005	1.005	0.69
S82.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77
S82.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	1.00
S82.C	0.995	1.003	1.005	1.005	1.005	1.005	1.005	0.69
S84.C	0.995	1.003	1.005	1.005	1.005	1.005	1.005	0.69
S83.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77
S83.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	1.00
S83.C	0.995	1.003	1.005	1.005	1.005	1.005	1.005	0.69
S85.C	0.995	1.003	1.005	1.005	1.005	1.005	1.005	0.69
S87.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77
S87.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	1.00
S87.C	0.995	1.003	1.005	1.005	1.005	1.005	1.005	0.69
S88.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77
S89.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77
S89.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	1.00

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S89.C	0.995	1.003	1.005	1.005	1.005	1.005	1.005	0.69
S90.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	1.00
S91.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77
S91.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	1.00
S91.C	0.995	1.003	1.005	1.005	1.005	1.005	1.005	0.69
S92.C	0.995	1.003	1.005	1.005	1.005	1.005	1.005	0.69
S93.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77
S93.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	1.00
S93.C	0.995	1.003	1.005	1.005	1.005	1.005	1.005	0.69
S94.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77
S95.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77
S95.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	1.00
S95.C	0.995	1.003	1.005	1.005	1.005	1.005	1.005	0.69
S96.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	1.00
S98.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77
S98.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	1.00
S98.C	0.995	1.003	1.005	1.005	1.005	1.005	1.005	0.69
S99.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77
S99.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	1.00
S99.C	0.995	1.003	1.005	1.005	1.005	1.005	1.005	0.69
S100.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77
S100.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	1.00
S100.C	0.995	1.003	1.005	1.005	1.005	1.005	1.005	0.69
S450.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77
S450.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	1.00
S450.C	0.995	1.003	1.005	1.005	1.005	1.005	1.005	0.69
S197.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77
S101.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77
S197.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	1.00
S101.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	1.00
S197.C	0.995	1.003	1.005	1.005	1.005	1.005	1.005	0.69
S101.C	0.995	1.003	1.005	1.005	1.005	1.005	1.005	0.69
S102.C	0.995	1.003	1.005	1.005	1.005	1.005	1.005	0.69
S105.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77
S105.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	1.00
S105.C	0.995	1.003	1.005	1.005	1.005	1.005	1.005	0.69
S103.C	0.995	1.003	1.005	1.005	1.005	1.005	1.005	0.69
S104.C	0.995	1.003	1.005	1.005	1.005	1.005	1.005	0.69
S106.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	1.00
S108.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S108.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	1.00
S108.C	0.995	1.003	1.005	1.005	1.005	1.005	1.005	0.69
S107.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	1.00
S109.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77
S300.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77
S300.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	1.00
S300.C	0.995	1.003	1.005	1.005	1.005	1.005	1.005	0.69
S110.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77
S111.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77
S112.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77
S113.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77
S114.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77
S135.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-1.00
S135.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S135.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S152.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-1.00
S152.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S152.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S160r.A	1.007	0.999	0.993	0.993	0.993	0.994	0.994	-0.77
S160r.B	0.997	0.997	0.998	0.998	0.998	1.000	1.000	1.00
S160r.C	0.995	1.003	1.005	1.005	1.005	1.005	1.005	0.69
S160.A	1.020	1.019	1.012	1.012	1.012	1.007	1.007	-1.00
S160.B	1.003	1.003	1.005	1.005	1.005	1.006	1.006	1.00
S160.C	0.977	0.979	0.993	0.993	0.993	1.005	1.005	1.00
S61s.A	1.020	1.019	1.012	1.012	1.012	1.007	1.007	-1.00
S61s.B	1.003	1.003	1.005	1.005	1.005	1.006	1.006	1.00
S61s.C	0.977	0.979	0.993	0.993	0.993	1.005	1.005	1.00
S300 open.A	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-1.00
S300 open.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S300 open.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S94 open.A	1.014	1.014	1.010	1.010	1.010	1.007	1.007	-1.00

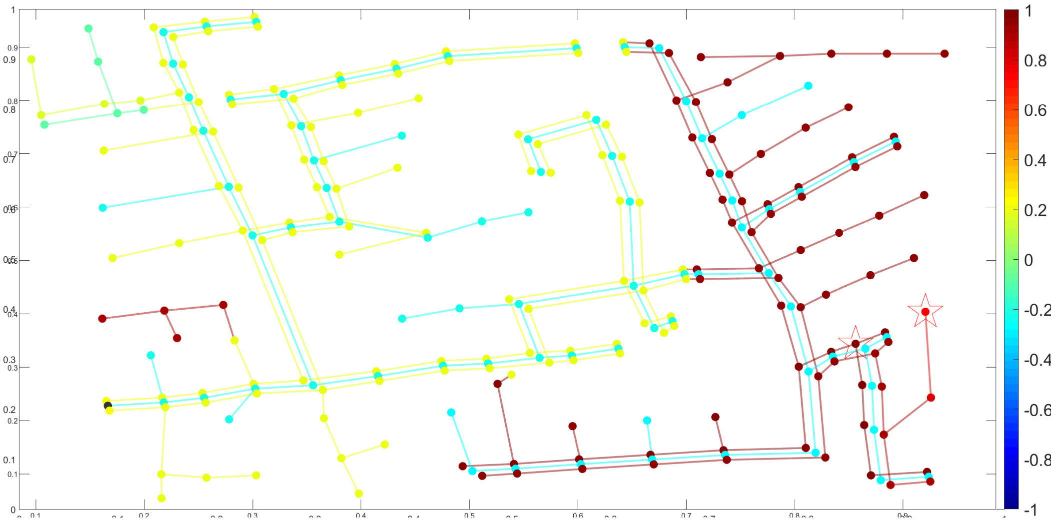

Figure F.4: Graphical representation of Pearson coefficients obtained for Two-phase perturbation at nodes 82, phase A and 85, phase C. Load consumption with a rated power of 400 kW and 200 kVAr, reference on phase A. (Scenario S4)

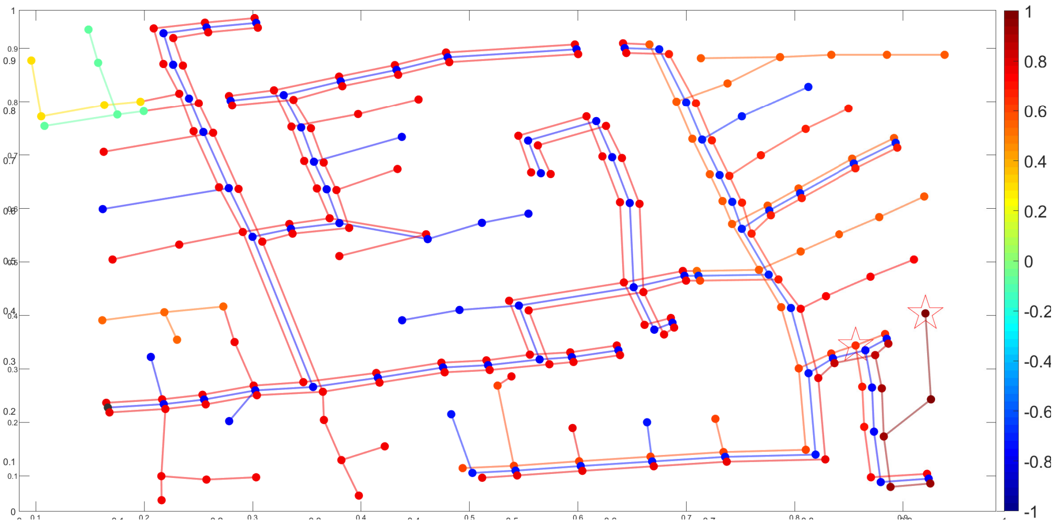

Figure F.5: Graphical representation of Pearson coefficients obtained for Two-phase perturbation at nodes 82, phase A and 85, phase C. Load consumption with a rated power of 400 kW and 200 kVAr, reference on phase C. (Scenario S4)

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S82.A})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		

Table F.4: Voltage magnitudes and Pearson coefficient values obtained for Scenario S4

Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S82.A})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S149.A	1.006	1.006	1.006	1.006	1.006	1.006	1.006	0.77	0.99
S1.A	1.004	1.004	1.005	1.005	1.005	1.006	1.006	0.78	0.99
S149.B	1.006	1.006	1.006	1.006	1.006	1.006	1.006	NaN	NaN
S1.B	1.008	1.008	1.007	1.007	1.007	1.006	1.006	-0.78	-0.99
S149.C	1.006	1.006	1.006	1.006	1.006	1.006	1.006	0.79	0.99
S1.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	0.78	0.99
S2.B	1.008	1.008	1.007	1.007	1.007	1.006	1.006	-0.78	-0.99
S3.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	0.78	0.99
S7.A	1.002	1.003	1.005	1.005	1.005	1.006	1.006	0.78	0.99
S7.B	1.009	1.009	1.008	1.008	1.008	1.006	1.006	-0.78	-0.99
S7.C	0.999	0.999	1.003	1.003	1.003	1.006	1.006	0.78	0.99
S4.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	0.78	0.99
S5.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	0.78	0.99
S6.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	0.78	0.99
S8.A	1.001	1.002	1.004	1.004	1.004	1.006	1.006	0.78	0.99
S8.B	1.010	1.010	1.008	1.008	1.008	1.006	1.006	-0.78	-0.99
S8.C	0.997	0.997	1.002	1.002	1.002	1.006	1.006	0.78	0.99
S12.B	1.010	1.010	1.008	1.008	1.008	1.006	1.006	-0.78	-0.99
S9.A	1.001	1.002	1.004	1.004	1.004	1.006	1.006	0.78	0.99
S13.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.78	0.99
S13.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.78	-0.99
S13.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.78	0.99
S9r.A	0.995	0.995	0.998	0.998	0.998	1.000	1.000	0.78	0.99
S14.A	0.995	0.995	0.998	0.998	0.998	1.000	1.000	0.78	0.99
S34.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.78	0.99
S18.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.78	0.99
S18.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.78	-0.99
S18.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.78	0.99
S11.A	0.995	0.995	0.998	0.998	0.998	1.000	1.000	0.78	0.99
S10.A	0.995	0.995	0.998	0.998	0.998	1.000	1.000	0.78	0.99
S15.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.78	0.99
S16.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.78	0.99
S17.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.78	0.99

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S82.A})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S19.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.78	0.99
S21.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.78	0.99
S21.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.78	-0.99
S21.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.78	0.99
S20.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.78	0.99
S22.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.78	-0.99
S23.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.78	0.99
S23.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.78	-0.99
S23.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.78	0.99
S24.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.78	0.99
S25.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.78	0.99
S25.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.78	-0.99
S25.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.78	0.99
S25r.A	1.000	1.000	1.003	1.003	1.003	1.000	1.000	0.07	0.00
S26.A	1.000	1.000	1.003	1.003	1.003	1.000	1.000	0.07	0.00
S25r.C	1.000	1.001	1.000	1.000	1.000	0.999	0.999	0.01	-0.38
S26.C	1.000	1.001	1.000	1.000	1.000	0.999	0.999	0.01	-0.38
S28.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.78	0.99
S28.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.78	-0.99
S28.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.78	0.99
S27.A	1.000	1.000	1.003	1.003	1.003	1.000	1.000	0.07	0.00
S27.C	1.000	1.001	1.000	1.000	1.000	0.999	0.999	0.01	-0.38
S31.C	1.000	1.001	1.000	1.000	1.000	0.999	0.999	0.01	-0.38
S33.A	1.000	1.000	1.003	1.003	1.003	1.000	1.000	0.07	0.00
S29.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.78	0.99
S29.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.78	-0.99
S29.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.78	0.99
S30.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.78	0.99
S30.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.78	-0.99
S30.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.78	0.99
S250.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.78	0.99
S250.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.78	-0.99
S250.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.78	0.99
S32.C	1.000	1.001	1.000	1.000	1.000	0.999	0.999	0.01	-0.38
S35.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.78	0.99
S36.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.78	0.99
S35.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.78	-0.99
S36.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.78	-0.99
S35.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.78	0.99
S40.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.78	0.99

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S82.A})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S40.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.78	-0.99
S40.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.78	0.99
S37.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.78	0.99
S38.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.78	-0.99
S39.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.78	-0.99
S41.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.78	0.99
S42.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.78	0.99
S42.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.78	-0.99
S42.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.78	0.99
S43.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.78	-0.99
S44.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.78	0.99
S44.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.78	-0.99
S44.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.78	0.99
S45.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.78	0.99
S47.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.78	0.99
S47.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.78	-0.99
S47.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.78	0.99
S46.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.78	0.99
S48.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.78	0.99
S48.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.78	-0.99
S48.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.78	0.99
S49.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.78	0.99
S49.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.78	-0.99
S49.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.78	0.99
S50.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.78	0.99
S50.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.78	-0.99
S50.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.78	0.99
S51.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.78	0.99
S51.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.78	-0.99
S51.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.78	0.99
S151.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.78	0.99
S151.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.78	-0.99
S151.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.78	0.99
S52.A	0.998	0.998	1.002	1.002	1.002	1.006	1.006	0.78	0.99
S53.A	0.997	0.997	1.002	1.002	1.002	1.006	1.006	0.78	0.99
S52.B	1.013	1.013	1.009	1.009	1.009	1.007	1.007	-0.78	-0.99
S53.B	1.014	1.013	1.010	1.010	1.010	1.007	1.007	-0.78	-0.99
S52.C	0.989	0.990	0.998	0.998	0.998	1.006	1.006	0.78	0.99
S53.C	0.987	0.988	0.998	0.997	0.997	1.006	1.005	0.78	0.99
S54.A	0.996	0.997	1.002	1.001	1.001	1.006	1.006	0.78	0.99

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S82.A})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S54.B	1.015	1.014	1.010	1.010	1.010	1.007	1.007	-0.78	-0.99
S54.C	0.986	0.987	0.997	0.997	0.997	1.005	1.005	0.78	0.99
S55.A	0.996	0.997	1.002	1.001	1.001	1.006	1.006	0.78	0.99
S55.B	1.015	1.014	1.010	1.010	1.010	1.007	1.007	-0.78	-0.99
S55.C	0.986	0.987	0.997	0.997	0.997	1.005	1.005	0.78	0.99
S57.A	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.78	0.99
S57.B	1.015	1.015	1.011	1.011	1.011	1.007	1.007	-0.78	-0.99
S57.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	0.78	0.99
S56.A	0.996	0.997	1.002	1.001	1.001	1.006	1.006	0.78	0.99
S56.B	1.015	1.014	1.010	1.010	1.010	1.007	1.007	-0.78	-0.99
S56.C	0.986	0.987	0.997	0.997	0.997	1.005	1.005	0.78	0.99
S58.B	1.015	1.015	1.011	1.011	1.011	1.007	1.007	-0.78	-0.99
S60.A	0.991	0.992	0.999	0.999	0.999	1.006	1.006	0.78	0.99
S60.B	1.017	1.017	1.011	1.011	1.011	1.007	1.007	-0.78	-0.99
S60.C	0.974	0.976	0.992	0.991	0.991	1.005	1.005	0.78	0.99
S59.B	1.015	1.015	1.011	1.011	1.011	1.007	1.007	-0.78	-0.99
S61.A	0.991	0.992	0.999	0.999	0.999	1.006	1.006	0.78	0.99
S61.B	1.017	1.017	1.011	1.011	1.011	1.007	1.007	-0.78	-0.99
S61.C	0.974	0.976	0.992	0.991	0.991	1.005	1.005	0.78	0.99
S62.A	0.991	0.992	0.999	0.999	0.999	1.006	1.006	0.78	0.99
S62.B	1.017	1.017	1.011	1.011	1.011	1.007	1.007	-0.78	-0.99
S62.C	0.974	0.976	0.992	0.991	0.991	1.005	1.005	0.78	0.99
S63.A	0.991	0.992	0.999	0.999	0.999	1.006	1.006	0.78	0.99
S63.B	1.017	1.017	1.011	1.011	1.011	1.007	1.007	-0.78	-0.99
S63.C	0.974	0.976	0.992	0.991	0.991	1.005	1.005	0.78	0.99
S64.A	0.991	0.992	0.999	0.999	0.999	1.006	1.006	0.78	0.99
S64.B	1.017	1.017	1.011	1.011	1.011	1.007	1.007	-0.78	-0.99
S64.C	0.974	0.976	0.992	0.991	0.991	1.005	1.005	0.78	0.99
S65.A	0.991	0.992	0.999	0.999	0.999	1.006	1.006	0.78	0.99
S65.B	1.017	1.017	1.011	1.011	1.011	1.007	1.007	-0.78	-0.99
S65.C	0.974	0.976	0.992	0.991	0.991	1.005	1.005	0.78	0.99
S66.A	0.991	0.992	0.999	0.999	0.999	1.006	1.006	0.78	0.99
S66.B	1.017	1.017	1.011	1.011	1.011	1.007	1.007	-0.78	-0.99
S66.C	0.974	0.976	0.992	0.991	0.991	1.005	1.005	0.78	0.99
S67.A	0.996	1.009	1.005	1.005	1.005	1.006	1.005	0.87	0.49
S68.A	0.996	1.009	1.005	1.005	1.005	1.006	1.005	0.87	0.49
S67.B	1.006	0.999	0.993	0.993	0.993	0.994	0.994	-0.85	-0.79
S67.C	0.994	1.003	1.002	1.002	1.002	1.005	1.005	1.00	0.82
S72.A	0.994	1.008	1.004	1.004	1.004	1.006	1.005	0.91	0.58
S72.B	1.006	0.999	0.993	0.993	0.993	0.994	0.994	-0.85	-0.81

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S82.A})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S72.C	0.991	1.000	1.001	1.001	1.001	1.005	1.005	1.00	0.91
S97.A	0.996	1.009	1.005	1.005	1.005	1.006	1.005	0.87	0.49
S97.B	1.006	0.999	0.993	0.993	0.993	0.994	0.994	-0.85	-0.79
S97.C	0.994	1.003	1.002	1.002	1.002	1.005	1.005	1.00	0.82
S69.A	0.996	1.009	1.005	1.005	1.005	1.006	1.005	0.87	0.49
S70.A	0.996	1.009	1.005	1.005	1.005	1.006	1.005	0.87	0.49
S71.A	0.996	1.009	1.005	1.005	1.005	1.006	1.005	0.87	0.49
S73.C	0.991	1.000	1.001	1.001	1.001	1.005	1.005	1.00	0.91
S76.A	0.993	1.007	1.004	1.004	1.004	1.006	1.005	0.94	0.63
S76.B	1.007	1.000	0.994	0.994	0.994	0.994	0.994	-0.86	-0.82
S76.C	0.989	0.999	1.000	1.000	1.000	1.005	1.004	0.98	0.94
S74.C	0.991	1.000	1.001	1.001	1.001	1.005	1.005	1.00	0.91
S75.C	0.991	1.000	1.001	1.001	1.001	1.005	1.005	1.00	0.91
S77.A	0.992	1.006	1.003	1.003	1.003	1.005	1.005	0.97	0.71
S77.B	1.008	1.001	0.994	0.994	0.994	0.994	0.994	-0.87	-0.85
S77.C	0.985	0.994	0.998	0.998	0.998	1.005	1.004	0.96	0.97
S86.A	0.993	1.007	1.004	1.004	1.004	1.006	1.005	0.94	0.63
S86.B	1.007	1.000	0.994	0.994	0.994	0.994	0.994	-0.86	-0.82
S86.C	0.989	0.999	1.000	1.000	1.000	1.005	1.004	0.98	0.94
S78.A	0.991	1.005	1.003	1.003	1.003	1.005	1.005	0.97	0.73
S78.B	1.009	1.001	0.994	0.994	0.994	0.994	0.994	-0.87	-0.86
S78.C	0.984	0.993	0.997	0.997	0.997	1.004	1.004	0.95	0.98
S79.A	0.991	1.005	1.003	1.003	1.003	1.005	1.005	0.97	0.73
S79.B	1.009	1.001	0.994	0.994	0.994	0.994	0.994	-0.87	-0.86
S79.C	0.984	0.993	0.997	0.997	0.997	1.004	1.004	0.95	0.98
S80.A	0.990	1.004	1.002	1.002	1.002	1.005	1.005	0.99	0.79
S80.B	1.010	1.002	0.995	0.995	0.995	0.994	0.994	-0.88	-0.88
S80.C	0.979	0.989	0.995	0.995	0.995	1.004	1.004	0.92	0.99
S81.A	0.989	1.003	1.002	1.001	1.001	1.005	1.005	1.00	0.81
S81.B	1.011	1.003	0.995	0.995	0.995	0.994	0.994	-0.88	-0.89
S81.C	0.977	0.987	0.994	0.994	0.994	1.004	1.004	0.91	0.99
S82.A	0.987	1.001	1.000	1.000	1.000	1.005	1.005	1.00	0.86
S82.B	1.012	1.004	0.996	0.996	0.996	0.994	0.995	-0.88	-0.90
S82.C	0.976	0.987	0.994	0.994	0.994	1.004	1.004	0.91	0.99
S84.C	0.964	0.975	0.988	0.988	0.988	1.004	1.003	0.88	1.00
S83.A	0.987	1.001	1.000	1.000	1.000	1.005	1.005	1.00	0.86
S83.B	1.012	1.004	0.996	0.996	0.996	0.994	0.995	-0.88	-0.90
S83.C	0.976	0.987	0.994	0.994	0.994	1.004	1.004	0.91	0.99
S85.C	0.955	0.966	0.984	0.984	0.984	1.003	1.003	0.86	1.00
S87.A	0.993	1.007	1.004	1.004	1.004	1.006	1.005	0.94	0.63

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S82.A})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S87.B	1.007	1.000	0.994	0.994	0.994	0.994	0.994	-0.86	-0.82
S87.C	0.989	0.999	1.000	1.000	1.000	1.005	1.004	0.98	0.94
S88.A	0.993	1.007	1.004	1.004	1.004	1.006	1.005	0.94	0.63
S89.A	0.993	1.007	1.004	1.004	1.004	1.006	1.005	0.94	0.63
S89.B	1.007	1.000	0.994	0.994	0.994	0.994	0.994	-0.86	-0.82
S89.C	0.989	0.999	1.000	1.000	1.000	1.005	1.004	0.98	0.94
S90.B	1.007	1.000	0.994	0.994	0.994	0.994	0.994	-0.86	-0.82
S91.A	0.993	1.007	1.004	1.004	1.004	1.006	1.005	0.94	0.63
S91.B	1.007	1.000	0.994	0.994	0.994	0.994	0.994	-0.86	-0.82
S91.C	0.989	0.999	1.000	1.000	1.000	1.005	1.004	0.98	0.94
S92.C	0.989	0.999	1.000	1.000	1.000	1.005	1.004	0.98	0.94
S93.A	0.993	1.007	1.004	1.004	1.004	1.006	1.005	0.94	0.63
S93.B	1.007	1.000	0.994	0.994	0.994	0.994	0.994	-0.86	-0.82
S93.C	0.989	0.999	1.000	1.000	1.000	1.005	1.004	0.98	0.94
S94.A	0.993	1.007	1.004	1.004	1.004	1.006	1.005	0.94	0.63
S95.A	0.993	1.007	1.004	1.004	1.004	1.006	1.005	0.94	0.63
S95.B	1.007	1.000	0.994	0.994	0.994	0.994	0.994	-0.86	-0.82
S95.C	0.989	0.999	1.000	1.000	1.000	1.005	1.004	0.98	0.94
S96.B	1.007	1.000	0.994	0.994	0.994	0.994	0.994	-0.86	-0.82
S98.A	0.996	1.009	1.005	1.005	1.005	1.006	1.005	0.87	0.49
S98.B	1.006	0.999	0.993	0.993	0.993	0.994	0.994	-0.85	-0.79
S98.C	0.994	1.003	1.002	1.002	1.002	1.005	1.005	1.00	0.82
S99.A	0.996	1.009	1.005	1.005	1.005	1.006	1.005	0.87	0.49
S99.B	1.006	0.999	0.993	0.993	0.993	0.994	0.994	-0.85	-0.79
S99.C	0.994	1.003	1.002	1.002	1.002	1.005	1.005	1.00	0.82
S100.A	0.996	1.009	1.005	1.005	1.005	1.006	1.005	0.87	0.49
S100.B	1.006	0.999	0.993	0.993	0.993	0.994	0.994	-0.85	-0.79
S100.C	0.994	1.003	1.002	1.002	1.002	1.005	1.005	1.00	0.82
S450.A	0.996	1.009	1.005	1.005	1.005	1.006	1.005	0.87	0.49
S450.B	1.006	0.999	0.993	0.993	0.993	0.994	0.994	-0.85	-0.79
S450.C	0.994	1.003	1.002	1.002	1.002	1.005	1.005	1.00	0.82
S197.A	0.996	1.009	1.005	1.005	1.005	1.006	1.005	0.87	0.49
S101.A	0.996	1.009	1.005	1.005	1.005	1.006	1.005	0.87	0.49
S197.B	1.006	0.999	0.993	0.993	0.993	0.994	0.994	-0.85	-0.79
S101.B	1.006	0.999	0.993	0.993	0.993	0.994	0.994	-0.85	-0.79
S197.C	0.994	1.003	1.002	1.002	1.002	1.005	1.005	1.00	0.82
S101.C	0.994	1.003	1.002	1.002	1.002	1.005	1.005	1.00	0.82
S102.C	0.994	1.003	1.002	1.002	1.002	1.005	1.005	1.00	0.82
S105.A	0.996	1.009	1.005	1.005	1.005	1.006	1.005	0.87	0.49
S105.B	1.006	0.999	0.993	0.993	0.993	0.994	0.994	-0.85	-0.79

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S82.A})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S105.C	0.994	1.003	1.002	1.002	1.002	1.005	1.005	1.00	0.82
S103.C	0.994	1.003	1.002	1.002	1.002	1.005	1.005	1.00	0.82
S104.C	0.994	1.003	1.002	1.002	1.002	1.005	1.005	1.00	0.82
S106.B	1.006	0.999	0.993	0.993	0.993	0.994	0.994	-0.85	-0.79
S108.A	0.996	1.009	1.005	1.005	1.005	1.006	1.005	0.87	0.49
S108.B	1.006	0.999	0.993	0.993	0.993	0.994	0.994	-0.85	-0.79
S108.C	0.994	1.003	1.002	1.002	1.002	1.005	1.005	1.00	0.82
S107.B	1.006	0.999	0.993	0.993	0.993	0.994	0.994	-0.85	-0.79
S109.A	0.996	1.009	1.005	1.005	1.005	1.006	1.005	0.87	0.49
S300.A	0.996	1.009	1.005	1.005	1.005	1.006	1.005	0.87	0.49
S300.B	1.006	0.999	0.993	0.993	0.993	0.994	0.994	-0.85	-0.79
S300.C	0.994	1.003	1.002	1.002	1.002	1.005	1.005	1.00	0.82
S110.A	0.996	1.009	1.005	1.005	1.005	1.006	1.005	0.87	0.49
S111.A	0.996	1.009	1.005	1.005	1.005	1.006	1.005	0.87	0.49
S112.A	0.996	1.009	1.005	1.005	1.005	1.006	1.005	0.87	0.49
S113.A	0.996	1.009	1.005	1.005	1.005	1.006	1.005	0.87	0.49
S114.A	0.996	1.009	1.005	1.005	1.005	1.006	1.005	0.87	0.49
S135.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.78	0.99
S135.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.78	-0.99
S135.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.78	0.99
S152.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.78	0.99
S152.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.78	-0.99
S152.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.78	0.99
S160r.A	0.997	1.010	1.005	1.005	1.005	1.006	1.006	0.80	0.38
S160r.B	1.005	0.998	0.992	0.992	0.992	0.994	0.994	-0.83	-0.75
S160r.C	0.998	1.007	1.004	1.004	1.004	1.005	1.005	0.90	0.56
S160.A	0.991	0.992	0.999	0.999	0.999	1.006	1.006	0.78	0.99
S160.B	1.017	1.017	1.011	1.011	1.011	1.007	1.007	-0.78	-0.99
S160.C	0.974	0.976	0.992	0.991	0.991	1.005	1.005	0.78	0.99
S61s.A	0.991	0.992	0.999	0.999	0.999	1.006	1.006	0.78	0.99
S61s.B	1.017	1.017	1.011	1.011	1.011	1.007	1.007	-0.78	-0.99
S61s.C	0.974	0.976	0.992	0.991	0.991	1.005	1.005	0.78	0.99
S300 open.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.78	0.99
S300 open.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.78	-0.99
S300 open.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.78	0.99
S94 open.A	0.996	0.997	1.002	1.001	1.001	1.006	1.006	0.78	0.99

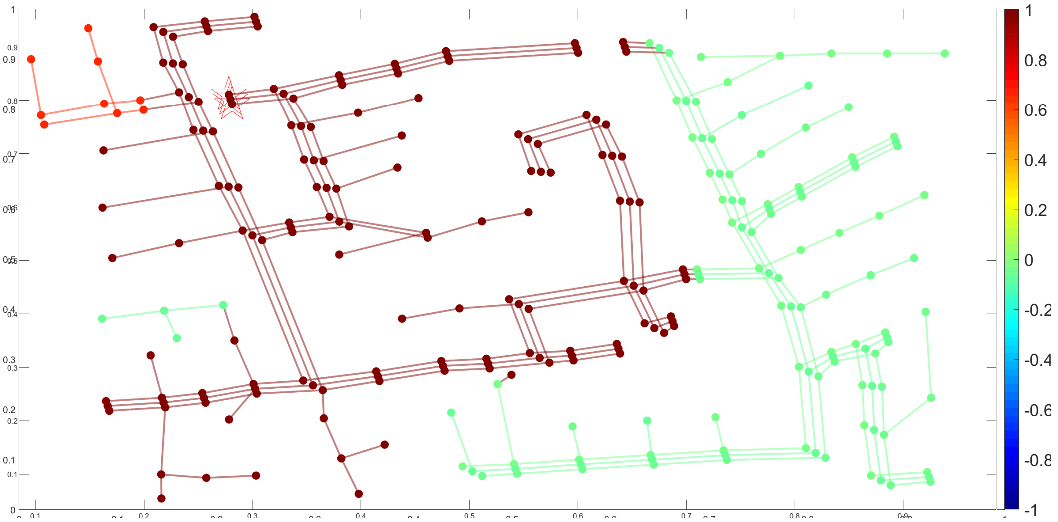

Figure F.6: Graphical representation of Pearson coefficients obtained for Three-phase perturbation at node 48. Load consumption with a rated power of 400 kW and 200 kVAr. (Scenario S5)

Table F.5: Voltage magnitudes and Pearson coefficient values obtained for Scenario S5

Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S48})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S149.A	1.006	1.006	1.006	1.006	1.006	1.006	1.006	1.00
S1.A	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S149.B	1.006	1.006	1.006	1.006	1.006	1.006	1.006	1.00
S1.B	1.006	1.006	1.006	1.006	1.006	1.006	1.006	1.00
S149.C	1.006	1.006	1.006	1.006	1.006	1.006	1.006	1.00
S1.C	1.006	1.006	1.006	1.006	1.006	1.006	1.006	1.00
S2.B	1.006	1.006	1.006	1.006	1.006	1.006	1.006	1.00
S3.C	1.006	1.006	1.006	1.006	1.006	1.006	1.006	1.00
S7.A	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S7.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S7.C	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S4.C	1.006	1.006	1.006	1.006	1.006	1.006	1.006	1.00
S5.C	1.006	1.006	1.006	1.006	1.006	1.006	1.006	1.00
S6.C	1.006	1.006	1.006	1.006	1.006	1.006	1.006	1.00
S8.A	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S8.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S8.C	1.005	1.005	1.005	1.005	1.005	1.006	1.006	1.00
S12.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S9.A	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S48})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S13.A	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S13.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S13.C	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S9r.A	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S14.A	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S34.C	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S18.A	1.002	1.003	1.004	1.004	1.004	1.006	1.006	1.00
S18.B	1.003	1.003	1.005	1.005	1.005	1.006	1.006	1.00
S18.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S11.A	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S10.A	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S15.C	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S16.C	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S17.C	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S19.A	1.002	1.003	1.004	1.004	1.004	1.006	1.006	1.00
S21.A	1.002	1.003	1.004	1.004	1.004	1.006	1.006	1.00
S21.B	1.003	1.003	1.005	1.005	1.005	1.006	1.006	1.00
S21.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S20.A	1.002	1.003	1.004	1.004	1.004	1.006	1.006	1.00
S22.B	1.003	1.003	1.005	1.005	1.005	1.006	1.006	1.00
S23.A	1.002	1.003	1.004	1.004	1.004	1.006	1.006	1.00
S23.B	1.003	1.003	1.005	1.005	1.005	1.006	1.006	1.00
S23.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S24.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S25.A	1.002	1.003	1.004	1.004	1.004	1.006	1.006	1.00
S25.B	1.003	1.003	1.005	1.005	1.005	1.006	1.006	1.00
S25.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S25r.A	0.996	1.003	0.998	0.998	0.998	1.000	1.000	0.14
S26.A	0.996	1.003	0.998	0.998	0.998	1.000	1.000	0.14
S25r.C	0.996	1.002	0.998	0.998	0.998	1.000	1.000	0.15
S26.C	0.996	1.002	0.998	0.998	0.998	1.000	1.000	0.15
S28.A	1.002	1.003	1.004	1.004	1.004	1.006	1.006	1.00
S28.B	1.003	1.003	1.005	1.005	1.005	1.006	1.006	1.00
S28.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S27.A	0.996	1.003	0.998	0.998	0.998	1.000	1.000	0.14
S27.C	0.996	1.002	0.998	0.998	0.998	1.000	1.000	0.15
S31.C	0.996	1.002	0.998	0.998	0.998	1.000	1.000	0.15
S33.A	0.996	1.003	0.998	0.998	0.998	1.000	1.000	0.14
S29.A	1.002	1.003	1.004	1.004	1.004	1.006	1.006	1.00
S29.B	1.003	1.003	1.005	1.005	1.005	1.006	1.006	1.00

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S48})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S29.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S30.A	1.002	1.003	1.004	1.004	1.004	1.006	1.006	1.00
S30.B	1.003	1.003	1.005	1.005	1.005	1.006	1.006	1.00
S30.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S250.A	1.002	1.003	1.004	1.004	1.004	1.006	1.006	1.00
S250.B	1.003	1.003	1.005	1.005	1.005	1.006	1.006	1.00
S250.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S32.C	0.996	1.002	0.998	0.998	0.998	1.000	1.000	0.15
S35.A	1.001	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S36.A	1.001	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S35.B	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S36.B	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S35.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S40.A	1.001	1.001	1.004	1.004	1.004	1.006	1.006	1.00
S40.B	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S40.C	1.001	1.001	1.004	1.004	1.004	1.006	1.006	1.00
S37.A	1.001	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S38.B	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S39.B	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S41.C	1.001	1.001	1.004	1.004	1.004	1.006	1.006	1.00
S42.A	1.000	1.001	1.003	1.003	1.003	1.006	1.006	1.00
S42.B	1.001	1.001	1.004	1.004	1.004	1.006	1.006	1.00
S42.C	1.001	1.001	1.004	1.004	1.004	1.006	1.006	1.00
S43.B	1.001	1.001	1.004	1.004	1.004	1.006	1.006	1.00
S44.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	1.00
S44.B	1.001	1.001	1.004	1.004	1.004	1.006	1.006	1.00
S44.C	1.000	1.001	1.003	1.003	1.003	1.006	1.006	1.00
S45.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	1.00
S47.A	0.999	1.000	1.003	1.003	1.003	1.006	1.006	1.00
S47.B	1.000	1.001	1.003	1.003	1.003	1.006	1.006	1.00
S47.C	1.000	1.000	1.003	1.003	1.003	1.006	1.006	1.00
S46.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	1.00
S48.A	0.999	1.000	1.003	1.003	1.003	1.006	1.006	1.00
S48.B	1.000	1.001	1.003	1.003	1.003	1.006	1.006	1.00
S48.C	1.000	1.000	1.003	1.003	1.003	1.006	1.006	1.00
S49.A	0.999	1.000	1.003	1.003	1.003	1.006	1.006	1.00
S49.B	1.000	1.001	1.003	1.003	1.003	1.006	1.006	1.00
S49.C	1.000	1.000	1.003	1.003	1.003	1.006	1.006	1.00
S50.A	0.999	1.000	1.003	1.003	1.003	1.006	1.006	1.00
S50.B	1.000	1.001	1.003	1.003	1.003	1.006	1.006	1.00

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S48})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S50.C	1.000	1.000	1.003	1.003	1.003	1.006	1.006	1.00
S51.A	0.999	1.000	1.003	1.003	1.003	1.006	1.006	1.00
S51.B	1.000	1.001	1.003	1.003	1.003	1.006	1.006	1.00
S51.C	1.000	1.000	1.003	1.003	1.003	1.006	1.006	1.00
S151.A	0.999	1.000	1.003	1.003	1.003	1.006	1.006	1.00
S151.B	1.000	1.001	1.003	1.003	1.003	1.006	1.006	1.00
S151.C	1.000	1.000	1.003	1.003	1.003	1.006	1.006	1.00
S52.A	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S53.A	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S52.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S53.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S52.C	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S53.C	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S54.A	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S54.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S54.C	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S55.A	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S55.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S55.C	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S57.A	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S57.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S57.C	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S56.A	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S56.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S56.C	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S58.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S60.A	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S60.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S60.C	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S59.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S61.A	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S61.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S61.C	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S62.A	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S62.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S62.C	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S63.A	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S63.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S63.C	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S64.A	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S48})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S64.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S64.C	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S65.A	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S65.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S65.C	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S66.A	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S66.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S66.C	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S67.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S68.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S67.B	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S67.C	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.76
S72.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S72.B	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S72.C	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.76
S97.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S97.B	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S97.C	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.76
S69.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S70.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S71.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S73.C	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.76
S76.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S76.B	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S76.C	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.76
S74.C	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.76
S75.C	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.76
S77.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S77.B	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S77.C	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.76
S86.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S86.B	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S86.C	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.76
S78.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S78.B	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S78.C	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.76
S79.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S79.B	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S79.C	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.76
S80.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S48})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S80.B	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S80.C	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.76
S81.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S81.B	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S81.C	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.76
S82.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S82.B	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S82.C	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.76
S84.C	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.76
S83.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S83.B	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S83.C	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.76
S85.C	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.76
S87.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S87.B	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S87.C	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.76
S88.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S89.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S89.B	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S89.C	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.76
S90.B	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S91.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S91.B	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S91.C	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.76
S92.C	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.76
S93.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S93.B	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S93.C	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.76
S94.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S95.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S95.B	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S95.C	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.76
S96.B	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S98.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S98.B	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S98.C	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.76
S99.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S99.B	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S99.C	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.76
S100.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S48})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S100.B	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S100.C	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.76
S450.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S450.B	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S450.C	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.76
S197.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S101.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S197.B	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S101.B	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S197.C	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.76
S101.C	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.76
S102.C	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.76
S105.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S105.B	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S105.C	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.76
S103.C	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.76
S104.C	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.76
S106.B	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S108.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S108.B	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S108.C	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.76
S107.B	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S109.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S300.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S300.B	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S300.C	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.76
S110.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S111.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S112.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S113.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S114.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S135.A	1.002	1.003	1.004	1.004	1.004	1.006	1.006	1.00
S135.B	1.003	1.003	1.005	1.005	1.005	1.006	1.006	1.00
S135.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S152.A	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S152.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S152.C	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S160r.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S160r.B	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S160r.C	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.76

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S48})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S160.A	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S160.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S160.C	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S61s.A	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S61s.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S61s.C	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S300 open.A	0.999	1.000	1.003	1.003	1.003	1.006	1.006	1.00
S300 open.B	1.000	1.001	1.003	1.003	1.003	1.006	1.006	1.00
S300 open.C	1.000	1.000	1.003	1.003	1.003	1.006	1.006	1.00
S94 open.A	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00

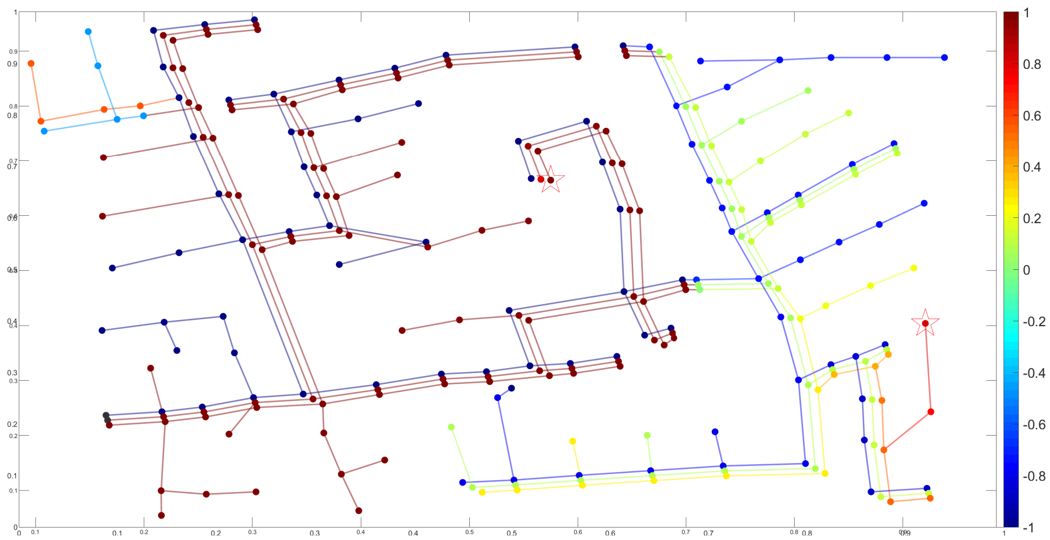

Figure F.7: Graphical representation of Pearson coefficients obtained for Single-phase perturbations at nodes 66, phase C and 85, phase C (synchronized). Load consumption with a rated power of 400 kW and 200 kVAr, reference at node S66C. (Scenario S6)

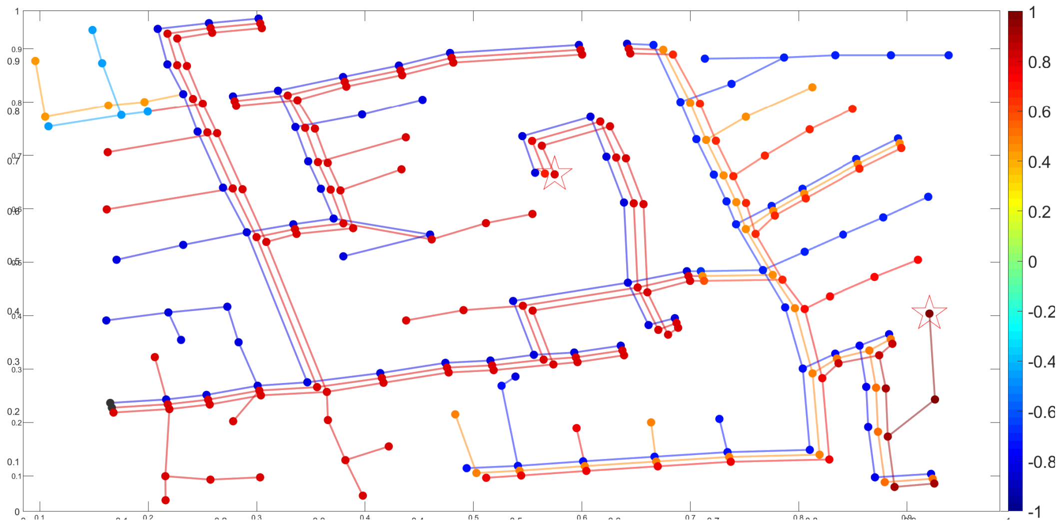

Figure F.8: Graphical representation of Pearson coefficients obtained for Single-phase perturbations at nodes 66, phase C and 85, phase C (synchronized). Load consumption with a rated power of 400 kW and 200 kVAr, reference at node S85C. (Scenario S6)

Table F.6: Voltage magnitudes and Pearson coefficient values obtained for Scenario S6

Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S149.A	1.006	1.006	1.006	1.006	1.006	1.006	1.006	NaN	NaN
S1.A	1.010	1.009	1.008	1.008	1.008	1.006	1.006	-1.00	-0.98
S149.B	1.006	1.006	1.006	1.006	1.006	1.006	1.006	NaN	NaN
S1.B	1.006	1.006	1.006	1.006	1.006	1.006	1.006	0.99	0.97
S149.C	1.006	1.006	1.006	1.006	1.006	1.006	1.006	1.00	0.98
S1.C	0.998	0.999	1.003	1.003	1.003	1.006	1.006	1.00	0.98
S2.B	1.006	1.006	1.006	1.006	1.006	1.006	1.006	0.99	0.97
S3.C	0.998	0.999	1.003	1.003	1.003	1.006	1.006	1.00	0.98
S7.A	1.012	1.012	1.009	1.009	1.009	1.006	1.007	-1.00	-0.98
S7.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.99	0.97
S7.C	0.992	0.993	1.000	1.000	1.000	1.006	1.006	1.00	0.98
S4.C	0.998	0.999	1.003	1.003	1.003	1.006	1.006	1.00	0.98
S5.C	0.998	0.999	1.003	1.003	1.003	1.006	1.006	1.00	0.98
S6.C	0.998	0.999	1.003	1.003	1.003	1.006	1.006	1.00	0.98
S8.A	1.014	1.013	1.010	1.010	1.010	1.007	1.007	-1.00	-0.98
S8.B	1.005	1.005	1.005	1.005	1.005	1.006	1.006	0.99	0.97
S8.C	0.988	0.989	0.998	0.998	0.998	1.006	1.005	1.00	0.98
S12.B	1.005	1.005	1.005	1.005	1.005	1.006	1.006	0.99	0.97

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S9.A	1.014	1.013	1.010	1.010	1.010	1.007	1.007	-1.00	-0.98
S13.A	1.016	1.016	1.011	1.011	1.011	1.007	1.007	-1.00	-0.98
S13.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	0.99	0.97
S13.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	1.00	0.98
S9r.A	1.001	1.001	0.997	0.997	0.997	0.994	0.994	-1.00	-0.98
S14.A	1.001	1.001	0.997	0.997	0.997	0.994	0.994	-1.00	-0.98
S34.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	1.00	0.98
S18.A	1.016	1.016	1.011	1.011	1.011	1.007	1.007	-1.00	-0.98
S18.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	0.99	0.97
S18.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	1.00	0.98
S11.A	1.001	1.001	0.997	0.997	0.997	0.994	0.994	-1.00	-0.98
S10.A	1.001	1.001	0.997	0.997	0.997	0.994	0.994	-1.00	-0.98
S15.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	1.00	0.98
S16.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	1.00	0.98
S17.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	1.00	0.98
S19.A	1.016	1.016	1.011	1.011	1.011	1.007	1.007	-1.00	-0.98
S21.A	1.016	1.016	1.011	1.011	1.011	1.007	1.007	-1.00	-0.98
S21.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	0.99	0.97
S21.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	1.00	0.98
S20.A	1.016	1.016	1.011	1.011	1.011	1.007	1.007	-1.00	-0.98
S22.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	0.99	0.97
S23.A	1.016	1.016	1.011	1.011	1.011	1.007	1.007	-1.00	-0.98
S23.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	0.99	0.97
S23.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	1.00	0.98
S24.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	1.00	0.98
S25.A	1.016	1.016	1.011	1.011	1.011	1.007	1.007	-1.00	-0.98
S25.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	0.99	0.97
S25.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	1.00	0.98
S25r.A	0.997	0.997	0.998	0.998	0.998	1.000	1.000	0.97	0.92
S26.A	0.997	0.997	0.998	0.998	0.998	1.000	1.000	0.97	0.92
S25r.C	1.000	1.002	1.002	1.001	1.001	0.999	0.999	-0.69	-0.61
S26.C	1.000	1.002	1.002	1.001	1.001	0.999	0.999	-0.69	-0.61
S28.A	1.016	1.016	1.011	1.011	1.011	1.007	1.007	-1.00	-0.98
S28.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	0.99	0.97
S28.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	1.00	0.98
S27.A	0.997	0.997	0.998	0.998	0.998	1.000	1.000	0.97	0.92
S27.C	1.000	1.002	1.002	1.001	1.001	0.999	0.999	-0.69	-0.61
S31.C	1.000	1.002	1.002	1.001	1.001	0.999	0.999	-0.69	-0.61
S33.A	0.997	0.997	0.998	0.998	0.998	1.000	1.000	0.97	0.92
S29.A	1.016	1.016	1.011	1.011	1.011	1.007	1.007	-1.00	-0.98

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S29.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	0.99	0.97
S29.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	1.00	0.98
S30.A	1.016	1.016	1.011	1.011	1.011	1.007	1.007	-1.00	-0.98
S30.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	0.99	0.97
S30.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	1.00	0.98
S250.A	1.016	1.016	1.011	1.011	1.011	1.007	1.007	-1.00	-0.98
S250.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	0.99	0.97
S250.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	1.00	0.98
S32.C	1.000	1.002	1.002	1.001	1.001	0.999	0.999	-0.69	-0.61
S35.A	1.016	1.016	1.011	1.011	1.011	1.007	1.007	-1.00	-0.98
S36.A	1.016	1.016	1.011	1.011	1.011	1.007	1.007	-1.00	-0.98
S35.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	0.99	0.97
S36.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	0.99	0.97
S35.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	1.00	0.98
S40.A	1.016	1.016	1.011	1.011	1.011	1.007	1.007	-1.00	-0.98
S40.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	0.99	0.97
S40.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	1.00	0.98
S37.A	1.016	1.016	1.011	1.011	1.011	1.007	1.007	-1.00	-0.98
S38.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	0.99	0.97
S39.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	0.99	0.97
S41.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	1.00	0.98
S42.A	1.016	1.016	1.011	1.011	1.011	1.007	1.007	-1.00	-0.98
S42.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	0.99	0.97
S42.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	1.00	0.98
S43.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	0.99	0.97
S44.A	1.016	1.016	1.011	1.011	1.011	1.007	1.007	-1.00	-0.98
S44.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	0.99	0.97
S44.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	1.00	0.98
S45.A	1.016	1.016	1.011	1.011	1.011	1.007	1.007	-1.00	-0.98
S47.A	1.016	1.016	1.011	1.011	1.011	1.007	1.007	-1.00	-0.98
S47.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	0.99	0.97
S47.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	1.00	0.98
S46.A	1.016	1.016	1.011	1.011	1.011	1.007	1.007	-1.00	-0.98
S48.A	1.016	1.016	1.011	1.011	1.011	1.007	1.007	-1.00	-0.98
S48.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	0.99	0.97
S48.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	1.00	0.98
S49.A	1.016	1.016	1.011	1.011	1.011	1.007	1.007	-1.00	-0.98
S49.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	0.99	0.97
S49.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	1.00	0.98
S50.A	1.016	1.016	1.011	1.011	1.011	1.007	1.007	-1.00	-0.98

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S50.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	0.99	0.97
S50.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	1.00	0.98
S51.A	1.016	1.016	1.011	1.011	1.011	1.007	1.007	-1.00	-0.98
S51.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	0.99	0.97
S51.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	1.00	0.98
S151.A	1.016	1.016	1.011	1.011	1.011	1.007	1.007	-1.00	-0.98
S151.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	0.99	0.97
S151.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	1.00	0.98
S52.A	1.020	1.019	1.013	1.013	1.013	1.007	1.007	-1.00	-0.98
S53.A	1.021	1.020	1.013	1.013	1.013	1.007	1.007	-1.00	-0.98
S52.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	0.99	0.97
S53.B	1.003	1.004	1.005	1.005	1.005	1.006	1.006	0.99	0.97
S52.C	0.974	0.976	0.992	0.992	0.992	1.005	1.005	1.00	0.98
S53.C	0.970	0.973	0.990	0.990	0.990	1.005	1.005	1.00	0.98
S54.A	1.022	1.021	1.014	1.014	1.014	1.007	1.007	-1.00	-0.98
S54.B	1.003	1.003	1.005	1.005	1.005	1.006	1.006	0.99	0.97
S54.C	0.968	0.970	0.989	0.989	0.989	1.005	1.005	1.00	0.98
S55.A	1.022	1.021	1.014	1.014	1.014	1.007	1.007	-1.00	-0.98
S55.B	1.003	1.003	1.005	1.005	1.005	1.006	1.006	0.99	0.97
S55.C	0.968	0.970	0.989	0.989	0.989	1.005	1.005	1.00	0.98
S57.A	1.026	1.024	1.015	1.015	1.015	1.007	1.007	-1.00	-0.98
S57.B	1.002	1.003	1.004	1.004	1.004	1.006	1.006	0.99	0.97
S57.C	0.961	0.964	0.986	0.985	0.985	1.005	1.004	1.00	0.98
S56.A	1.022	1.021	1.014	1.014	1.014	1.007	1.007	-1.00	-0.98
S56.B	1.003	1.003	1.005	1.005	1.005	1.006	1.006	0.99	0.97
S56.C	0.968	0.970	0.989	0.989	0.989	1.005	1.005	1.00	0.98
S58.B	1.002	1.003	1.004	1.004	1.004	1.006	1.006	0.99	0.97
S60.A	1.033	1.031	1.019	1.019	1.019	1.007	1.007	-1.00	-0.98
S60.B	1.001	1.001	1.003	1.003	1.003	1.006	1.006	0.99	0.97
S60.C	0.946	0.950	0.979	0.979	0.979	1.004	1.004	1.00	0.98
S59.B	1.002	1.003	1.004	1.004	1.004	1.006	1.006	0.99	0.97
S61.A	1.033	1.031	1.019	1.019	1.019	1.007	1.007	-1.00	-0.98
S61.B	1.001	1.001	1.003	1.003	1.003	1.006	1.006	0.99	0.97
S61.C	0.946	0.950	0.979	0.979	0.979	1.004	1.004	1.00	0.98
S62.A	1.033	1.031	1.019	1.019	1.019	1.007	1.007	-1.00	-0.98
S62.B	1.002	1.002	1.004	1.004	1.004	1.006	1.006	0.99	0.97
S62.C	0.942	0.946	0.977	0.977	0.977	1.004	1.003	1.00	0.98
S63.A	1.034	1.032	1.019	1.019	1.019	1.007	1.008	-1.00	-0.98
S63.B	1.002	1.002	1.004	1.004	1.004	1.006	1.006	0.98	0.96
S63.C	0.939	0.943	0.975	0.975	0.975	1.004	1.003	1.00	0.98

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S64.A	1.034	1.033	1.020	1.020	1.020	1.007	1.008	-1.00	-0.98
S64.B	1.003	1.003	1.004	1.004	1.004	1.006	1.006	0.97	0.94
S64.C	0.932	0.937	0.972	0.972	0.972	1.003	1.003	1.00	0.98
S65.A	1.035	1.034	1.020	1.020	1.020	1.007	1.008	-1.00	-0.98
S65.B	1.005	1.005	1.005	1.005	1.005	1.006	1.006	0.86	0.84
S65.C	0.925	0.930	0.969	0.968	0.968	1.003	1.003	1.00	0.98
S66.A	1.036	1.034	1.020	1.020	1.020	1.007	1.008	-1.00	-0.98
S66.B	1.006	1.006	1.005	1.005	1.005	1.006	1.006	0.27	0.26
S66.C	0.919	0.925	0.966	0.966	0.966	1.003	1.002	1.00	0.98
S67.A	1.009	0.994	0.994	0.994	0.994	0.995	0.995	-0.54	-0.67
S68.A	1.009	0.994	0.994	0.994	0.994	0.995	0.995	-0.54	-0.67
S67.B	0.994	0.995	0.997	0.997	0.997	1.000	1.000	0.99	0.97
S67.C	0.996	1.006	1.002	1.002	1.002	1.004	1.004	0.36	0.54
S72.A	1.010	0.995	0.995	0.995	0.995	0.995	0.995	-0.60	-0.72
S72.B	0.994	0.994	0.997	0.997	0.997	1.000	1.000	0.99	0.97
S72.C	0.993	1.004	1.001	1.000	1.000	1.004	1.003	0.58	0.73
S97.A	1.009	0.994	0.994	0.994	0.994	0.995	0.995	-0.54	-0.67
S97.B	0.994	0.995	0.997	0.997	0.997	1.000	1.000	0.99	0.97
S97.C	0.996	1.006	1.002	1.002	1.002	1.004	1.004	0.36	0.54
S69.A	1.009	0.994	0.994	0.994	0.994	0.995	0.995	-0.54	-0.67
S70.A	1.009	0.994	0.994	0.994	0.994	0.995	0.995	-0.54	-0.67
S71.A	1.009	0.994	0.994	0.994	0.994	0.995	0.995	-0.54	-0.67
S73.C	0.993	1.004	1.001	1.000	1.000	1.004	1.003	0.58	0.73
S76.A	1.011	0.996	0.995	0.995	0.995	0.995	0.995	-0.64	-0.75
S76.B	0.994	0.994	0.996	0.996	0.996	1.000	1.000	0.99	0.97
S76.C	0.991	1.002	1.000	0.999	0.999	1.004	1.003	0.69	0.82
S74.C	0.993	1.004	1.001	1.000	1.000	1.004	1.003	0.58	0.73
S75.C	0.993	1.004	1.001	1.000	1.000	1.004	1.003	0.58	0.73
S77.A	1.013	0.998	0.996	0.996	0.996	0.995	0.995	-0.71	-0.81
S77.B	0.994	0.994	0.996	0.996	0.996	1.000	1.000	0.99	0.97
S77.C	0.987	0.999	0.998	0.998	0.998	1.004	1.003	0.81	0.92
S86.A	1.011	0.996	0.995	0.995	0.995	0.995	0.995	-0.64	-0.75
S86.B	0.994	0.994	0.996	0.996	0.996	1.000	1.000	0.99	0.97
S86.C	0.991	1.002	1.000	0.999	0.999	1.004	1.003	0.69	0.82
S78.A	1.014	0.998	0.996	0.996	0.996	0.995	0.995	-0.72	-0.82
S78.B	0.994	0.994	0.996	0.996	0.996	1.000	1.000	0.99	0.97
S78.C	0.986	0.998	0.997	0.997	0.997	1.004	1.003	0.84	0.93
S79.A	1.014	0.998	0.996	0.996	0.996	0.995	0.995	-0.72	-0.82
S79.B	0.994	0.994	0.996	0.996	0.996	1.000	1.000	0.99	0.97
S79.C	0.986	0.998	0.997	0.997	0.997	1.004	1.003	0.84	0.93

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S80.A	1.016	1.001	0.997	0.998	0.998	0.995	0.995	-0.78	-0.87
S80.B	0.993	0.994	0.996	0.996	0.996	1.000	1.000	0.99	0.97
S80.C	0.982	0.994	0.995	0.995	0.995	1.003	1.003	0.90	0.97
S81.A	1.017	1.002	0.998	0.998	0.998	0.995	0.995	-0.80	-0.88
S81.B	0.993	0.993	0.996	0.996	0.996	1.000	1.000	0.99	0.97
S81.C	0.980	0.992	0.995	0.994	0.994	1.003	1.003	0.91	0.98
S82.A	1.017	1.002	0.998	0.998	0.998	0.995	0.995	-0.80	-0.88
S82.B	0.993	0.993	0.996	0.996	0.996	1.000	1.000	0.99	0.97
S82.C	0.980	0.992	0.995	0.994	0.994	1.003	1.003	0.91	0.98
S84.C	0.967	0.980	0.989	0.988	0.988	1.003	1.002	0.97	1.00
S83.A	1.017	1.002	0.998	0.998	0.998	0.995	0.995	-0.80	-0.88
S83.B	0.993	0.993	0.996	0.996	0.996	1.000	1.000	0.99	0.97
S83.C	0.980	0.992	0.995	0.994	0.994	1.003	1.003	0.91	0.98
S85.C	0.958	0.972	0.984	0.984	0.984	1.002	1.002	0.98	1.00
S87.A	1.011	0.996	0.995	0.995	0.995	0.995	0.995	-0.64	-0.75
S87.B	0.994	0.994	0.996	0.996	0.996	1.000	1.000	0.99	0.97
S87.C	0.991	1.002	1.000	0.999	0.999	1.004	1.003	0.69	0.82
S88.A	1.011	0.996	0.995	0.995	0.995	0.995	0.995	-0.64	-0.75
S89.A	1.011	0.996	0.995	0.995	0.995	0.995	0.995	-0.64	-0.75
S89.B	0.994	0.994	0.996	0.996	0.996	1.000	1.000	0.99	0.97
S89.C	0.991	1.002	1.000	0.999	0.999	1.004	1.003	0.69	0.82
S90.B	0.994	0.994	0.996	0.996	0.996	1.000	1.000	0.99	0.97
S91.A	1.011	0.996	0.995	0.995	0.995	0.995	0.995	-0.64	-0.75
S91.B	0.994	0.994	0.996	0.996	0.996	1.000	1.000	0.99	0.97
S91.C	0.991	1.002	1.000	0.999	0.999	1.004	1.003	0.69	0.82
S92.C	0.991	1.002	1.000	0.999	0.999	1.004	1.003	0.69	0.82
S93.A	1.011	0.996	0.995	0.995	0.995	0.995	0.995	-0.64	-0.75
S93.B	0.994	0.994	0.996	0.996	0.996	1.000	1.000	0.99	0.97
S93.C	0.991	1.002	1.000	0.999	0.999	1.004	1.003	0.69	0.82
S94.A	1.011	0.996	0.995	0.995	0.995	0.995	0.995	-0.64	-0.75
S95.A	1.011	0.996	0.995	0.995	0.995	0.995	0.995	-0.64	-0.75
S95.B	0.994	0.994	0.996	0.996	0.996	1.000	1.000	0.99	0.97
S95.C	0.991	1.002	1.000	0.999	0.999	1.004	1.003	0.69	0.82
S96.B	0.994	0.994	0.996	0.996	0.996	1.000	1.000	0.99	0.97
S98.A	1.009	0.994	0.994	0.994	0.994	0.995	0.995	-0.54	-0.67
S98.B	0.994	0.995	0.997	0.997	0.997	1.000	1.000	0.99	0.97
S98.C	0.996	1.006	1.002	1.002	1.002	1.004	1.004	0.36	0.54
S99.A	1.009	0.994	0.994	0.994	0.994	0.995	0.995	-0.54	-0.67
S99.B	0.994	0.995	0.997	0.997	0.997	1.000	1.000	0.99	0.97
S99.C	0.996	1.006	1.002	1.002	1.002	1.004	1.004	0.36	0.54

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S100.A	1.009	0.994	0.994	0.994	0.994	0.995	0.995	-0.54	-0.67
S100.B	0.994	0.995	0.997	0.997	0.997	1.000	1.000	0.99	0.97
S100.C	0.996	1.006	1.002	1.002	1.002	1.004	1.004	0.36	0.54
S450.A	1.009	0.994	0.994	0.994	0.994	0.995	0.995	-0.54	-0.67
S450.B	0.994	0.995	0.997	0.997	0.997	1.000	1.000	0.99	0.97
S450.C	0.996	1.006	1.002	1.002	1.002	1.004	1.004	0.36	0.54
S197.A	1.009	0.994	0.994	0.994	0.994	0.995	0.995	-0.54	-0.67
S101.A	1.009	0.994	0.994	0.994	0.994	0.995	0.995	-0.54	-0.67
S197.B	0.994	0.995	0.997	0.997	0.997	1.000	1.000	0.99	0.97
S101.B	0.994	0.995	0.997	0.997	0.997	1.000	1.000	0.99	0.97
S197.C	0.996	1.006	1.002	1.002	1.002	1.004	1.004	0.36	0.54
S101.C	0.996	1.006	1.002	1.002	1.002	1.004	1.004	0.36	0.54
S102.C	0.996	1.006	1.002	1.002	1.002	1.004	1.004	0.36	0.54
S105.A	1.009	0.994	0.994	0.994	0.994	0.995	0.995	-0.54	-0.67
S105.B	0.994	0.995	0.997	0.997	0.997	1.000	1.000	0.99	0.97
S105.C	0.996	1.006	1.002	1.002	1.002	1.004	1.004	0.36	0.54
S103.C	0.996	1.006	1.002	1.002	1.002	1.004	1.004	0.36	0.54
S104.C	0.996	1.006	1.002	1.002	1.002	1.004	1.004	0.36	0.54
S106.B	0.994	0.995	0.997	0.997	0.997	1.000	1.000	0.99	0.97
S108.A	1.009	0.994	0.994	0.994	0.994	0.995	0.995	-0.54	-0.67
S108.B	0.994	0.995	0.997	0.997	0.997	1.000	1.000	0.99	0.97
S108.C	0.996	1.006	1.002	1.002	1.002	1.004	1.004	0.36	0.54
S107.B	0.994	0.995	0.997	0.997	0.997	1.000	1.000	0.99	0.97
S109.A	1.009	0.994	0.994	0.994	0.994	0.995	0.995	-0.54	-0.67
S300.A	1.009	0.994	0.994	0.994	0.994	0.995	0.995	-0.54	-0.67
S300.B	0.994	0.995	0.997	0.997	0.997	1.000	1.000	0.99	0.97
S300.C	0.996	1.006	1.002	1.002	1.002	1.004	1.004	0.36	0.54
S110.A	1.009	0.994	0.994	0.994	0.994	0.995	0.995	-0.54	-0.67
S111.A	1.009	0.994	0.994	0.994	0.994	0.995	0.995	-0.54	-0.67
S112.A	1.009	0.994	0.994	0.994	0.994	0.995	0.995	-0.54	-0.67
S113.A	1.009	0.994	0.994	0.994	0.994	0.995	0.995	-0.54	-0.67
S114.A	1.009	0.994	0.994	0.994	0.994	0.995	0.995	-0.54	-0.67
S135.A	1.016	1.016	1.011	1.011	1.011	1.007	1.007	-1.00	-0.98
S135.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	0.99	0.97
S135.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	1.00	0.98
S152.A	1.016	1.016	1.011	1.011	1.011	1.007	1.007	-1.00	-0.98
S152.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	0.99	0.97
S152.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	1.00	0.98
S160r.A	1.007	0.992	0.993	0.993	0.993	0.995	0.995	-0.44	-0.58
S160r.B	0.995	0.995	0.997	0.997	0.997	1.000	1.000	0.99	0.97

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S160r.C	0.999	1.010	1.003	1.003	1.003	1.004	1.004	-0.04	0.17
S160.A	1.033	1.031	1.019	1.019	1.019	1.007	1.007	-1.00	-0.98
S160.B	1.001	1.001	1.003	1.003	1.003	1.006	1.006	0.99	0.97
S160.C	0.946	0.950	0.979	0.979	0.979	1.004	1.004	1.00	0.98
S61s.A	1.033	1.031	1.019	1.019	1.019	1.007	1.007	-1.00	-0.98
S61s.B	1.001	1.001	1.003	1.003	1.003	1.006	1.006	0.99	0.97
S61s.C	0.946	0.950	0.979	0.979	0.979	1.004	1.004	1.00	0.98
S300 open.A	1.016	1.016	1.011	1.011	1.011	1.007	1.007	-1.00	-0.98
S300 open.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	0.99	0.97
S300 open.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	1.00	0.98
S94 open.A	1.022	1.021	1.014	1.014	1.014	1.007	1.007	-1.00	-0.98

F.0.2 Considering OLTCs connected with capacitors compensation

Table F.7: Voltage magnitudes and Pearson coefficient values obtained for Scenario S1

Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S100.A	1.002	0.994	0.993	0.993	0.993	0.993	0.993	-0.82
S100.B	0.988	0.988	0.989	0.989	0.989	0.991	0.991	0.93
S100.C	0.989	1.005	1.003	1.002	1.002	1.004	1.004	0.77
S101.A	1.002	0.994	0.993	0.993	0.993	0.993	0.993	-0.82
S101.B	0.988	0.988	0.989	0.989	0.989	0.991	0.991	0.93
S101.C	0.989	1.005	1.003	1.002	1.002	1.004	1.004	0.77
S102.C	0.989	1.005	1.003	1.002	1.002	1.004	1.004	0.77
S103.C	0.989	1.005	1.003	1.002	1.002	1.004	1.004	0.77
S104.C	0.989	1.005	1.003	1.002	1.002	1.004	1.004	0.77
S105.A	1.002	0.994	0.993	0.993	0.993	0.993	0.993	-0.82
S105.B	0.988	0.988	0.989	0.989	0.989	0.991	0.991	0.93
S105.C	0.989	1.005	1.003	1.002	1.002	1.004	1.004	0.77
S106.B	0.988	0.988	0.989	0.989	0.989	0.991	0.991	0.93

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S107.B	0.988	0.988	0.989	0.989	0.989	0.991	0.991	0.93
S108.A	1.002	0.994	0.993	0.993	0.993	0.993	0.993	-0.82
S108.B	0.988	0.988	0.989	0.989	0.989	0.991	0.991	0.93
S108.C	0.989	1.005	1.003	1.002	1.002	1.004	1.004	0.77
S109.A	1.002	0.994	0.993	0.993	0.993	0.993	0.993	-0.82
S10.A	0.996	0.996	0.994	0.994	0.994	0.992	0.992	-0.97
S110.A	1.002	0.994	0.993	0.993	0.993	0.993	0.993	-0.82
S111.A	1.002	0.994	0.993	0.993	0.993	0.993	0.993	-0.82
S112.A	1.002	0.994	0.993	0.993	0.993	0.993	0.993	-0.82
S113.A	1.002	0.994	0.993	0.993	0.993	0.993	0.993	-0.82
S114.A	1.002	0.994	0.993	0.993	0.993	0.993	0.993	-0.82
S11.A	0.996	0.996	0.994	0.994	0.994	0.992	0.992	-0.97
S12.B	0.997	0.997	0.997	0.997	0.997	0.998	0.998	0.93
S135.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-0.97
S135.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	0.93
S135.C	0.988	0.989	0.995	0.995	0.995	1.000	1.000	0.97
S13.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-0.97
S13.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	0.93
S13.C	0.988	0.989	0.995	0.995	0.995	1.000	1.000	0.97
S149.A	0.994	0.994	0.994	0.994	0.994	0.994	0.994	-0.78
S149.B	0.994	0.994	0.994	0.994	0.994	0.994	0.994	NaN
S149.C	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.98
S14.A	0.996	0.996	0.994	0.994	0.994	0.992	0.992	-0.97
S151.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-0.97
S151.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	0.93
S151.C	0.988	0.989	0.995	0.995	0.995	1.000	1.000	0.97
S152.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-0.97
S152.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	0.93
S152.C	0.988	0.989	0.995	0.995	0.995	1.000	1.000	0.97
S15.C	0.988	0.989	0.995	0.995	0.995	1.000	1.000	0.97
S160.A	1.023	1.022	1.016	1.016	1.016	1.010	1.010	-0.97
S160.B	1.005	1.005	1.006	1.006	1.006	1.008	1.008	0.93
S160.C	0.979	0.982	0.996	0.996	0.996	1.009	1.008	0.97
S160r.A	0.998	0.990	0.990	0.990	0.990	0.991	0.991	-0.69
S160r.B	0.986	0.986	0.988	0.988	0.988	0.989	0.989	0.93
S160r.C	0.991	1.006	1.002	1.002	1.002	1.002	1.002	0.61
S16.C	0.988	0.989	0.995	0.995	0.995	1.000	1.000	0.97
S17.C	0.988	0.989	0.995	0.995	0.995	1.000	1.000	0.97
S18.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-0.97
S18.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	0.93

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S18.C	0.988	0.989	0.995	0.995	0.995	1.000	1.000	0.97
S197.A	1.002	0.994	0.993	0.993	0.993	0.993	0.993	-0.82
S197.B	0.988	0.988	0.989	0.989	0.989	0.991	0.991	0.93
S197.C	0.989	1.005	1.003	1.002	1.002	1.004	1.004	0.77
S19.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-0.97
S1.A	0.998	0.997	0.997	0.997	0.997	0.996	0.996	-0.97
S1.B	0.995	0.995	0.995	0.995	0.995	0.996	0.996	0.93
S1.C	0.992	0.992	0.994	0.994	0.994	0.996	0.996	0.97
S20.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-0.97
S21.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-0.97
S21.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	0.93
S21.C	0.988	0.989	0.995	0.995	0.995	1.000	1.000	0.97
S22.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	0.93
S23.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-0.97
S23.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	0.93
S23.C	0.988	0.989	0.995	0.995	0.995	1.000	1.000	0.97
S24.C	0.988	0.989	0.995	0.995	0.995	1.000	1.000	0.97
S250.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-0.97
S250.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	0.93
S250.C	0.988	0.989	0.995	0.995	0.995	1.000	1.000	0.97
S25.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-0.97
S25.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	0.93
S25.C	0.988	0.989	0.995	0.995	0.995	1.000	1.000	0.97
S25r.A	0.999	0.998	0.996	0.996	0.996	1.000	1.000	0.15
S25r.C	1.000	1.002	1.001	1.001	1.001	1.000	1.000	-0.31
S26.A	0.999	0.998	0.996	0.996	0.996	1.000	1.000	0.15
S26.C	1.000	1.002	1.001	1.001	1.001	1.000	1.000	-0.30
S27.A	0.999	0.998	0.996	0.996	0.996	1.000	1.000	0.15
S27.C	1.000	1.002	1.001	1.001	1.001	1.000	1.000	-0.30
S28.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-0.97
S28.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	0.93
S28.C	0.988	0.989	0.995	0.995	0.995	1.000	1.000	0.97
S29.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-0.97
S29.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	0.93
S29.C	0.988	0.989	0.995	0.995	0.995	1.000	1.000	0.97
S2.B	0.995	0.995	0.995	0.995	0.995	0.996	0.996	0.93
S300.A	1.002	0.994	0.993	0.993	0.993	0.993	0.993	-0.82
S300.B	0.988	0.988	0.989	0.989	0.989	0.991	0.991	0.93
S300.C	0.989	1.005	1.003	1.002	1.002	1.004	1.004	0.77

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S300 open.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-0.97
S300 open.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	0.93
S300 open.C	0.988	0.989	0.995	0.995	0.995	1.000	1.000	0.97
S30.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-0.97
S30.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	0.93
S30.C	0.988	0.989	0.995	0.995	0.995	1.000	1.000	0.97
S31.C	1.000	1.002	1.001	1.001	1.001	1.000	1.000	-0.30
S32.C	1.000	1.002	1.001	1.001	1.001	1.000	1.000	-0.30
S33.A	0.999	0.998	0.996	0.996	0.996	1.000	1.000	0.15
S34.C	0.988	0.989	0.995	0.995	0.995	1.000	1.000	0.97
S35.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-0.97
S35.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	0.93
S35.C	0.988	0.989	0.995	0.995	0.995	1.000	1.000	0.97
S36.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-0.97
S36.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	0.93
S37.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-0.97
S38.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	0.93
S39.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	0.93
S3.C	0.992	0.992	0.994	0.994	0.994	0.996	0.996	0.97
S40.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-0.97
S40.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	0.93
S40.C	0.988	0.989	0.995	0.995	0.995	1.000	1.000	0.97
S41.C	0.988	0.989	0.995	0.995	0.995	1.000	1.000	0.97
S42.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-0.97
S42.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	0.93
S42.C	0.988	0.989	0.995	0.995	0.995	1.000	1.000	0.97
S43.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	0.93
S44.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-0.97
S44.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	0.93
S44.C	0.988	0.989	0.995	0.995	0.995	1.000	1.000	0.97
S450.A	1.002	0.994	0.993	0.993	0.993	0.993	0.993	-0.82
S450.B	0.988	0.988	0.989	0.989	0.989	0.991	0.991	0.93
S450.C	0.989	1.005	1.003	1.002	1.002	1.004	1.004	0.77
S45.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-0.97
S46.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-0.97
S47.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-0.97
S47.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	0.93

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S47.C	0.988	0.989	0.995	0.995	0.995	1.000	1.000	0.97
S48.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-0.97
S48.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	0.93
S48.C	0.988	0.989	0.995	0.995	0.995	1.000	1.000	0.97
S49.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-0.97
S49.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	0.93
S49.C	0.988	0.989	0.995	0.995	0.995	1.000	1.000	0.97
S4.C	0.992	0.992	0.994	0.994	0.994	0.996	0.996	0.97
S50.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-0.97
S50.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	0.93
S50.C	0.988	0.989	0.995	0.995	0.995	1.000	1.000	0.97
S51.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-0.97
S51.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	0.93
S51.C	0.988	0.989	0.995	0.995	0.995	1.000	1.000	0.97
S52.A	1.009	1.008	1.005	1.005	1.005	1.002	1.002	-0.97
S52.B	1.000	1.000	1.000	1.000	1.000	1.001	1.001	0.93
S52.C	0.986	0.988	0.995	0.995	0.995	1.002	1.002	0.97
S53.A	1.011	1.010	1.006	1.006	1.006	1.003	1.003	-0.97
S53.B	1.001	1.001	1.001	1.001	1.001	1.002	1.002	0.93
S53.C	0.985	0.987	0.996	0.996	0.996	1.003	1.003	0.97
S54.A	1.012	1.011	1.007	1.007	1.007	1.004	1.004	-0.97
S54.B	1.001	1.001	1.002	1.002	1.002	1.003	1.003	0.92
S54.C	0.984	0.986	0.996	0.996	0.996	1.004	1.004	0.97
S55.A	1.012	1.011	1.007	1.007	1.007	1.004	1.004	-0.97
S55.B	1.001	1.001	1.002	1.002	1.002	1.003	1.003	0.92
S55.C	0.984	0.986	0.996	0.996	0.996	1.004	1.004	0.97
S56.A	1.012	1.011	1.007	1.007	1.007	1.004	1.004	-0.97
S56.B	1.001	1.001	1.002	1.002	1.002	1.003	1.003	0.92
S56.C	0.984	0.986	0.996	0.996	0.996	1.004	1.004	0.97
S57.A	1.016	1.015	1.010	1.010	1.010	1.006	1.006	-0.97
S57.B	1.002	1.002	1.003	1.003	1.003	1.004	1.004	0.93
S57.C	0.982	0.985	0.996	0.996	0.996	1.005	1.005	0.97
S58.B	1.002	1.002	1.003	1.003	1.003	1.004	1.004	0.93
S59.B	1.002	1.002	1.003	1.003	1.003	1.004	1.004	0.93
S5.C	0.992	0.992	0.994	0.994	0.994	0.996	0.996	0.97
S60.A	1.023	1.022	1.016	1.016	1.016	1.010	1.010	-0.97
S60.B	1.005	1.005	1.006	1.006	1.006	1.008	1.008	0.93
S60.C	0.979	0.982	0.996	0.996	0.996	1.009	1.008	0.97
S61.A	1.023	1.022	1.016	1.016	1.016	1.010	1.010	-0.97
S61.B	1.005	1.005	1.006	1.006	1.006	1.008	1.008	0.93

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S61.C	0.979	0.982	0.996	0.996	0.996	1.009	1.008	0.97
S61s.A	1.023	1.022	1.016	1.016	1.016	1.010	1.010	-0.97
S61s.B	1.005	1.005	1.006	1.006	1.006	1.008	1.008	0.93
S61s.C	0.979	0.982	0.996	0.996	0.996	1.009	1.008	0.97
S62.A	1.023	1.022	1.016	1.016	1.016	1.010	1.010	-0.97
S62.B	1.005	1.005	1.006	1.006	1.006	1.008	1.008	0.93
S62.C	0.979	0.982	0.996	0.996	0.996	1.009	1.008	0.97
S63.A	1.023	1.022	1.016	1.016	1.016	1.010	1.010	-0.97
S63.B	1.005	1.005	1.006	1.006	1.006	1.008	1.008	0.93
S63.C	0.979	0.982	0.996	0.996	0.996	1.009	1.008	0.97
S64.A	1.023	1.022	1.016	1.016	1.016	1.010	1.010	-0.97
S64.B	1.005	1.005	1.006	1.006	1.006	1.008	1.008	0.93
S64.C	0.979	0.982	0.996	0.996	0.996	1.009	1.008	0.97
S65.A	1.023	1.022	1.016	1.016	1.016	1.010	1.010	-0.97
S65.B	1.005	1.005	1.006	1.006	1.006	1.008	1.008	0.93
S65.C	0.979	0.982	0.996	0.996	0.996	1.009	1.008	0.97
S66.A	1.023	1.022	1.016	1.016	1.016	1.010	1.010	-0.97
S66.B	1.005	1.005	1.006	1.006	1.006	1.008	1.008	0.93
S66.C	0.979	0.982	0.996	0.996	0.996	1.009	1.008	0.97
S67.A	1.002	0.994	0.993	0.993	0.993	0.993	0.993	-0.82
S67.B	0.988	0.988	0.989	0.989	0.989	0.991	0.991	0.93
S67.C	0.989	1.005	1.003	1.002	1.002	1.004	1.004	0.77
S68.A	1.002	0.994	0.993	0.993	0.993	0.993	0.993	-0.82
S69.A	1.002	0.994	0.993	0.993	0.993	0.993	0.993	-0.82
S6.C	0.992	0.992	0.994	0.994	0.994	0.996	0.996	0.97
S70.A	1.002	0.994	0.993	0.993	0.993	0.993	0.993	-0.82
S71.A	1.002	0.994	0.993	0.993	0.993	0.993	0.993	-0.82
S72.A	1.005	0.996	0.995	0.995	0.995	0.994	0.995	-0.88
S72.B	0.989	0.989	0.991	0.991	0.991	0.992	0.992	0.93
S72.C	0.987	1.004	1.003	1.003	1.003	1.005	1.005	0.85
S73.C	0.987	1.004	1.003	1.003	1.003	1.005	1.005	0.85
S74.C	0.987	1.004	1.003	1.003	1.003	1.005	1.005	0.85
S75.C	0.987	1.004	1.003	1.003	1.003	1.005	1.005	0.85
S76.A	1.007	0.998	0.997	0.997	0.997	0.996	0.996	-0.90
S76.B	0.990	0.990	0.991	0.991	0.991	0.993	0.993	0.93
S76.C	0.986	1.003	1.003	1.003	1.003	1.006	1.006	0.89
S77.A	1.011	1.002	0.999	0.999	0.999	0.997	0.997	-0.95
S77.B	0.991	0.991	0.993	0.993	0.993	0.995	0.995	0.93
S77.C	0.984	1.001	1.002	1.002	1.002	1.008	1.007	0.94
S78.A	1.012	1.003	1.000	1.000	1.000	0.998	0.998	-0.95

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S78.B	0.992	0.992	0.993	0.993	0.993	0.995	0.995	0.93
S78.C	0.983	1.000	1.002	1.002	1.002	1.008	1.008	0.95
S79.A	1.012	1.003	1.000	1.000	1.000	0.998	0.998	-0.95
S79.B	0.992	0.992	0.993	0.993	0.993	0.995	0.995	0.93
S79.C	0.983	1.000	1.002	1.002	1.002	1.008	1.008	0.95
S7.A	1.000	1.000	0.999	0.999	0.999	0.997	0.997	-0.97
S7.B	0.996	0.996	0.997	0.997	0.997	0.997	0.997	0.93
S7.C	0.990	0.991	0.994	0.994	0.994	0.997	0.997	0.97
S80.A	1.016	1.008	1.003	1.003	1.003	1.000	1.000	-0.98
S80.B	0.993	0.993	0.995	0.995	0.995	0.997	0.997	0.93
S80.C	0.980	0.998	1.002	1.002	1.002	1.010	1.009	0.97
S81.A	1.018	1.009	1.004	1.004	1.004	1.001	1.001	-0.98
S81.B	0.994	0.994	0.996	0.996	0.996	0.998	0.998	0.93
S81.C	0.979	0.997	1.002	1.002	1.002	1.010	1.010	0.98
S82.A	1.019	1.010	1.005	1.006	1.006	1.002	1.002	-0.98
S82.B	0.995	0.995	0.997	0.997	0.997	0.999	0.999	0.93
S82.C	0.980	0.998	1.003	1.003	1.003	1.011	1.011	0.98
S83.A	1.020	1.011	1.007	1.007	1.007	1.003	1.003	-0.98
S83.B	0.996	0.996	0.998	0.998	0.998	1.000	1.000	0.93
S83.C	0.981	0.999	1.004	1.004	1.004	1.012	1.012	0.98
S84.C	0.966	0.985	0.996	0.996	0.996	1.010	1.009	1.00
S85.C	0.957	0.977	0.992	0.992	0.992	1.009	1.009	1.00
S86.A	1.007	0.999	0.997	0.997	0.997	0.996	0.996	-0.91
S86.B	0.991	0.990	0.992	0.992	0.992	0.994	0.994	0.93
S86.C	0.987	1.003	1.003	1.003	1.003	1.007	1.007	0.89
S87.A	1.008	1.000	0.998	0.998	0.998	0.997	0.997	-0.91
S87.B	0.991	0.991	0.993	0.993	0.993	0.995	0.995	0.93
S87.C	0.987	1.004	1.004	1.004	1.004	1.007	1.007	0.89
S88.A	1.008	1.000	0.998	0.998	0.998	0.997	0.997	-0.91
S89.A	1.008	0.999	0.998	0.998	0.998	0.997	0.997	-0.91
S89.B	0.991	0.991	0.993	0.993	0.993	0.995	0.995	0.93
S89.C	0.988	1.004	1.004	1.004	1.004	1.008	1.007	0.89
S8.A	1.002	1.002	1.000	1.000	1.000	0.998	0.998	-0.97
S8.B	0.997	0.997	0.997	0.997	0.997	0.998	0.998	0.93
S8.C	0.989	0.990	0.995	0.995	0.995	0.998	0.998	0.97
S90.B	0.992	0.992	0.994	0.994	0.994	0.995	0.995	0.93
S91.A	1.008	0.999	0.998	0.998	0.998	0.997	0.997	-0.91
S91.B	0.991	0.991	0.993	0.993	0.993	0.995	0.995	0.93
S91.C	0.988	1.005	1.005	1.005	1.005	1.008	1.008	0.89
S92.C	0.989	1.005	1.005	1.005	1.005	1.009	1.008	0.89

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S93.A	1.008	0.999	0.998	0.998	0.998	0.997	0.997	-0.91
S93.B	0.991	0.991	0.993	0.993	0.993	0.995	0.995	0.93
S93.C	0.988	1.005	1.005	1.005	1.005	1.008	1.008	0.89
S94.A	1.008	0.999	0.998	0.998	0.998	0.997	0.997	-0.91
S94 open.A	1.012	1.011	1.007	1.007	1.007	1.004	1.004	-0.97
S95.A	1.008	0.999	0.998	0.998	0.998	0.997	0.997	-0.91
S95.B	0.991	0.991	0.993	0.993	0.993	0.995	0.995	0.93
S95.C	0.988	1.005	1.005	1.005	1.005	1.008	1.008	0.89
S96.B	0.991	0.991	0.993	0.993	0.993	0.995	0.995	0.93
S97.A	1.002	0.994	0.993	0.993	0.993	0.993	0.993	-0.82
S97.B	0.988	0.988	0.989	0.989	0.989	0.991	0.991	0.93
S97.C	0.989	1.005	1.003	1.002	1.002	1.004	1.004	0.77
S98.A	1.002	0.994	0.993	0.993	0.993	0.993	0.993	-0.82
S98.B	0.988	0.988	0.989	0.989	0.989	0.991	0.991	0.93
S98.C	0.989	1.005	1.003	1.002	1.002	1.004	1.004	0.77
S99.A	1.002	0.994	0.993	0.993	0.993	0.993	0.993	-0.82
S99.B	0.988	0.988	0.989	0.989	0.989	0.991	0.991	0.93
S99.C	0.989	1.005	1.003	1.002	1.002	1.004	1.004	0.77
S9.A	1.002	1.002	1.000	1.000	1.000	0.998	0.998	-0.97
S9r.A	0.996	0.996	0.994	0.994	0.994	0.992	0.992	-0.97

Table F.8: Voltage magnitudes and Pearson coefficient values obtained for Scenario S2

Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
S100.A	0.992	0.993	0.992	1.001	0.999	0.992	0.992	-0.93
S100.B	0.997	0.998	0.998	0.995	0.993	0.997	0.997	0.94
S100.C	0.999	0.994	1.005	0.994	0.991	0.999	0.999	0.88
S101.A	0.992	0.993	0.992	1.001	0.999	0.992	0.992	-0.93
S101.B	0.997	0.998	0.998	0.995	0.993	0.997	0.997	0.94
S101.C	0.999	0.994	1.005	0.994	0.991	0.999	0.999	0.88
S102.C	0.999	0.994	1.005	0.994	0.991	0.999	0.999	0.88
S103.C	0.999	0.994	1.005	0.994	0.991	0.999	0.999	0.88
S104.C	0.999	0.994	1.005	0.994	0.991	0.999	0.999	0.88
S105.A	0.992	0.993	0.992	1.001	0.999	0.992	0.992	-0.93

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
S105.B	0.997	0.998	0.998	0.995	0.993	0.997	0.997	0.94
S105.C	0.999	0.994	1.005	0.994	0.991	0.999	0.999	0.88
S106.B	0.997	0.998	0.998	0.995	0.993	0.997	0.997	0.94
S107.B	0.997	0.998	0.998	0.995	0.993	0.997	0.997	0.94
S108.A	0.992	0.993	0.992	1.001	0.999	0.992	0.992	-0.93
S108.B	0.997	0.998	0.998	0.995	0.993	0.997	0.997	0.94
S108.C	0.999	0.994	1.005	0.994	0.991	0.999	0.999	0.88
S109.A	0.992	0.993	0.992	1.001	0.999	0.992	0.992	-0.93
S10.A	0.994	0.994	0.993	0.996	0.997	0.994	0.994	-0.99
S110.A	0.992	0.993	0.992	1.001	0.999	0.992	0.992	-0.93
S111.A	0.992	0.993	0.992	1.001	0.999	0.992	0.992	-0.93
S112.A	0.992	0.993	0.992	1.001	0.999	0.992	0.992	-0.93
S113.A	0.992	0.993	0.992	1.001	0.999	0.992	0.992	-0.93
S114.A	0.992	0.993	0.992	1.001	0.999	0.992	0.992	-0.93
S11.A	0.994	0.994	0.993	0.996	0.997	0.994	0.994	-0.99
S12.B	0.999	0.999	1.000	0.999	0.998	0.999	0.999	0.92
S135.A	0.993	0.994	0.993	0.996	0.998	0.993	0.993	-0.99
S135.B	1.001	1.001	1.001	1.000	1.000	1.001	1.001	0.93
S135.C	1.014	1.012	1.014	1.008	1.004	1.014	1.014	0.99
S13.A	0.993	0.994	0.993	0.996	0.998	0.993	0.993	-0.99
S13.B	1.001	1.001	1.001	1.000	1.000	1.001	1.001	0.93
S13.C	1.014	1.012	1.014	1.008	1.004	1.014	1.014	0.99
S149.A	0.994	0.994	0.994	0.994	0.994	0.994	0.994	-0.42
S149.B	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.93
S149.C	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.98
S14.A	0.994	0.994	0.993	0.996	0.997	0.994	0.994	-0.99
S151.A	0.993	0.994	0.993	0.996	0.998	0.993	0.993	-0.99
S151.B	1.001	1.001	1.001	1.000	1.000	1.001	1.001	0.93
S151.C	1.014	1.012	1.014	1.008	1.004	1.014	1.014	0.99
S152.A	0.993	0.994	0.993	0.996	0.998	0.993	0.993	-0.99
S152.B	1.001	1.001	1.001	1.000	1.000	1.001	1.001	0.93
S152.C	1.014	1.012	1.014	1.008	1.004	1.014	1.014	0.99
S15.C	1.014	1.012	1.014	1.008	1.004	1.014	1.014	0.99
S160.A	0.993	0.994	0.992	1.000	1.005	0.993	0.993	-0.99
S160.B	1.014	1.014	1.014	1.012	1.010	1.014	1.014	0.94
S160.C	1.045	1.040	1.044	1.028	1.020	1.045	1.045	0.99
S160r.A	0.993	0.994	0.992	1.000	0.998	0.993	0.993	-0.90
S160r.B	0.995	0.995	0.995	0.993	0.991	0.995	0.995	0.94
S160r.C	0.993	0.988	0.999	0.990	0.988	0.993	0.993	0.76
S16.C	1.014	1.012	1.014	1.008	1.004	1.014	1.014	0.99

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
S17.C	1.014	1.012	1.014	1.008	1.004	1.014	1.014	0.99
S18.A	0.993	0.994	0.993	0.996	0.998	0.993	0.993	-0.99
S18.B	1.001	1.001	1.001	1.000	1.000	1.001	1.001	0.93
S18.C	1.014	1.012	1.014	1.008	1.004	1.014	1.014	0.99
S197.A	0.992	0.993	0.992	1.001	0.999	0.992	0.992	-0.93
S197.B	0.997	0.998	0.998	0.995	0.993	0.997	0.997	0.94
S197.C	0.999	0.994	1.005	0.994	0.991	0.999	0.999	0.88
S19.A	0.993	0.994	0.993	0.996	0.998	0.993	0.993	-0.99
S1.A	0.994	0.994	0.994	0.995	0.995	0.994	0.994	-0.99
S1.B	0.996	0.996	0.996	0.996	0.996	0.996	0.996	0.92
S1.C	1.001	1.000	1.000	0.998	0.997	1.001	1.001	0.99
S20.A	0.993	0.994	0.993	0.996	0.998	0.993	0.993	-0.99
S21.A	0.993	0.994	0.993	0.996	0.998	0.993	0.993	-0.99
S21.B	1.001	1.001	1.001	1.000	1.000	1.001	1.001	0.93
S21.C	1.014	1.012	1.014	1.008	1.004	1.014	1.014	0.99
S22.B	1.001	1.001	1.001	1.000	1.000	1.001	1.001	0.93
S23.A	0.993	0.994	0.993	0.996	0.998	0.993	0.993	-0.99
S23.B	1.001	1.001	1.001	1.000	1.000	1.001	1.001	0.93
S23.C	1.014	1.012	1.014	1.008	1.004	1.014	1.014	0.99
S24.C	1.014	1.012	1.014	1.008	1.004	1.014	1.014	0.99
S250.A	0.993	0.994	0.993	0.996	0.998	0.993	0.993	-0.99
S250.B	1.001	1.001	1.001	1.000	1.000	1.001	1.001	0.93
S250.C	1.014	1.012	1.014	1.008	1.004	1.014	1.014	0.99
S25.A	0.993	0.994	0.993	0.996	0.998	0.993	0.993	-0.99
S25.B	1.001	1.001	1.001	1.000	1.000	1.001	1.001	0.93
S25.C	1.014	1.012	1.014	1.008	1.004	1.014	1.014	0.99
S25r.A	1.000	1.000	1.000	1.003	0.998	1.000	1.000	0.00
S25r.C	1.002	1.000	1.001	1.002	0.998	1.002	1.002	0.76
S26.A	1.000	1.000	1.000	1.003	0.998	1.000	1.000	0.00
S26.C	1.002	1.000	1.001	1.002	0.998	1.002	1.002	0.76
S27.A	1.000	1.000	1.000	1.003	0.998	1.000	1.000	0.00
S27.C	1.002	1.000	1.001	1.002	0.998	1.002	1.002	0.76
S28.A	0.993	0.994	0.993	0.996	0.998	0.993	0.993	-0.99
S28.B	1.001	1.001	1.001	1.000	1.000	1.001	1.001	0.93
S28.C	1.014	1.012	1.014	1.008	1.004	1.014	1.014	0.99
S29.A	0.993	0.994	0.993	0.996	0.998	0.993	0.993	-0.99
S29.B	1.001	1.001	1.001	1.000	1.000	1.001	1.001	0.93
S29.C	1.014	1.012	1.014	1.008	1.004	1.014	1.014	0.99
S2.B	0.996	0.996	0.996	0.996	0.996	0.996	0.996	0.92
S300.A	0.992	0.993	0.992	1.001	0.999	0.992	0.992	-0.93

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
S300.B	0.997	0.998	0.998	0.995	0.993	0.997	0.997	0.94
S300.C	0.999	0.994	1.005	0.994	0.991	0.999	0.999	0.88
S300 open.A	0.993	0.994	0.993	0.996	0.998	0.993	0.993	-0.99
S300 open.B	1.001	1.001	1.001	1.000	1.000	1.001	1.001	0.93
S300 open.C	1.014	1.012	1.014	1.008	1.004	1.014	1.014	0.99
S30.A	0.993	0.994	0.993	0.996	0.998	0.993	0.993	-0.99
S30.B	1.001	1.001	1.001	1.000	1.000	1.001	1.001	0.93
S30.C	1.014	1.012	1.014	1.008	1.004	1.014	1.014	0.99
S31.C	1.002	1.000	1.001	1.002	0.998	1.002	1.002	0.76
S32.C	1.002	1.000	1.001	1.002	0.998	1.002	1.002	0.76
S33.A	1.000	1.000	1.000	1.003	0.998	1.000	1.000	0.00
S34.C	1.014	1.012	1.014	1.008	1.004	1.014	1.014	0.99
S35.A	0.993	0.994	0.993	0.996	0.998	0.993	0.993	-0.99
S35.B	1.001	1.001	1.001	1.000	1.000	1.001	1.001	0.93
S35.C	1.014	1.012	1.014	1.008	1.004	1.014	1.014	0.99
S36.A	0.993	0.994	0.993	0.996	0.998	0.993	0.993	-0.99
S36.B	1.001	1.001	1.001	1.000	1.000	1.001	1.001	0.93
S37.A	0.993	0.994	0.993	0.996	0.998	0.993	0.993	-0.99
S38.B	1.001	1.001	1.001	1.000	1.000	1.001	1.001	0.93
S39.B	1.001	1.001	1.001	1.000	1.000	1.001	1.001	0.93
S3.C	1.001	1.000	1.000	0.998	0.997	1.001	1.001	0.99
S40.A	0.993	0.994	0.993	0.996	0.998	0.993	0.993	-0.99
S40.B	1.001	1.001	1.001	1.000	1.000	1.001	1.001	0.93
S40.C	1.014	1.012	1.014	1.008	1.004	1.014	1.014	0.99
S41.C	1.014	1.012	1.014	1.008	1.004	1.014	1.014	0.99
S42.A	0.993	0.994	0.993	0.996	0.998	0.993	0.993	-0.99
S42.B	1.001	1.001	1.001	1.000	1.000	1.001	1.001	0.93
S42.C	1.014	1.012	1.014	1.008	1.004	1.014	1.014	0.99
S43.B	1.001	1.001	1.001	1.000	1.000	1.001	1.001	0.93
S44.A	0.993	0.994	0.993	0.996	0.998	0.993	0.993	-0.99
S44.B	1.001	1.001	1.001	1.000	1.000	1.001	1.001	0.93
S44.C	1.014	1.012	1.014	1.008	1.004	1.014	1.014	0.99
S450.A	0.992	0.993	0.992	1.001	0.999	0.992	0.992	-0.93
S450.B	0.997	0.998	0.998	0.995	0.993	0.997	0.997	0.94
S450.C	0.999	0.994	1.005	0.994	0.991	0.999	0.999	0.88
S45.A	0.993	0.994	0.993	0.996	0.998	0.993	0.993	-0.99
S46.A	0.993	0.994	0.993	0.996	0.998	0.993	0.993	-0.99

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
S47.A	0.993	0.994	0.993	0.996	0.998	0.993	0.993	-0.99
S47.B	1.001	1.001	1.001	1.000	1.000	1.001	1.001	0.93
S47.C	1.014	1.012	1.014	1.008	1.004	1.014	1.014	0.99
S48.A	0.993	0.994	0.993	0.996	0.998	0.993	0.993	-0.99
S48.B	1.001	1.001	1.001	1.000	1.000	1.001	1.001	0.93
S48.C	1.014	1.012	1.014	1.008	1.004	1.014	1.014	0.99
S49.A	0.993	0.994	0.993	0.996	0.998	0.993	0.993	-0.99
S49.B	1.001	1.001	1.001	1.000	1.000	1.001	1.001	0.93
S49.C	1.014	1.012	1.014	1.008	1.004	1.014	1.014	0.99
S4.C	1.001	1.000	1.000	0.998	0.997	1.001	1.001	0.99
S50.A	0.993	0.994	0.993	0.996	0.998	0.993	0.993	-0.99
S50.B	1.001	1.001	1.001	1.000	1.000	1.001	1.001	0.93
S50.C	1.014	1.012	1.014	1.008	1.004	1.014	1.014	0.99
S51.A	0.993	0.994	0.993	0.996	0.998	0.993	0.993	-0.99
S51.B	1.001	1.001	1.001	1.000	1.000	1.001	1.001	0.93
S51.C	1.014	1.012	1.014	1.008	1.004	1.014	1.014	0.99
S52.A	0.993	0.994	0.993	0.997	0.999	0.993	0.993	-0.99
S52.B	1.004	1.004	1.004	1.003	1.002	1.004	1.004	0.93
S52.C	1.021	1.019	1.021	1.012	1.008	1.021	1.021	0.99
S53.A	0.993	0.994	0.993	0.998	1.000	0.993	0.993	-0.99
S53.B	1.005	1.005	1.005	1.004	1.003	1.005	1.005	0.93
S53.C	1.025	1.022	1.024	1.015	1.010	1.025	1.025	0.99
S54.A	0.993	0.994	0.993	0.998	1.001	0.993	0.993	-0.99
S54.B	1.006	1.006	1.006	1.005	1.004	1.006	1.006	0.93
S54.C	1.027	1.024	1.026	1.016	1.011	1.027	1.027	0.99
S55.A	0.993	0.994	0.993	0.998	1.001	0.993	0.993	-0.99
S55.B	1.006	1.006	1.006	1.005	1.004	1.006	1.006	0.93
S55.C	1.027	1.024	1.026	1.016	1.011	1.027	1.027	0.99
S56.A	0.993	0.994	0.993	0.998	1.001	0.993	0.993	-0.99
S56.B	1.006	1.006	1.006	1.005	1.004	1.006	1.006	0.93
S56.C	1.027	1.024	1.026	1.016	1.011	1.027	1.027	0.99
S57.A	0.993	0.994	0.993	0.999	1.002	0.993	0.993	-0.99
S57.B	1.008	1.009	1.009	1.007	1.006	1.008	1.008	0.93
S57.C	1.033	1.029	1.032	1.020	1.014	1.033	1.033	0.99
S58.B	1.008	1.009	1.009	1.007	1.006	1.008	1.008	0.93
S59.B	1.008	1.009	1.009	1.007	1.006	1.008	1.008	0.93
S5.C	1.001	1.000	1.000	0.998	0.997	1.001	1.001	0.99
S60.A	0.993	0.994	0.992	1.000	1.005	0.993	0.993	-0.99
S60.B	1.014	1.014	1.014	1.012	1.010	1.014	1.014	0.94
S60.C	1.045	1.040	1.044	1.028	1.020	1.045	1.045	0.99

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
S61.A	0.993	0.994	0.992	1.000	1.005	0.993	0.993	-0.99
S61.B	1.014	1.014	1.014	1.012	1.010	1.014	1.014	0.94
S61.C	1.045	1.040	1.044	1.028	1.020	1.045	1.045	0.99
S61s.A	0.993	0.994	0.992	1.000	1.005	0.993	0.993	-0.99
S61s.B	1.014	1.014	1.014	1.012	1.010	1.014	1.014	0.94
S61s.C	1.045	1.040	1.044	1.028	1.020	1.045	1.045	0.99
S62.A	0.993	0.994	0.992	1.000	1.005	0.993	0.993	-0.99
S62.B	1.014	1.014	1.014	1.012	1.010	1.014	1.014	0.94
S62.C	1.045	1.040	1.044	1.028	1.020	1.045	1.045	0.99
S63.A	0.993	0.994	0.992	1.000	1.005	0.993	0.993	-0.99
S63.B	1.014	1.014	1.014	1.012	1.010	1.014	1.014	0.94
S63.C	1.045	1.040	1.044	1.028	1.020	1.045	1.045	0.99
S64.A	0.993	0.994	0.992	1.000	1.005	0.993	0.993	-0.99
S64.B	1.014	1.014	1.014	1.012	1.010	1.014	1.014	0.94
S64.C	1.045	1.040	1.044	1.028	1.020	1.045	1.045	0.99
S65.A	0.993	0.994	0.992	1.000	1.005	0.993	0.993	-0.99
S65.B	1.014	1.014	1.014	1.012	1.010	1.014	1.014	0.94
S65.C	1.045	1.040	1.044	1.028	1.020	1.045	1.045	0.99
S66.A	0.993	0.994	0.992	1.000	1.005	0.993	0.993	-0.99
S66.B	1.014	1.014	1.014	1.012	1.010	1.014	1.014	0.94
S66.C	1.045	1.040	1.044	1.028	1.020	1.045	1.045	0.99
S67.A	0.992	0.993	0.992	1.001	0.999	0.992	0.992	-0.93
S67.B	0.997	0.998	0.998	0.995	0.993	0.997	0.997	0.94
S67.C	0.999	0.994	1.005	0.994	0.991	0.999	0.999	0.88
S68.A	0.992	0.993	0.992	1.001	0.999	0.992	0.992	-0.93
S69.A	0.992	0.993	0.992	1.001	0.999	0.992	0.992	-0.93
S6.C	1.001	1.000	1.000	0.998	0.997	1.001	1.001	0.99
S70.A	0.992	0.993	0.992	1.001	0.999	0.992	0.992	-0.93
S71.A	0.992	0.993	0.992	1.001	0.999	0.992	0.992	-0.93
S72.A	0.992	0.993	0.991	1.001	1.000	0.992	0.992	-0.95
S72.B	0.999	1.000	1.000	0.997	0.995	0.999	0.999	0.94
S72.C	1.004	0.998	1.009	0.997	0.993	1.004	1.004	0.93
S73.C	1.004	0.998	1.009	0.997	0.993	1.004	1.004	0.93
S74.C	1.004	0.998	1.009	0.997	0.993	1.004	1.004	0.93
S75.C	1.004	0.998	1.009	0.997	0.993	1.004	1.004	0.93
S76.A	0.992	0.993	0.991	1.002	1.001	0.992	0.992	-0.95
S76.B	1.001	1.001	1.002	0.998	0.996	1.001	1.001	0.94
S76.C	1.008	1.002	1.013	1.000	0.995	1.008	1.008	0.95
S77.A	0.990	0.992	0.990	1.002	1.002	0.990	0.990	-0.96
S77.B	1.003	1.004	1.004	1.000	0.998	1.003	1.003	0.94

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
S77.C	1.014	1.008	1.019	1.004	0.998	1.014	1.014	0.97
S78.A	0.990	0.992	0.989	1.002	1.002	0.990	0.990	-0.96
S78.B	1.004	1.004	1.005	1.001	0.998	1.004	1.004	0.94
S78.C	1.016	1.009	1.021	1.005	0.999	1.016	1.016	0.98
S79.A	0.990	0.992	0.989	1.002	1.002	0.990	0.990	-0.96
S79.B	1.004	1.004	1.005	1.001	0.998	1.004	1.004	0.94
S79.C	1.016	1.009	1.021	1.005	0.999	1.016	1.016	0.98
S7.A	0.994	0.994	0.993	0.995	0.996	0.994	0.994	-0.99
S7.B	0.998	0.998	0.998	0.998	0.997	0.998	0.998	0.92
S7.C	1.006	1.005	1.006	1.002	1.000	1.006	1.006	0.99
S80.A	0.988	0.991	0.988	1.002	1.003	0.988	0.988	-0.97
S80.B	1.006	1.007	1.008	1.003	1.001	1.006	1.006	0.94
S80.C	1.024	1.016	1.029	1.010	1.002	1.024	1.024	0.99
S81.A	0.988	0.990	0.987	1.002	1.003	0.988	0.988	-0.97
S81.B	1.008	1.008	1.009	1.004	1.002	1.008	1.008	0.94
S81.C	1.027	1.019	1.032	1.012	1.004	1.027	1.027	0.99
S82.A	0.989	0.991	0.988	1.003	1.005	0.989	0.989	-0.97
S82.B	1.009	1.010	1.010	1.005	1.003	1.009	1.009	0.94
S82.C	1.028	1.020	1.033	1.013	1.005	1.028	1.028	0.99
S83.A	0.990	0.992	0.989	1.004	1.006	0.990	0.990	-0.97
S83.B	1.010	1.011	1.011	1.006	1.004	1.010	1.010	0.94
S83.C	1.029	1.021	1.034	1.014	1.006	1.029	1.029	0.99
S84.C	1.044	1.034	1.048	1.021	1.009	1.044	1.044	1.00
S85.C	1.056	1.045	1.060	1.027	1.012	1.056	1.056	1.00
S86.A	0.992	0.994	0.992	1.003	1.002	0.992	0.992	-0.95
S86.B	1.001	1.002	1.003	0.999	0.997	1.001	1.001	0.94
S86.C	1.008	1.002	1.013	1.000	0.996	1.008	1.008	0.95
S87.A	0.993	0.994	0.992	1.003	1.002	0.993	0.993	-0.95
S87.B	1.002	1.003	1.003	0.999	0.997	1.002	1.002	0.94
S87.C	1.009	1.003	1.014	1.001	0.996	1.009	1.009	0.95
S88.A	0.993	0.995	0.993	1.003	1.003	0.993	0.993	-0.95
S89.A	0.992	0.994	0.992	1.003	1.002	0.992	0.992	-0.95
S89.B	1.002	1.003	1.003	1.000	0.998	1.002	1.002	0.94
S89.C	1.009	1.003	1.014	1.001	0.996	1.009	1.009	0.95
S8.A	0.994	0.994	0.993	0.996	0.997	0.994	0.994	-0.99
S8.B	0.999	0.999	1.000	0.999	0.998	0.999	0.999	0.92
S8.C	1.009	1.008	1.009	1.004	1.002	1.009	1.009	0.99
S90.B	1.003	1.003	1.004	1.000	0.998	1.003	1.003	0.94
S91.A	0.992	0.994	0.992	1.003	1.002	0.992	0.992	-0.95
S91.B	1.002	1.003	1.003	0.999	0.997	1.002	1.002	0.94

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
S91.C	1.010	1.004	1.015	1.001	0.997	1.010	1.010	0.95
S92.C	1.010	1.004	1.015	1.002	0.997	1.010	1.010	0.95
S93.A	0.992	0.994	0.992	1.003	1.002	0.992	0.992	-0.95
S93.B	1.002	1.003	1.003	0.999	0.997	1.002	1.002	0.94
S93.C	1.010	1.004	1.015	1.001	0.997	1.010	1.010	0.95
S94.A	0.992	0.994	0.992	1.003	1.002	0.992	0.992	-0.95
S94 open.A	0.993	0.994	0.993	0.998	1.001	0.993	0.993	-0.99
S95.A	0.992	0.994	0.992	1.003	1.002	0.992	0.992	-0.95
S95.B	1.002	1.003	1.003	0.999	0.997	1.002	1.002	0.94
S95.C	1.010	1.004	1.015	1.001	0.997	1.010	1.010	0.95
S96.B	1.002	1.003	1.003	0.999	0.997	1.002	1.002	0.94
S97.A	0.992	0.993	0.992	1.001	0.999	0.992	0.992	-0.93
S97.B	0.997	0.998	0.998	0.995	0.993	0.997	0.997	0.94
S97.C	0.999	0.994	1.005	0.994	0.991	0.999	0.999	0.88
S98.A	0.992	0.993	0.992	1.001	0.999	0.992	0.992	-0.93
S98.B	0.997	0.998	0.998	0.995	0.993	0.997	0.997	0.94
S98.C	0.999	0.994	1.005	0.994	0.991	0.999	0.999	0.88
S99.A	0.992	0.993	0.992	1.001	0.999	0.992	0.992	-0.93
S99.B	0.997	0.998	0.998	0.995	0.993	0.997	0.997	0.94
S99.C	0.999	0.994	1.005	0.994	0.991	0.999	0.999	0.88
S9.A	0.994	0.994	0.993	0.996	0.997	0.994	0.994	-0.99
S9r.A	0.994	0.994	0.993	0.996	0.997	0.994	0.994	-0.99

Table F.9: Voltage magnitudes and Pearson coefficient values obtained for Scenario S3

Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S100.A	0.999	0.998	0.992	0.992	0.992	0.993	0.993	-0.80
S100.B	0.988	0.988	0.989	0.989	0.989	0.991	0.991	1.00
S100.C	0.994	1.003	1.005	1.005	1.005	1.004	1.004	0.66
S101.A	0.999	0.998	0.992	0.992	0.992	0.993	0.993	-0.80
S101.B	0.988	0.988	0.989	0.989	0.989	0.991	0.991	1.00
S101.C	0.994	1.003	1.005	1.005	1.005	1.004	1.004	0.66
S102.C	0.994	1.003	1.005	1.005	1.005	1.004	1.004	0.66
S103.C	0.994	1.003	1.005	1.005	1.005	1.004	1.004	0.66

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S104.C	0.994	1.003	1.005	1.005	1.005	1.004	1.004	0.66
S105.A	0.999	0.998	0.992	0.992	0.992	0.993	0.993	-0.80
S105.B	0.988	0.988	0.989	0.989	0.989	0.991	0.991	1.00
S105.C	0.994	1.003	1.005	1.005	1.005	1.004	1.004	0.66
S106.B	0.988	0.988	0.989	0.989	0.989	0.991	0.991	1.00
S107.B	0.988	0.988	0.989	0.989	0.989	0.991	0.991	1.00
S108.A	0.999	0.998	0.992	0.992	0.992	0.993	0.993	-0.80
S108.B	0.988	0.988	0.989	0.989	0.989	0.991	0.991	1.00
S108.C	0.994	1.003	1.005	1.005	1.005	1.004	1.004	0.66
S109.A	0.999	0.998	0.992	0.992	0.992	0.993	0.993	-0.80
S10.A	0.996	0.996	0.994	0.994	0.994	0.992	0.992	-1.00
S110.A	0.999	0.998	0.992	0.992	0.992	0.993	0.993	-0.80
S111.A	0.999	0.998	0.992	0.992	0.992	0.993	0.993	-0.80
S112.A	0.999	0.998	0.992	0.992	0.992	0.993	0.993	-0.80
S113.A	0.999	0.998	0.992	0.992	0.992	0.993	0.993	-0.80
S114.A	0.999	0.998	0.992	0.992	0.992	0.993	0.993	-0.80
S11.A	0.996	0.996	0.994	0.994	0.994	0.992	0.992	-1.00
S12.B	0.997	0.997	0.997	0.997	0.997	0.998	0.998	1.00
S135.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-1.00
S135.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	1.00
S135.C	0.989	0.990	0.995	0.995	0.995	1.000	1.000	1.00
S13.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-1.00
S13.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	1.00
S13.C	0.989	0.990	0.995	0.995	0.995	1.000	1.000	1.00
S149.A	0.994	0.994	0.994	0.994	0.994	0.994	0.994	NaN
S149.B	0.994	0.994	0.994	0.994	0.994	0.994	0.994	NaN
S149.C	0.994	0.994	0.994	0.994	0.994	0.994	0.994	1.00
S14.A	0.996	0.996	0.994	0.994	0.994	0.992	0.992	-1.00
S151.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-1.00
S151.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	1.00
S151.C	0.989	0.990	0.995	0.995	0.995	1.000	1.000	1.00
S152.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-1.00
S152.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	1.00
S152.C	0.989	0.990	0.995	0.995	0.995	1.000	1.000	1.00
S15.C	0.989	0.990	0.995	0.995	0.995	1.000	1.000	1.00
S160.A	1.023	1.022	1.015	1.015	1.015	1.010	1.010	-1.00
S160.B	1.005	1.005	1.006	1.006	1.006	1.008	1.008	1.00
S160.C	0.980	0.983	0.997	0.997	0.997	1.009	1.009	1.00
S160r.A	0.997	0.996	0.990	0.990	0.990	0.991	0.991	-0.80
S160r.B	0.986	0.986	0.987	0.987	0.987	0.989	0.989	1.00

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S160r.C	0.993	1.001	1.003	1.003	1.003	1.002	1.002	0.66
S16.C	0.989	0.990	0.995	0.995	0.995	1.000	1.000	1.00
S17.C	0.989	0.990	0.995	0.995	0.995	1.000	1.000	1.00
S18.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-1.00
S18.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	1.00
S18.C	0.989	0.990	0.995	0.995	0.995	1.000	1.000	1.00
S197.A	0.999	0.998	0.992	0.992	0.992	0.993	0.993	-0.80
S197.B	0.988	0.988	0.989	0.989	0.989	0.991	0.991	1.00
S197.C	0.994	1.003	1.005	1.005	1.005	1.004	1.004	0.66
S19.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-1.00
S1.A	0.998	0.997	0.997	0.997	0.997	0.996	0.996	-1.00
S1.B	0.995	0.995	0.995	0.995	0.995	0.996	0.996	1.00
S1.C	0.992	0.992	0.994	0.994	0.994	0.996	0.996	1.00
S20.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-1.00
S21.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-1.00
S21.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	1.00
S21.C	0.989	0.990	0.995	0.995	0.995	1.000	1.000	1.00
S22.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	1.00
S23.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-1.00
S23.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	1.00
S23.C	0.989	0.990	0.995	0.995	0.995	1.000	1.000	1.00
S24.C	0.989	0.990	0.995	0.995	0.995	1.000	1.000	1.00
S250.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-1.00
S250.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	1.00
S250.C	0.989	0.990	0.995	0.995	0.995	1.000	1.000	1.00
S25.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-1.00
S25.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	1.00
S25.C	0.989	0.990	0.995	0.995	0.995	1.000	1.000	1.00
S25r.A	0.999	0.998	0.996	0.996	0.996	1.000	1.000	0.25
S25r.C	1.001	1.002	1.001	1.001	1.001	1.000	1.000	-0.73
S26.A	0.999	0.998	0.996	0.996	0.996	1.000	1.000	0.25
S26.C	1.001	1.002	1.001	1.001	1.001	1.000	1.000	-0.73
S27.A	0.999	0.998	0.996	0.996	0.996	1.000	1.000	0.25
S27.C	1.001	1.002	1.001	1.001	1.001	1.000	1.000	-0.73
S28.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-1.00
S28.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	1.00
S28.C	0.989	0.990	0.995	0.995	0.995	1.000	1.000	1.00
S29.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-1.00
S29.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	1.00
S29.C	0.989	0.990	0.995	0.995	0.995	1.000	1.000	1.00

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S2.B	0.995	0.995	0.995	0.995	0.995	0.996	0.996	1.00
S300.A	0.999	0.998	0.992	0.992	0.992	0.993	0.993	-0.80
S300.B	0.988	0.988	0.989	0.989	0.989	0.991	0.991	1.00
S300.C	0.994	1.003	1.005	1.005	1.005	1.004	1.004	0.66
S300 open.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-1.00
S300 open.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	1.00
S300 open.C	0.989	0.990	0.995	0.995	0.995	1.000	1.000	1.00
S30.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-1.00
S30.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	1.00
S30.C	0.989	0.990	0.995	0.995	0.995	1.000	1.000	1.00
S31.C	1.001	1.002	1.001	1.001	1.001	1.000	1.000	-0.73
S32.C	1.001	1.002	1.001	1.001	1.001	1.000	1.000	-0.73
S33.A	0.999	0.998	0.996	0.996	0.996	1.000	1.000	0.25
S34.C	0.989	0.990	0.995	0.995	0.995	1.000	1.000	1.00
S35.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-1.00
S35.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	1.00
S35.C	0.989	0.990	0.995	0.995	0.995	1.000	1.000	1.00
S36.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-1.00
S36.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	1.00
S37.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-1.00
S38.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	1.00
S39.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	1.00
S3.C	0.992	0.992	0.994	0.994	0.994	0.996	0.996	1.00
S40.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-1.00
S40.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	1.00
S40.C	0.989	0.990	0.995	0.995	0.995	1.000	1.000	1.00
S41.C	0.989	0.990	0.995	0.995	0.995	1.000	1.000	1.00
S42.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-1.00
S42.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	1.00
S42.C	0.989	0.990	0.995	0.995	0.995	1.000	1.000	1.00
S43.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	1.00
S44.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-1.00
S44.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	1.00
S44.C	0.989	0.990	0.995	0.995	0.995	1.000	1.000	1.00
S450.A	0.999	0.998	0.992	0.992	0.992	0.993	0.993	-0.80
S450.B	0.988	0.988	0.989	0.989	0.989	0.991	0.991	1.00
S450.C	0.994	1.003	1.005	1.005	1.005	1.004	1.004	0.66

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S45.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-1.00
S46.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-1.00
S47.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-1.00
S47.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	1.00
S47.C	0.989	0.990	0.995	0.995	0.995	1.000	1.000	1.00
S48.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-1.00
S48.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	1.00
S48.C	0.989	0.990	0.995	0.995	0.995	1.000	1.000	1.00
S49.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-1.00
S49.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	1.00
S49.C	0.989	0.990	0.995	0.995	0.995	1.000	1.000	1.00
S4.C	0.992	0.992	0.994	0.994	0.994	0.996	0.996	1.00
S50.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-1.00
S50.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	1.00
S50.C	0.989	0.990	0.995	0.995	0.995	1.000	1.000	1.00
S51.A	1.005	1.005	1.002	1.002	1.002	1.000	1.000	-1.00
S51.B	0.998	0.998	0.999	0.999	0.999	0.999	0.999	1.00
S51.C	0.989	0.990	0.995	0.995	0.995	1.000	1.000	1.00
S52.A	1.009	1.008	1.005	1.005	1.005	1.002	1.002	-1.00
S52.B	1.000	1.000	1.000	1.000	1.000	1.001	1.001	1.00
S52.C	0.987	0.988	0.996	0.996	0.996	1.002	1.002	1.00
S53.A	1.011	1.010	1.006	1.006	1.006	1.003	1.003	-1.00
S53.B	1.000	1.000	1.001	1.001	1.001	1.002	1.002	1.00
S53.C	0.986	0.988	0.996	0.996	0.996	1.003	1.003	1.00
S54.A	1.012	1.011	1.007	1.007	1.007	1.004	1.004	-1.00
S54.B	1.001	1.001	1.002	1.002	1.002	1.003	1.003	1.00
S54.C	0.986	0.987	0.996	0.996	0.996	1.004	1.004	1.00
S55.A	1.012	1.011	1.007	1.007	1.007	1.004	1.004	-1.00
S55.B	1.001	1.001	1.002	1.002	1.002	1.003	1.003	1.00
S55.C	0.986	0.987	0.996	0.996	0.996	1.004	1.004	1.00
S56.A	1.012	1.011	1.007	1.007	1.007	1.004	1.004	-1.00
S56.B	1.001	1.001	1.002	1.002	1.002	1.003	1.003	1.00
S56.C	0.986	0.987	0.996	0.996	0.996	1.004	1.004	1.00
S57.A	1.015	1.015	1.010	1.010	1.010	1.006	1.006	-1.00
S57.B	1.002	1.002	1.003	1.003	1.003	1.004	1.004	1.00
S57.C	0.984	0.986	0.996	0.996	0.996	1.005	1.005	1.00
S58.B	1.002	1.002	1.003	1.003	1.003	1.004	1.004	1.00
S59.B	1.002	1.002	1.003	1.003	1.003	1.004	1.004	1.00
S5.C	0.992	0.992	0.994	0.994	0.994	0.996	0.996	1.00
S60.A	1.023	1.022	1.015	1.015	1.015	1.010	1.010	-1.00

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S60.B	1.005	1.005	1.006	1.006	1.006	1.008	1.008	1.00
S60.C	0.980	0.983	0.997	0.997	0.997	1.009	1.009	1.00
S61.A	1.023	1.022	1.015	1.015	1.015	1.010	1.010	-1.00
S61.B	1.005	1.005	1.006	1.006	1.006	1.008	1.008	1.00
S61.C	0.980	0.983	0.997	0.997	0.997	1.009	1.009	1.00
S61s.A	1.023	1.022	1.015	1.015	1.015	1.010	1.010	-1.00
S61s.B	1.005	1.005	1.006	1.006	1.006	1.008	1.008	1.00
S61s.C	0.980	0.983	0.997	0.997	0.997	1.009	1.009	1.00
S62.A	1.024	1.023	1.016	1.016	1.016	1.010	1.010	-1.00
S62.B	1.005	1.005	1.007	1.007	1.007	1.008	1.008	0.99
S62.C	0.976	0.979	0.995	0.995	0.995	1.009	1.008	1.00
S63.A	1.024	1.023	1.016	1.016	1.016	1.010	1.010	-1.00
S63.B	1.006	1.006	1.007	1.007	1.007	1.008	1.008	0.99
S63.C	0.972	0.976	0.993	0.993	0.993	1.008	1.008	1.00
S64.A	1.025	1.024	1.016	1.016	1.016	1.010	1.010	-1.00
S64.B	1.007	1.007	1.007	1.007	1.007	1.008	1.008	0.95
S64.C	0.966	0.970	0.990	0.990	0.990	1.008	1.008	1.00
S65.A	1.026	1.025	1.017	1.017	1.017	1.010	1.010	-1.00
S65.B	1.009	1.008	1.008	1.008	1.008	1.008	1.008	-0.75
S65.C	0.958	0.962	0.987	0.987	0.987	1.008	1.008	1.00
S66.A	1.027	1.026	1.017	1.017	1.017	1.010	1.010	-1.00
S66.B	1.010	1.009	1.008	1.009	1.009	1.008	1.008	-0.97
S66.C	0.952	0.957	0.984	0.984	0.984	1.008	1.007	1.00
S67.A	0.999	0.998	0.992	0.992	0.992	0.993	0.993	-0.80
S67.B	0.988	0.988	0.989	0.989	0.989	0.991	0.991	1.00
S67.C	0.994	1.003	1.005	1.005	1.005	1.004	1.004	0.66
S68.A	0.999	0.998	0.992	0.992	0.992	0.993	0.993	-0.80
S69.A	0.999	0.998	0.992	0.992	0.992	0.993	0.993	-0.80
S6.C	0.992	0.992	0.994	0.994	0.994	0.996	0.996	1.00
S70.A	0.999	0.998	0.992	0.992	0.992	0.993	0.993	-0.80
S71.A	0.999	0.998	0.992	0.992	0.992	0.993	0.993	-0.80
S72.A	1.001	1.000	0.993	0.993	0.993	0.994	0.994	-0.80
S72.B	0.989	0.989	0.991	0.991	0.991	0.992	0.992	1.00
S72.C	0.995	1.004	1.006	1.006	1.006	1.005	1.005	0.66
S73.C	0.995	1.004	1.006	1.006	1.006	1.005	1.005	0.66
S74.C	0.995	1.004	1.006	1.006	1.006	1.005	1.005	0.66
S75.C	0.995	1.004	1.006	1.006	1.006	1.005	1.005	0.66
S76.A	1.002	1.001	0.995	0.995	0.995	0.995	0.995	-0.80
S76.B	0.990	0.990	0.992	0.992	0.992	0.993	0.993	1.00
S76.C	0.996	1.005	1.007	1.007	1.007	1.006	1.006	0.66

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S77.A	1.004	1.003	0.996	0.996	0.996	0.997	0.997	-0.81
S77.B	0.992	0.992	0.993	0.993	0.993	0.995	0.995	1.00
S77.C	0.998	1.007	1.009	1.008	1.008	1.008	1.008	0.66
S78.A	1.004	1.003	0.997	0.997	0.997	0.998	0.998	-0.81
S78.B	0.992	0.992	0.994	0.994	0.994	0.996	0.995	1.00
S78.C	0.998	1.007	1.009	1.009	1.009	1.008	1.008	0.66
S79.A	1.004	1.003	0.997	0.997	0.997	0.998	0.998	-0.81
S79.B	0.992	0.992	0.994	0.994	0.994	0.996	0.995	1.00
S79.C	0.998	1.007	1.009	1.009	1.009	1.008	1.008	0.66
S7.A	1.000	1.000	0.999	0.999	0.999	0.997	0.997	-1.00
S7.B	0.996	0.996	0.997	0.997	0.997	0.997	0.997	1.00
S7.C	0.991	0.991	0.995	0.995	0.995	0.997	0.997	1.00
S80.A	1.006	1.005	0.999	0.999	0.999	0.999	1.000	-0.81
S80.B	0.994	0.994	0.996	0.996	0.996	0.998	0.998	1.00
S80.C	1.000	1.009	1.011	1.011	1.011	1.010	1.010	0.67
S81.A	1.007	1.006	0.999	0.999	0.999	1.000	1.000	-0.81
S81.B	0.995	0.995	0.997	0.997	0.997	0.998	0.998	1.00
S81.C	1.001	1.010	1.011	1.011	1.011	1.011	1.011	0.67
S82.A	1.008	1.007	1.000	1.000	1.000	1.001	1.001	-0.81
S82.B	0.996	0.996	0.998	0.998	0.998	0.999	0.999	1.00
S82.C	1.002	1.011	1.012	1.012	1.012	1.012	1.012	0.67
S83.A	1.009	1.008	1.001	1.002	1.002	1.002	1.002	-0.81
S83.B	0.997	0.997	0.999	0.999	0.999	1.000	1.000	1.00
S83.C	1.003	1.012	1.013	1.013	1.013	1.013	1.013	0.67
S84.C	1.001	1.010	1.011	1.011	1.011	1.011	1.011	0.67
S85.C	1.001	1.010	1.011	1.011	1.011	1.011	1.011	0.67
S86.A	1.003	1.002	0.995	0.995	0.995	0.996	0.996	-0.80
S86.B	0.991	0.991	0.992	0.992	0.992	0.994	0.994	1.00
S86.C	0.997	1.006	1.008	1.008	1.008	1.007	1.007	0.66
S87.A	1.003	1.002	0.996	0.996	0.996	0.997	0.997	-0.81
S87.B	0.991	0.991	0.993	0.993	0.993	0.995	0.995	1.00
S87.C	0.997	1.006	1.008	1.008	1.008	1.008	1.007	0.66
S88.A	1.004	1.003	0.996	0.996	0.996	0.997	0.997	-0.81
S89.A	1.003	1.002	0.996	0.996	0.996	0.996	0.997	-0.81
S89.B	0.992	0.992	0.993	0.993	0.993	0.995	0.995	1.00
S89.C	0.998	1.007	1.009	1.008	1.008	1.008	1.008	0.66
S8.A	1.002	1.002	1.000	1.000	1.000	0.998	0.998	-1.00
S8.B	0.997	0.997	0.997	0.997	0.997	0.998	0.998	1.00
S8.C	0.990	0.991	0.995	0.995	0.995	0.998	0.998	1.00
S90.B	0.992	0.992	0.994	0.994	0.994	0.995	0.995	1.00

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S91.A	1.003	1.002	0.996	0.996	0.996	0.996	0.996	-0.81
S91.B	0.991	0.991	0.993	0.993	0.993	0.995	0.995	1.00
S91.C	0.998	1.007	1.009	1.009	1.009	1.008	1.008	0.66
S92.C	0.999	1.008	1.010	1.009	1.009	1.009	1.009	0.66
S93.A	1.003	1.002	0.996	0.996	0.996	0.996	0.996	-0.81
S93.B	0.991	0.991	0.993	0.993	0.993	0.995	0.995	1.00
S93.C	0.998	1.007	1.009	1.009	1.009	1.008	1.008	0.66
S94.A	1.003	1.002	0.996	0.996	0.996	0.996	0.996	-0.81
S94 open.A	1.012	1.011	1.007	1.007	1.007	1.004	1.004	-1.00
S95.A	1.003	1.002	0.996	0.996	0.996	0.996	0.996	-0.81
S95.B	0.991	0.991	0.993	0.993	0.993	0.995	0.995	1.00
S95.C	0.998	1.007	1.009	1.009	1.009	1.008	1.008	0.66
S96.B	0.991	0.991	0.993	0.993	0.993	0.995	0.995	1.00
S97.A	0.999	0.998	0.992	0.992	0.992	0.993	0.993	-0.80
S97.B	0.988	0.988	0.989	0.989	0.989	0.991	0.991	1.00
S97.C	0.994	1.003	1.005	1.005	1.005	1.004	1.004	0.66
S98.A	0.999	0.998	0.992	0.992	0.992	0.993	0.993	-0.80
S98.B	0.988	0.988	0.989	0.989	0.989	0.991	0.991	1.00
S98.C	0.994	1.003	1.005	1.005	1.005	1.004	1.004	0.66
S99.A	0.999	0.998	0.992	0.992	0.992	0.993	0.993	-0.80
S99.B	0.988	0.988	0.989	0.989	0.989	0.991	0.991	1.00
S99.C	0.994	1.003	1.005	1.005	1.005	1.004	1.004	0.66
S9.A	1.002	1.002	1.000	1.000	1.000	0.998	0.998	-1.00
S9r.A	0.996	0.996	0.994	0.994	0.994	0.992	0.992	-1.00

Table F.10: Voltage magnitudes and Pearson coefficient values obtained for Scenario S4

Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S82.A})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S100.A	0.995	1.002	1.004	1.004	1.004	0.998	0.998	0.76	0.27
S100.B	0.997	0.996	0.990	0.990	0.990	0.992	0.992	-0.94	-0.80
S100.C	0.993	1.003	1.001	1.001	1.001	0.997	0.997	0.67	0.20
S101.A	0.995	1.002	1.004	1.004	1.004	0.998	0.998	0.76	0.27
S101.B	0.997	0.996	0.990	0.990	0.990	0.992	0.992	-0.94	-0.80
S101.C	0.993	1.003	1.001	1.001	1.001	0.997	0.997	0.67	0.20

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S82.A})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S102.C	0.993	1.003	1.001	1.001	1.001	0.997	0.997	0.67	0.20
S103.C	0.993	1.003	1.001	1.001	1.001	0.997	0.997	0.67	0.20
S104.C	0.993	1.003	1.001	1.001	1.001	0.997	0.997	0.67	0.20
S105.A	0.995	1.002	1.004	1.004	1.004	0.998	0.998	0.76	0.27
S105.B	0.997	0.996	0.990	0.990	0.990	0.992	0.992	-0.94	-0.80
S105.C	0.993	1.003	1.001	1.001	1.001	0.997	0.997	0.67	0.20
S106.B	0.997	0.996	0.990	0.990	0.990	0.992	0.992	-0.94	-0.80
S107.B	0.997	0.996	0.990	0.990	0.990	0.992	0.992	-0.94	-0.80
S108.A	0.995	1.002	1.004	1.004	1.004	0.998	0.998	0.76	0.27
S108.B	0.997	0.996	0.990	0.990	0.990	0.992	0.992	-0.94	-0.80
S108.C	0.993	1.003	1.001	1.001	1.001	0.997	0.997	0.67	0.20
S109.A	0.995	1.002	1.004	1.004	1.004	0.998	0.998	0.76	0.27
S10.A	0.993	1.006	1.003	1.002	1.002	0.998	0.998	0.58	0.13
S110.A	0.995	1.002	1.004	1.004	1.004	0.998	0.998	0.76	0.27
S111.A	0.995	1.002	1.004	1.004	1.004	0.998	0.998	0.76	0.27
S112.A	0.995	1.002	1.004	1.004	1.004	0.998	0.998	0.76	0.27
S113.A	0.995	1.002	1.004	1.004	1.004	0.998	0.998	0.76	0.27
S114.A	0.995	1.002	1.004	1.004	1.004	0.998	0.998	0.76	0.27
S11.A	0.993	1.006	1.003	1.002	1.002	0.998	0.998	0.58	0.13
S12.B	1.002	1.008	1.006	1.006	1.006	0.998	0.998	0.13	-0.45
S135.A	0.993	1.000	1.003	1.003	1.003	1.000	1.000	0.94	0.58
S135.B	1.005	1.010	1.008	1.008	1.008	1.000	1.000	0.03	-0.53
S135.C	0.987	0.995	1.001	1.001	1.001	1.000	1.000	1.00	0.88
S13.A	0.993	1.000	1.003	1.003	1.003	1.000	1.000	0.94	0.58
S13.B	1.005	1.010	1.008	1.008	1.008	1.000	1.000	0.03	-0.53
S13.C	0.987	0.995	1.001	1.001	1.001	1.000	1.000	1.00	0.88
S149.A	0.994	1.000	1.000	1.000	1.000	0.994	0.994	0.47	-0.10
S149.B	0.994	1.000	1.000	1.000	1.000	0.994	0.994	0.47	-0.10
S149.C	0.994	1.000	1.000	1.000	1.000	0.994	0.994	0.47	-0.10
S14.A	0.993	1.006	1.003	1.002	1.002	0.998	0.998	0.58	0.13
S151.A	0.993	1.000	1.003	1.003	1.003	1.000	1.000	0.94	0.58
S151.B	1.005	1.010	1.008	1.008	1.008	1.000	1.000	0.03	-0.53
S151.C	0.987	0.995	1.001	1.001	1.001	1.000	1.000	1.00	0.88
S152.A	0.993	1.000	1.003	1.003	1.003	1.000	1.000	0.94	0.58
S152.B	1.005	1.010	1.008	1.008	1.008	1.000	1.000	0.03	-0.53
S152.C	0.987	0.995	1.001	1.001	1.001	1.000	1.000	1.00	0.88
S15.C	0.987	0.995	1.001	1.001	1.001	1.000	1.000	1.00	0.88
S160.A	0.994	1.002	1.009	1.009	1.009	1.009	1.009	0.98	0.92
S160.B	1.020	1.025	1.019	1.019	1.019	1.009	1.009	-0.25	-0.75
S160.C	0.977	0.986	1.001	1.001	1.001	1.008	1.008	0.87	0.99

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S82.A})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S160r.A	0.994	1.002	1.003	1.003	1.003	0.996	0.996	0.66	0.13
S160r.B	0.994	0.993	0.988	0.988	0.988	0.990	0.990	-0.93	-0.72
S160r.C	0.995	1.004	1.001	1.001	1.001	0.996	0.995	0.33	-0.21
S16.C	0.987	0.995	1.001	1.001	1.001	1.000	1.000	1.00	0.88
S17.C	0.987	0.995	1.001	1.001	1.001	1.000	1.000	1.00	0.88
S18.A	0.993	1.000	1.003	1.003	1.003	1.000	1.000	0.94	0.58
S18.B	1.005	1.010	1.008	1.008	1.008	1.000	1.000	0.03	-0.53
S18.C	0.987	0.995	1.001	1.001	1.001	1.000	1.000	1.00	0.88
S197.A	0.995	1.002	1.004	1.004	1.004	0.998	0.998	0.76	0.27
S197.B	0.997	0.996	0.990	0.990	0.990	0.992	0.992	-0.94	-0.80
S197.C	0.993	1.003	1.001	1.001	1.001	0.997	0.997	0.67	0.20
S19.A	0.993	1.000	1.003	1.003	1.003	1.000	1.000	0.94	0.58
S1.A	0.994	1.000	1.001	1.001	1.001	0.996	0.996	0.68	0.15
S1.B	0.997	1.003	1.003	1.003	1.003	0.996	0.996	0.31	-0.28
S1.C	0.992	0.998	1.000	1.000	1.000	0.996	0.996	0.83	0.38
S20.A	0.993	1.000	1.003	1.003	1.003	1.000	1.000	0.94	0.58
S21.A	0.993	1.000	1.003	1.003	1.003	1.000	1.000	0.94	0.58
S21.B	1.005	1.010	1.008	1.008	1.008	1.000	1.000	0.03	-0.53
S21.C	0.987	0.995	1.001	1.001	1.001	1.000	1.000	1.00	0.88
S22.B	1.005	1.010	1.008	1.008	1.008	1.000	1.000	0.03	-0.53
S23.A	0.993	1.000	1.003	1.003	1.003	1.000	1.000	0.94	0.58
S23.B	1.005	1.010	1.008	1.008	1.008	1.000	1.000	0.03	-0.53
S23.C	0.987	0.995	1.001	1.001	1.001	1.000	1.000	1.00	0.88
S24.C	0.987	0.995	1.001	1.001	1.001	1.000	1.000	1.00	0.88
S250.A	0.993	1.000	1.003	1.003	1.003	1.000	1.000	0.94	0.58
S250.B	1.005	1.010	1.008	1.008	1.008	1.000	1.000	0.03	-0.53
S250.C	0.987	0.995	1.001	1.001	1.001	1.000	1.000	1.00	0.88
S25.A	0.993	1.000	1.003	1.003	1.003	1.000	1.000	0.94	0.58
S25.B	1.005	1.010	1.008	1.008	1.008	1.000	1.000	0.03	-0.53
S25.C	0.987	0.995	1.001	1.001	1.001	1.000	1.000	1.00	0.88
S25r.A	1.000	1.000	0.997	0.997	0.997	1.000	1.000	-0.59	-0.22
S25r.C	1.000	1.001	1.001	1.001	1.001	1.000	1.000	0.37	-0.19
S26.A	1.000	1.000	0.997	0.997	0.997	1.000	1.000	-0.59	-0.22
S26.C	1.000	1.001	1.001	1.001	1.001	1.000	1.000	0.37	-0.19
S27.A	1.000	1.000	0.997	0.997	0.997	1.000	1.000	-0.59	-0.22
S27.C	1.000	1.001	1.001	1.001	1.001	1.000	1.000	0.37	-0.19
S28.A	0.993	1.000	1.003	1.003	1.003	1.000	1.000	0.94	0.58
S28.B	1.005	1.010	1.008	1.008	1.008	1.000	1.000	0.03	-0.53
S28.C	0.987	0.995	1.001	1.001	1.001	1.000	1.000	1.00	0.88
S29.A	0.993	1.000	1.003	1.003	1.003	1.000	1.000	0.94	0.58

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S82.A})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S29.B	1.005	1.010	1.008	1.008	1.008	1.000	1.000	0.03	-0.53
S29.C	0.987	0.995	1.001	1.001	1.001	1.000	1.000	1.00	0.88
S2.B	0.997	1.003	1.003	1.003	1.003	0.996	0.996	0.31	-0.28
S300.A	0.995	1.002	1.004	1.004	1.004	0.998	0.998	0.76	0.27
S300.B	0.997	0.996	0.990	0.990	0.990	0.992	0.992	-0.94	-0.80
S300.C	0.993	1.003	1.001	1.001	1.001	0.997	0.997	0.67	0.20
S300 open.A	0.993	1.000	1.003	1.003	1.003	1.000	1.000	0.94	0.58
S300 open.B	1.005	1.010	1.008	1.008	1.008	1.000	1.000	0.03	-0.53
S300 open.C	0.987	0.995	1.001	1.001	1.001	1.000	1.000	1.00	0.88
S30.A	0.993	1.000	1.003	1.003	1.003	1.000	1.000	0.94	0.58
S30.B	1.005	1.010	1.008	1.008	1.008	1.000	1.000	0.03	-0.53
S30.C	0.987	0.995	1.001	1.001	1.001	1.000	1.000	1.00	0.88
S31.C	1.000	1.001	1.001	1.001	1.001	1.000	1.000	0.37	-0.19
S32.C	1.000	1.001	1.001	1.001	1.001	1.000	1.000	0.37	-0.19
S33.A	1.000	1.000	0.997	0.997	0.997	1.000	1.000	-0.59	-0.22
S34.C	0.987	0.995	1.001	1.001	1.001	1.000	1.000	1.00	0.88
S35.A	0.993	1.000	1.003	1.003	1.003	1.000	1.000	0.94	0.58
S35.B	1.005	1.010	1.008	1.008	1.008	1.000	1.000	0.03	-0.53
S35.C	0.987	0.995	1.001	1.001	1.001	1.000	1.000	1.00	0.88
S36.A	0.993	1.000	1.003	1.003	1.003	1.000	1.000	0.94	0.58
S36.B	1.005	1.010	1.008	1.008	1.008	1.000	1.000	0.03	-0.53
S37.A	0.993	1.000	1.003	1.003	1.003	1.000	1.000	0.94	0.58
S38.B	1.005	1.010	1.008	1.008	1.008	1.000	1.000	0.03	-0.53
S39.B	1.005	1.010	1.008	1.008	1.008	1.000	1.000	0.03	-0.53
S3.C	0.992	0.998	1.000	1.000	1.000	0.996	0.996	0.83	0.38
S40.A	0.993	1.000	1.003	1.003	1.003	1.000	1.000	0.94	0.58
S40.B	1.005	1.010	1.008	1.008	1.008	1.000	1.000	0.03	-0.53
S40.C	0.987	0.995	1.001	1.001	1.001	1.000	1.000	1.00	0.88
S41.C	0.987	0.995	1.001	1.001	1.001	1.000	1.000	1.00	0.88
S42.A	0.993	1.000	1.003	1.003	1.003	1.000	1.000	0.94	0.58
S42.B	1.005	1.010	1.008	1.008	1.008	1.000	1.000	0.03	-0.53
S42.C	0.987	0.995	1.001	1.001	1.001	1.000	1.000	1.00	0.88
S43.B	1.005	1.010	1.008	1.008	1.008	1.000	1.000	0.03	-0.53
S44.A	0.993	1.000	1.003	1.003	1.003	1.000	1.000	0.94	0.58
S44.B	1.005	1.010	1.008	1.008	1.008	1.000	1.000	0.03	-0.53
S44.C	0.987	0.995	1.001	1.001	1.001	1.000	1.000	1.00	0.88
S450.A	0.995	1.002	1.004	1.004	1.004	0.998	0.998	0.76	0.27

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S82.A})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S450.B	0.997	0.996	0.990	0.990	0.990	0.992	0.992	-0.94	-0.80
S450.C	0.993	1.003	1.001	1.001	1.001	0.997	0.997	0.67	0.20
S45.A	0.993	1.000	1.003	1.003	1.003	1.000	1.000	0.94	0.58
S46.A	0.993	1.000	1.003	1.003	1.003	1.000	1.000	0.94	0.58
S47.A	0.993	1.000	1.003	1.003	1.003	1.000	1.000	0.94	0.58
S47.B	1.005	1.010	1.008	1.008	1.008	1.000	1.000	0.03	-0.53
S47.C	0.987	0.995	1.001	1.001	1.001	1.000	1.000	1.00	0.88
S48.A	0.993	1.000	1.003	1.003	1.003	1.000	1.000	0.94	0.58
S48.B	1.005	1.010	1.008	1.008	1.008	1.000	1.000	0.03	-0.53
S48.C	0.987	0.995	1.001	1.001	1.001	1.000	1.000	1.00	0.88
S49.A	0.993	1.000	1.003	1.003	1.003	1.000	1.000	0.94	0.58
S49.B	1.005	1.010	1.008	1.008	1.008	1.000	1.000	0.03	-0.53
S49.C	0.987	0.995	1.001	1.001	1.001	1.000	1.000	1.00	0.88
S4.C	0.992	0.998	1.000	1.000	1.000	0.996	0.996	0.83	0.38
S50.A	0.993	1.000	1.003	1.003	1.003	1.000	1.000	0.94	0.58
S50.B	1.005	1.010	1.008	1.008	1.008	1.000	1.000	0.03	-0.53
S50.C	0.987	0.995	1.001	1.001	1.001	1.000	1.000	1.00	0.88
S51.A	0.993	1.000	1.003	1.003	1.003	1.000	1.000	0.94	0.58
S51.B	1.005	1.010	1.008	1.008	1.008	1.000	1.000	0.03	-0.53
S51.C	0.987	0.995	1.001	1.001	1.001	1.000	1.000	1.00	0.88
S52.A	0.993	1.000	1.004	1.004	1.004	1.002	1.002	0.99	0.72
S52.B	1.008	1.014	1.011	1.011	1.011	1.001	1.002	-0.07	-0.62
S52.C	0.985	0.993	1.001	1.001	1.001	1.002	1.002	0.97	0.94
S53.A	0.993	1.000	1.005	1.005	1.005	1.003	1.003	1.00	0.77
S53.B	1.010	1.016	1.012	1.012	1.012	1.002	1.002	-0.11	-0.65
S53.C	0.984	0.992	1.001	1.001	1.001	1.003	1.003	0.95	0.96
S54.A	0.993	1.001	1.005	1.005	1.005	1.003	1.003	1.00	0.80
S54.B	1.011	1.017	1.013	1.013	1.013	1.003	1.003	-0.14	-0.67
S54.C	0.984	0.992	1.001	1.001	1.001	1.003	1.003	0.94	0.97
S55.A	0.993	1.001	1.005	1.005	1.005	1.003	1.003	1.00	0.80
S55.B	1.011	1.017	1.013	1.013	1.013	1.003	1.003	-0.14	-0.67
S55.C	0.984	0.992	1.001	1.001	1.001	1.003	1.003	0.94	0.97
S56.A	0.993	1.001	1.005	1.005	1.005	1.003	1.003	1.00	0.80
S56.B	1.011	1.017	1.013	1.013	1.013	1.003	1.003	-0.14	-0.67
S56.C	0.984	0.992	1.001	1.001	1.001	1.003	1.003	0.94	0.97
S57.A	0.994	1.001	1.007	1.007	1.007	1.005	1.005	1.00	0.85
S57.B	1.014	1.019	1.015	1.015	1.015	1.005	1.005	-0.18	-0.70
S57.C	0.981	0.990	1.001	1.001	1.001	1.005	1.005	0.91	0.98
S58.B	1.014	1.019	1.015	1.015	1.015	1.005	1.005	-0.18	-0.70
S59.B	1.014	1.019	1.015	1.015	1.015	1.005	1.005	-0.18	-0.70

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S82.A})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S5.C	0.992	0.998	1.000	1.000	1.000	0.996	0.996	0.83	0.38
S60.A	0.994	1.002	1.009	1.009	1.009	1.009	1.009	0.98	0.92
S60.B	1.020	1.025	1.019	1.019	1.019	1.009	1.009	-0.25	-0.75
S60.C	0.977	0.986	1.001	1.001	1.001	1.008	1.008	0.87	0.99
S61.A	0.994	1.002	1.009	1.009	1.009	1.009	1.009	0.98	0.92
S61.B	1.020	1.025	1.019	1.019	1.019	1.009	1.009	-0.25	-0.75
S61.C	0.977	0.986	1.001	1.001	1.001	1.008	1.008	0.87	0.99
S61s.A	0.994	1.002	1.009	1.009	1.009	1.009	1.009	0.98	0.92
S61s.B	1.020	1.025	1.019	1.019	1.019	1.009	1.009	-0.25	-0.75
S61s.C	0.977	0.986	1.001	1.001	1.001	1.008	1.008	0.87	0.99
S62.A	0.994	1.002	1.009	1.009	1.009	1.009	1.009	0.98	0.92
S62.B	1.020	1.025	1.019	1.019	1.019	1.009	1.009	-0.25	-0.75
S62.C	0.977	0.986	1.001	1.001	1.001	1.008	1.008	0.87	0.99
S63.A	0.994	1.002	1.009	1.009	1.009	1.009	1.009	0.98	0.92
S63.B	1.020	1.025	1.019	1.019	1.019	1.009	1.009	-0.25	-0.75
S63.C	0.977	0.986	1.001	1.001	1.001	1.008	1.008	0.87	0.99
S64.A	0.994	1.002	1.009	1.009	1.009	1.009	1.009	0.98	0.92
S64.B	1.020	1.025	1.019	1.019	1.019	1.009	1.009	-0.25	-0.75
S64.C	0.977	0.986	1.001	1.001	1.001	1.008	1.008	0.87	0.99
S65.A	0.994	1.002	1.009	1.009	1.009	1.009	1.009	0.98	0.92
S65.B	1.020	1.025	1.019	1.019	1.019	1.009	1.009	-0.25	-0.75
S65.C	0.977	0.986	1.001	1.001	1.001	1.008	1.008	0.87	0.99
S66.A	0.994	1.002	1.009	1.009	1.009	1.009	1.009	0.98	0.92
S66.B	1.020	1.025	1.019	1.019	1.019	1.009	1.009	-0.25	-0.75
S66.C	0.977	0.986	1.001	1.001	1.001	1.008	1.008	0.87	0.99
S67.A	0.995	1.002	1.004	1.004	1.004	0.998	0.998	0.76	0.27
S67.B	0.997	0.996	0.990	0.990	0.990	0.992	0.992	-0.94	-0.80
S67.C	0.993	1.003	1.001	1.001	1.001	0.997	0.997	0.67	0.20
S68.A	0.995	1.002	1.004	1.004	1.004	0.998	0.998	0.76	0.27
S69.A	0.995	1.002	1.004	1.004	1.004	0.998	0.998	0.76	0.27
S6.C	0.992	0.998	1.000	1.000	1.000	0.996	0.996	0.83	0.38
S70.A	0.995	1.002	1.004	1.004	1.004	0.998	0.998	0.76	0.27
S71.A	0.995	1.002	1.004	1.004	1.004	0.998	0.998	0.76	0.27
S72.A	0.995	1.003	1.005	1.005	1.005	1.000	1.000	0.84	0.39
S72.B	1.000	0.998	0.992	0.992	0.992	0.993	0.993	-0.94	-0.83
S72.C	0.991	1.001	1.001	1.001	1.001	0.998	0.998	0.86	0.50
S73.C	0.991	1.001	1.001	1.001	1.001	0.998	0.998	0.86	0.50
S74.C	0.991	1.001	1.001	1.001	1.001	0.998	0.998	0.86	0.50
S75.C	0.991	1.001	1.001	1.001	1.001	0.998	0.998	0.86	0.50
S76.A	0.995	1.003	1.006	1.006	1.006	1.001	1.001	0.88	0.47

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S82.A})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S76.B	1.001	1.000	0.993	0.993	0.993	0.994	0.994	-0.94	-0.85
S76.C	0.990	1.000	1.001	1.001	1.001	0.999	0.999	0.93	0.67
S77.A	0.995	1.003	1.007	1.007	1.007	1.002	1.002	0.94	0.58
S77.B	1.004	1.003	0.995	0.995	0.995	0.996	0.996	-0.93	-0.89
S77.C	0.987	0.998	1.000	1.000	1.000	1.001	1.000	0.97	0.86
S78.A	0.995	1.003	1.007	1.007	1.007	1.003	1.003	0.95	0.61
S78.B	1.005	1.003	0.996	0.996	0.996	0.996	0.997	-0.93	-0.90
S78.C	0.987	0.997	1.000	1.000	1.000	1.001	1.001	0.97	0.89
S79.A	0.995	1.003	1.007	1.007	1.007	1.003	1.003	0.95	0.61
S79.B	1.005	1.003	0.996	0.996	0.996	0.996	0.997	-0.93	-0.90
S79.C	0.987	0.997	1.000	1.000	1.000	1.001	1.001	0.97	0.89
S7.A	0.994	1.000	1.002	1.002	1.002	0.997	0.997	0.80	0.33
S7.B	1.000	1.006	1.005	1.005	1.005	0.997	0.997	0.19	-0.39
S7.C	0.990	0.997	1.000	1.000	1.000	0.997	0.997	0.97	0.65
S80.A	0.995	1.003	1.008	1.008	1.008	1.005	1.005	0.98	0.71
S80.B	1.009	1.007	0.999	0.999	0.999	0.999	0.999	-0.92	-0.92
S80.C	0.983	0.994	1.000	0.999	0.999	1.003	1.002	0.94	0.96
S81.A	0.995	1.004	1.008	1.008	1.008	1.005	1.005	0.99	0.74
S81.B	1.010	1.008	1.000	1.000	1.000	0.999	0.999	-0.91	-0.93
S81.C	0.982	0.993	0.999	0.999	0.999	1.003	1.003	0.92	0.97
S82.A	0.994	1.003	1.008	1.008	1.008	1.006	1.006	1.00	0.83
S82.B	1.012	1.010	1.001	1.001	1.001	1.000	1.001	-0.90	-0.94
S82.C	0.982	0.993	1.000	1.000	1.000	1.004	1.004	0.92	0.97
S83.A	0.995	1.004	1.009	1.009	1.009	1.008	1.007	1.00	0.83
S83.B	1.013	1.011	1.002	1.002	1.002	1.002	1.002	-0.90	-0.94
S83.C	0.983	0.994	1.001	1.001	1.001	1.005	1.005	0.92	0.97
S84.C	0.969	0.981	0.993	0.993	0.993	1.003	1.002	0.86	1.00
S85.C	0.960	0.972	0.989	0.989	0.989	1.002	1.002	0.83	1.00
S86.A	0.996	1.004	1.006	1.006	1.006	1.002	1.001	0.88	0.47
S86.B	1.002	1.000	0.994	0.994	0.994	0.995	0.995	-0.94	-0.85
S86.C	0.991	1.001	1.002	1.001	1.001	1.000	1.000	0.93	0.67
S87.A	0.996	1.004	1.007	1.007	1.007	1.002	1.002	0.88	0.47
S87.B	1.003	1.001	0.994	0.994	0.994	0.995	0.996	-0.94	-0.85
S87.C	0.991	1.001	1.002	1.002	1.002	1.000	1.000	0.93	0.67
S88.A	0.996	1.004	1.007	1.007	1.007	1.002	1.002	0.88	0.47
S89.A	0.996	1.004	1.007	1.007	1.007	1.002	1.002	0.88	0.47
S89.B	1.003	1.001	0.995	0.995	0.995	0.996	0.996	-0.94	-0.85
S89.C	0.992	1.002	1.002	1.002	1.002	1.001	1.000	0.93	0.67
S8.A	0.993	1.000	1.003	1.002	1.002	0.998	0.998	0.87	0.44
S8.B	1.002	1.008	1.006	1.006	1.006	0.998	0.998	0.13	-0.45

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S82.A})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S8.C	0.989	0.996	1.001	1.001	1.001	0.998	0.998	1.00	0.77
S90.B	1.003	1.002	0.995	0.995	0.995	0.996	0.996	-0.94	-0.85
S91.A	0.996	1.004	1.007	1.007	1.007	1.002	1.002	0.88	0.47
S91.B	1.003	1.001	0.994	0.994	0.994	0.996	0.996	-0.94	-0.85
S91.C	0.992	1.002	1.003	1.003	1.003	1.001	1.001	0.93	0.67
S92.C	0.993	1.003	1.003	1.003	1.003	1.002	1.001	0.93	0.67
S93.A	0.996	1.004	1.007	1.007	1.007	1.002	1.002	0.88	0.47
S93.B	1.003	1.001	0.994	0.994	0.994	0.996	0.996	-0.94	-0.85
S93.C	0.992	1.002	1.003	1.003	1.003	1.001	1.001	0.93	0.67
S94.A	0.996	1.004	1.007	1.007	1.007	1.002	1.002	0.88	0.47
S94 open.A	0.993	1.001	1.005	1.005	1.005	1.003	1.003	1.00	0.80
S95.A	0.996	1.004	1.007	1.007	1.007	1.002	1.002	0.88	0.47
S95.B	1.003	1.001	0.994	0.994	0.994	0.996	0.996	-0.94	-0.85
S95.C	0.992	1.002	1.003	1.003	1.003	1.001	1.001	0.93	0.67
S96.B	1.003	1.001	0.994	0.994	0.994	0.996	0.996	-0.94	-0.85
S97.A	0.995	1.002	1.004	1.004	1.004	0.998	0.998	0.76	0.27
S97.B	0.997	0.996	0.990	0.990	0.990	0.992	0.992	-0.94	-0.80
S97.C	0.993	1.003	1.001	1.001	1.001	0.997	0.997	0.67	0.20
S98.A	0.995	1.002	1.004	1.004	1.004	0.998	0.998	0.76	0.27
S98.B	0.997	0.996	0.990	0.990	0.990	0.992	0.992	-0.94	-0.80
S98.C	0.993	1.003	1.001	1.001	1.001	0.997	0.997	0.67	0.20
S99.A	0.995	1.002	1.004	1.004	1.004	0.998	0.998	0.76	0.27
S99.B	0.997	0.996	0.990	0.990	0.990	0.992	0.992	-0.94	-0.80
S99.C	0.993	1.003	1.001	1.001	1.001	0.997	0.997	0.67	0.20
S9.A	0.993	1.000	1.003	1.002	1.002	0.998	0.998	0.87	0.44
S9r.A	0.993	1.006	1.003	1.002	1.002	0.998	0.998	0.58	0.13

Table F.11: Voltage magnitudes and Pearson coefficient values obtained for Scenario S5

Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S48})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S100.A	0.990	0.997	0.998	0.998	0.998	0.999	0.999	0.78
S100.B	0.989	0.989	0.990	0.990	0.990	0.991	0.991	1.00
S100.C	0.990	0.990	0.991	0.991	0.991	0.992	0.992	1.00
S101.A	0.990	0.997	0.998	0.998	0.998	0.999	0.999	0.78

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S48})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S101.B	0.989	0.989	0.990	0.990	0.990	0.991	0.991	1.00
S101.C	0.990	0.990	0.991	0.991	0.991	0.992	0.992	1.00
S102.C	0.990	0.990	0.991	0.991	0.991	0.992	0.992	1.00
S103.C	0.990	0.990	0.991	0.991	0.991	0.992	0.992	1.00
S104.C	0.990	0.990	0.991	0.991	0.991	0.992	0.992	1.00
S105.A	0.990	0.997	0.998	0.998	0.998	0.999	0.999	0.78
S105.B	0.989	0.989	0.990	0.990	0.990	0.991	0.991	1.00
S105.C	0.990	0.990	0.991	0.991	0.991	0.992	0.992	1.00
S106.B	0.989	0.989	0.990	0.990	0.990	0.991	0.991	1.00
S107.B	0.989	0.989	0.990	0.990	0.990	0.991	0.991	1.00
S108.A	0.990	0.997	0.998	0.998	0.998	0.999	0.999	0.78
S108.B	0.989	0.989	0.990	0.990	0.990	0.991	0.991	1.00
S108.C	0.990	0.990	0.991	0.991	0.991	0.992	0.992	1.00
S109.A	0.990	0.997	0.998	0.998	0.998	0.999	0.999	0.78
S10.A	0.996	0.997	0.997	0.997	0.997	0.998	0.998	1.00
S110.A	0.990	0.997	0.998	0.998	0.998	0.999	0.999	0.78
S111.A	0.990	0.997	0.998	0.998	0.998	0.999	0.999	0.78
S112.A	0.990	0.997	0.998	0.998	0.998	0.999	0.999	0.78
S113.A	0.990	0.997	0.998	0.998	0.998	0.999	0.999	0.78
S114.A	0.990	0.997	0.998	0.998	0.998	0.999	0.999	0.78
S11.A	0.996	0.997	0.997	0.997	0.997	0.998	0.998	1.00
S12.B	0.996	0.997	0.997	0.997	0.997	0.998	0.998	1.00
S135.A	0.996	0.996	0.998	0.998	0.998	1.000	1.000	1.00
S135.B	0.996	0.996	0.998	0.998	0.998	0.999	0.999	1.00
S135.C	0.996	0.996	0.998	0.998	0.998	1.000	1.000	1.00
S13.A	0.997	0.997	0.999	0.999	0.999	1.000	1.000	1.00
S13.B	0.997	0.998	0.998	0.998	0.998	0.999	0.999	1.00
S13.C	0.998	0.998	0.999	0.999	0.999	1.000	1.000	1.00
S149.A	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.99
S149.B	0.994	0.994	0.994	0.994	0.994	0.994	0.994	1.00
S149.C	0.994	0.994	0.994	0.994	0.994	0.994	0.994	1.00
S14.A	0.996	0.997	0.997	0.997	0.997	0.998	0.998	1.00
S151.A	0.993	0.994	0.997	0.997	0.997	1.000	1.000	1.00
S151.B	0.994	0.994	0.997	0.997	0.997	0.999	0.999	1.00
S151.C	0.994	0.994	0.997	0.997	0.997	1.000	1.000	1.00
S152.A	0.997	0.997	0.999	0.999	0.999	1.000	1.000	1.00
S152.B	0.997	0.998	0.998	0.998	0.998	0.999	0.999	1.00
S152.C	0.998	0.998	0.999	0.999	0.999	1.000	1.000	1.00
S15.C	0.998	0.998	0.999	0.999	0.999	1.000	1.000	1.00
S160.A	1.007	1.007	1.008	1.008	1.008	1.010	1.010	1.00

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S48})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S160.B	1.006	1.006	1.007	1.007	1.007	1.008	1.008	1.00
S160.C	1.007	1.007	1.008	1.008	1.008	1.009	1.009	1.00
S160r.A	0.988	0.995	0.996	0.996	0.996	0.997	0.997	0.78
S160r.B	0.987	0.988	0.989	0.988	0.988	0.989	0.989	1.00
S160r.C	0.988	0.988	0.989	0.989	0.989	0.990	0.990	1.00
S16.C	0.998	0.998	0.999	0.999	0.999	1.000	1.000	1.00
S17.C	0.998	0.998	0.999	0.999	0.999	1.000	1.000	1.00
S18.A	0.996	0.996	0.998	0.998	0.998	1.000	1.000	1.00
S18.B	0.996	0.996	0.998	0.998	0.998	0.999	0.999	1.00
S18.C	0.996	0.996	0.998	0.998	0.998	1.000	1.000	1.00
S197.A	0.990	0.997	0.998	0.998	0.998	0.999	0.999	0.78
S197.B	0.989	0.989	0.990	0.990	0.990	0.991	0.991	1.00
S197.C	0.990	0.990	0.991	0.991	0.991	0.992	0.992	1.00
S19.A	0.996	0.996	0.998	0.998	0.998	1.000	1.000	1.00
S1.A	0.995	0.995	0.995	0.995	0.995	0.996	0.996	1.00
S1.B	0.995	0.995	0.995	0.995	0.995	0.996	0.996	1.00
S1.C	0.995	0.995	0.996	0.996	0.996	0.996	0.996	1.00
S20.A	0.996	0.996	0.998	0.998	0.998	1.000	1.000	1.00
S21.A	0.996	0.996	0.998	0.998	0.998	1.000	1.000	1.00
S21.B	0.996	0.996	0.998	0.998	0.998	0.999	0.999	1.00
S21.C	0.996	0.996	0.998	0.998	0.998	1.000	1.000	1.00
S22.B	0.996	0.996	0.998	0.998	0.998	0.999	0.999	1.00
S23.A	0.996	0.996	0.998	0.998	0.998	1.000	1.000	1.00
S23.B	0.996	0.996	0.998	0.998	0.998	0.999	0.999	1.00
S23.C	0.996	0.996	0.998	0.998	0.998	1.000	1.000	1.00
S24.C	0.996	0.996	0.998	0.998	0.998	1.000	1.000	1.00
S250.A	0.996	0.996	0.998	0.998	0.998	1.000	1.000	1.00
S250.B	0.996	0.996	0.998	0.998	0.998	0.999	0.999	1.00
S250.C	0.996	0.996	0.998	0.998	0.998	1.000	1.000	1.00
S25.A	0.996	0.996	0.998	0.998	0.998	1.000	1.000	1.00
S25.B	0.996	0.996	0.998	0.998	0.998	0.999	0.999	1.00
S25.C	0.996	0.996	0.998	0.998	0.998	1.000	1.000	1.00
S25r.A	0.996	1.002	0.998	0.998	0.998	1.000	1.000	0.16
S25r.C	0.996	1.003	0.998	0.998	0.998	1.000	1.000	0.15
S26.A	0.996	1.002	0.998	0.998	0.998	1.000	1.000	0.16
S26.C	0.996	1.003	0.998	0.998	0.998	1.000	1.000	0.15
S27.A	0.996	1.002	0.998	0.998	0.998	1.000	1.000	0.16
S27.C	0.996	1.003	0.998	0.998	0.998	1.000	1.000	0.15
S28.A	0.996	0.996	0.998	0.998	0.998	1.000	1.000	1.00
S28.B	0.996	0.996	0.998	0.998	0.998	0.999	0.999	1.00

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S48})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S28.C	0.996	0.996	0.998	0.998	0.998	1.000	1.000	1.00
S29.A	0.996	0.996	0.998	0.998	0.998	1.000	1.000	1.00
S29.B	0.996	0.996	0.998	0.998	0.998	0.999	0.999	1.00
S29.C	0.996	0.996	0.998	0.998	0.998	1.000	1.000	1.00
S2.B	0.995	0.995	0.995	0.995	0.995	0.996	0.996	1.00
S300.A	0.990	0.997	0.998	0.998	0.998	0.999	0.999	0.78
S300.B	0.989	0.989	0.990	0.990	0.990	0.991	0.991	1.00
S300.C	0.990	0.990	0.991	0.991	0.991	0.992	0.992	1.00
S300 open.A	0.993	0.994	0.997	0.997	0.997	1.000	1.000	1.00
S300 open.B	0.994	0.994	0.997	0.997	0.997	0.999	0.999	1.00
S300 open.C	0.994	0.994	0.997	0.997	0.997	1.000	1.000	1.00
S30.A	0.996	0.996	0.998	0.998	0.998	1.000	1.000	1.00
S30.B	0.996	0.996	0.998	0.998	0.998	0.999	0.999	1.00
S30.C	0.996	0.996	0.998	0.998	0.998	1.000	1.000	1.00
S31.C	0.996	1.003	0.998	0.998	0.998	1.000	1.000	0.15
S32.C	0.996	1.003	0.998	0.998	0.998	1.000	1.000	0.15
S33.A	0.996	1.002	0.998	0.998	0.998	1.000	1.000	0.16
S34.C	0.998	0.998	0.999	0.999	0.999	1.000	1.000	1.00
S35.A	0.995	0.996	0.998	0.998	0.998	1.000	1.000	1.00
S35.B	0.995	0.995	0.997	0.997	0.997	0.999	0.999	1.00
S35.C	0.996	0.996	0.998	0.998	0.998	1.000	1.000	1.00
S36.A	0.995	0.996	0.998	0.998	0.998	1.000	1.000	1.00
S36.B	0.995	0.995	0.997	0.997	0.997	0.999	0.999	1.00
S37.A	0.995	0.996	0.998	0.998	0.998	1.000	1.000	1.00
S38.B	0.995	0.995	0.997	0.997	0.997	0.999	0.999	1.00
S39.B	0.995	0.995	0.997	0.997	0.997	0.999	0.999	1.00
S3.C	0.995	0.995	0.996	0.996	0.996	0.996	0.996	1.00
S40.A	0.995	0.995	0.997	0.997	0.997	1.000	1.000	1.00
S40.B	0.995	0.995	0.997	0.997	0.997	0.999	0.999	1.00
S40.C	0.995	0.995	0.998	0.998	0.998	1.000	1.000	1.00
S41.C	0.995	0.995	0.998	0.998	0.998	1.000	1.000	1.00
S42.A	0.994	0.994	0.997	0.997	0.997	1.000	1.000	1.00
S42.B	0.994	0.995	0.997	0.997	0.997	0.999	0.999	1.00
S42.C	0.995	0.995	0.997	0.997	0.997	1.000	1.000	1.00
S43.B	0.994	0.995	0.997	0.997	0.997	0.999	0.999	1.00
S44.A	0.994	0.994	0.997	0.997	0.997	1.000	1.000	1.00
S44.B	0.994	0.994	0.997	0.997	0.997	0.999	0.999	1.00

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S48})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S44.C	0.994	0.995	0.997	0.997	0.997	1.000	1.000	1.00
S450.A	0.990	0.997	0.998	0.998	0.998	0.999	0.999	0.78
S450.B	0.989	0.989	0.990	0.990	0.990	0.991	0.991	1.00
S450.C	0.990	0.990	0.991	0.991	0.991	0.992	0.992	1.00
S45.A	0.994	0.994	0.997	0.997	0.997	1.000	1.000	1.00
S46.A	0.994	0.994	0.997	0.997	0.997	1.000	1.000	1.00
S47.A	0.993	0.994	0.997	0.997	0.997	1.000	1.000	1.00
S47.B	0.994	0.994	0.997	0.997	0.997	0.999	0.999	1.00
S47.C	0.994	0.994	0.997	0.997	0.997	1.000	1.000	1.00
S48.A	0.993	0.993	0.997	0.997	0.997	1.000	1.000	1.00
S48.B	0.993	0.994	0.996	0.996	0.996	0.999	0.999	1.00
S48.C	0.994	0.994	0.997	0.997	0.997	1.000	1.000	1.00
S49.A	0.993	0.994	0.997	0.997	0.997	1.000	1.000	1.00
S49.B	0.994	0.994	0.997	0.997	0.997	0.999	0.999	1.00
S49.C	0.994	0.994	0.997	0.997	0.997	1.000	1.000	1.00
S4.C	0.995	0.995	0.996	0.996	0.996	0.996	0.996	1.00
S50.A	0.993	0.994	0.997	0.997	0.997	1.000	1.000	1.00
S50.B	0.994	0.994	0.997	0.997	0.997	0.999	0.999	1.00
S50.C	0.994	0.994	0.997	0.997	0.997	1.000	1.000	1.00
S51.A	0.993	0.994	0.997	0.997	0.997	1.000	1.000	1.00
S51.B	0.994	0.994	0.997	0.997	0.997	0.999	0.999	1.00
S51.C	0.994	0.994	0.997	0.997	0.997	1.000	1.000	1.00
S52.A	0.999	1.000	1.001	1.001	1.001	1.002	1.002	1.00
S52.B	0.999	0.999	1.000	1.000	1.000	1.001	1.001	1.00
S52.C	1.000	1.000	1.001	1.001	1.001	1.002	1.002	1.00
S53.A	1.000	1.001	1.002	1.002	1.002	1.003	1.003	1.00
S53.B	1.000	1.000	1.001	1.001	1.001	1.002	1.002	1.00
S53.C	1.001	1.001	1.002	1.002	1.002	1.003	1.003	1.00
S54.A	1.001	1.001	1.002	1.002	1.002	1.004	1.004	1.00
S54.B	1.001	1.001	1.002	1.002	1.002	1.003	1.003	1.00
S54.C	1.002	1.002	1.003	1.003	1.003	1.004	1.004	1.00
S55.A	1.001	1.001	1.002	1.002	1.002	1.004	1.004	1.00
S55.B	1.001	1.001	1.002	1.002	1.002	1.003	1.003	1.00
S55.C	1.002	1.002	1.003	1.003	1.003	1.004	1.004	1.00
S56.A	1.001	1.001	1.002	1.002	1.002	1.004	1.004	1.00
S56.B	1.001	1.001	1.002	1.002	1.002	1.003	1.003	1.00
S56.C	1.002	1.002	1.003	1.003	1.003	1.004	1.004	1.00
S57.A	1.003	1.003	1.004	1.004	1.004	1.006	1.006	1.00
S57.B	1.003	1.003	1.004	1.004	1.004	1.004	1.004	1.00
S57.C	1.003	1.003	1.005	1.005	1.005	1.005	1.005	1.00

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S48})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S58.B	1.003	1.003	1.004	1.004	1.004	1.004	1.004	1.00
S59.B	1.003	1.003	1.004	1.004	1.004	1.004	1.004	1.00
S5.C	0.995	0.995	0.996	0.996	0.996	0.996	0.996	1.00
S60.A	1.007	1.007	1.008	1.008	1.008	1.010	1.010	1.00
S60.B	1.006	1.006	1.007	1.007	1.007	1.008	1.008	1.00
S60.C	1.007	1.007	1.008	1.008	1.008	1.009	1.009	1.00
S61.A	1.007	1.007	1.008	1.008	1.008	1.010	1.010	1.00
S61.B	1.006	1.006	1.007	1.007	1.007	1.008	1.008	1.00
S61.C	1.007	1.007	1.008	1.008	1.008	1.009	1.009	1.00
S61s.A	1.007	1.007	1.008	1.008	1.008	1.010	1.010	1.00
S61s.B	1.006	1.006	1.007	1.007	1.007	1.008	1.008	1.00
S61s.C	1.007	1.007	1.008	1.008	1.008	1.009	1.009	1.00
S62.A	1.007	1.007	1.008	1.008	1.008	1.010	1.010	1.00
S62.B	1.006	1.006	1.007	1.007	1.007	1.008	1.008	1.00
S62.C	1.007	1.007	1.008	1.008	1.008	1.009	1.009	1.00
S63.A	1.007	1.007	1.008	1.008	1.008	1.010	1.010	1.00
S63.B	1.006	1.006	1.007	1.007	1.007	1.008	1.008	1.00
S63.C	1.007	1.007	1.008	1.008	1.008	1.009	1.009	1.00
S64.A	1.007	1.007	1.008	1.008	1.008	1.010	1.010	1.00
S64.B	1.006	1.006	1.007	1.007	1.007	1.008	1.008	1.00
S64.C	1.007	1.007	1.008	1.008	1.008	1.009	1.009	1.00
S65.A	1.007	1.007	1.008	1.008	1.008	1.010	1.010	1.00
S65.B	1.006	1.006	1.007	1.007	1.007	1.008	1.008	1.00
S65.C	1.007	1.007	1.008	1.008	1.008	1.009	1.009	1.00
S66.A	1.007	1.007	1.008	1.008	1.008	1.010	1.010	1.00
S66.B	1.006	1.006	1.007	1.007	1.007	1.008	1.008	1.00
S66.C	1.007	1.007	1.008	1.008	1.008	1.009	1.009	1.00
S67.A	0.990	0.997	0.998	0.998	0.998	0.999	0.999	0.78
S67.B	0.989	0.989	0.990	0.990	0.990	0.991	0.991	1.00
S67.C	0.990	0.990	0.991	0.991	0.991	0.992	0.992	1.00
S68.A	0.990	0.997	0.998	0.998	0.998	0.999	0.999	0.78
S69.A	0.990	0.997	0.998	0.998	0.998	0.999	0.999	0.78
S6.C	0.995	0.995	0.996	0.996	0.996	0.996	0.996	1.00
S70.A	0.990	0.997	0.998	0.998	0.998	0.999	0.999	0.78
S71.A	0.990	0.997	0.998	0.998	0.998	0.999	0.999	0.78
S72.A	0.991	0.998	0.999	0.999	0.999	1.000	1.000	0.78
S72.B	0.991	0.991	0.992	0.992	0.992	0.993	0.993	1.00
S72.C	0.991	0.991	0.992	0.992	0.992	0.993	0.993	1.00
S73.C	0.991	0.991	0.992	0.992	0.992	0.993	0.993	1.00
S74.C	0.991	0.991	0.992	0.992	0.992	0.993	0.993	1.00

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S48})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S75.C	0.991	0.991	0.992	0.992	0.992	0.993	0.993	1.00
S76.A	0.992	0.999	1.000	1.000	1.000	1.002	1.001	0.78
S76.B	0.992	0.992	0.993	0.993	0.993	0.994	0.994	1.00
S76.C	0.992	0.992	0.993	0.993	0.993	0.994	0.994	1.00
S77.A	0.994	1.001	1.002	1.002	1.002	1.003	1.003	0.78
S77.B	0.994	0.994	0.995	0.995	0.995	0.995	0.995	1.00
S77.C	0.994	0.994	0.995	0.995	0.995	0.996	0.996	1.00
S78.A	0.994	1.001	1.002	1.002	1.002	1.004	1.004	0.78
S78.B	0.994	0.994	0.995	0.995	0.995	0.996	0.996	1.00
S78.C	0.994	0.994	0.995	0.995	0.995	0.996	0.996	1.00
S79.A	0.994	1.001	1.002	1.002	1.002	1.004	1.004	0.78
S79.B	0.994	0.994	0.995	0.995	0.995	0.996	0.996	1.00
S79.C	0.994	0.994	0.995	0.995	0.995	0.996	0.996	1.00
S7.A	0.996	0.996	0.997	0.997	0.997	0.997	0.997	1.00
S7.B	0.996	0.996	0.996	0.996	0.996	0.997	0.997	1.00
S7.C	0.996	0.996	0.997	0.997	0.997	0.997	0.997	1.00
S80.A	0.996	1.003	1.004	1.004	1.004	1.006	1.006	0.78
S80.B	0.996	0.996	0.997	0.997	0.997	0.998	0.998	1.00
S80.C	0.996	0.996	0.997	0.997	0.997	0.998	0.998	1.00
S81.A	0.997	1.004	1.005	1.005	1.005	1.006	1.006	0.78
S81.B	0.997	0.997	0.998	0.998	0.998	0.999	0.999	1.00
S81.C	0.996	0.996	0.997	0.997	0.997	0.998	0.998	1.00
S82.A	0.998	1.005	1.006	1.006	1.006	1.007	1.007	0.78
S82.B	0.998	0.998	0.999	0.999	0.999	1.000	1.000	1.00
S82.C	0.997	0.997	0.998	0.998	0.998	0.999	0.999	1.00
S83.A	0.999	1.006	1.007	1.007	1.007	1.008	1.008	0.77
S83.B	0.999	0.999	1.000	1.000	1.000	1.001	1.001	1.00
S83.C	0.998	0.998	0.999	0.999	0.999	1.000	1.000	1.00
S84.C	0.996	0.996	0.997	0.997	0.997	0.998	0.998	1.00
S85.C	0.996	0.996	0.997	0.997	0.997	0.998	0.998	1.00
S86.A	0.993	1.000	1.001	1.001	1.001	1.002	1.002	0.78
S86.B	0.993	0.993	0.994	0.994	0.994	0.994	0.994	1.00
S86.C	0.993	0.993	0.994	0.994	0.994	0.995	0.995	1.00
S87.A	0.993	1.000	1.002	1.002	1.002	1.003	1.003	0.78
S87.B	0.993	0.993	0.994	0.994	0.994	0.995	0.995	1.00
S87.C	0.993	0.993	0.994	0.994	0.994	0.995	0.995	1.00
S88.A	0.994	1.001	1.002	1.002	1.002	1.003	1.003	0.78
S89.A	0.993	1.000	1.001	1.001	1.001	1.003	1.003	0.78
S89.B	0.993	0.993	0.994	0.994	0.994	0.995	0.995	1.00
S89.C	0.994	0.994	0.995	0.995	0.995	0.996	0.996	1.00

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S48})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S8.A	0.996	0.997	0.997	0.997	0.997	0.998	0.998	1.00
S8.B	0.996	0.997	0.997	0.997	0.997	0.998	0.998	1.00
S8.C	0.997	0.997	0.998	0.998	0.998	0.998	0.998	1.00
S90.B	0.994	0.994	0.995	0.995	0.995	0.996	0.996	1.00
S91.A	0.993	1.000	1.001	1.001	1.001	1.003	1.002	0.78
S91.B	0.993	0.993	0.994	0.994	0.994	0.995	0.995	1.00
S91.C	0.994	0.994	0.995	0.995	0.995	0.996	0.996	1.00
S92.C	0.995	0.995	0.996	0.996	0.996	0.997	0.997	1.00
S93.A	0.993	1.000	1.001	1.001	1.001	1.003	1.002	0.78
S93.B	0.993	0.993	0.994	0.994	0.994	0.995	0.995	1.00
S93.C	0.994	0.994	0.995	0.995	0.995	0.996	0.996	1.00
S94.A	0.993	1.000	1.001	1.001	1.001	1.003	1.002	0.78
S94 open.A	1.001	1.001	1.002	1.002	1.002	1.004	1.004	1.00
S95.A	0.993	1.000	1.001	1.001	1.001	1.003	1.002	0.78
S95.B	0.993	0.993	0.994	0.994	0.994	0.995	0.995	1.00
S95.C	0.994	0.994	0.995	0.995	0.995	0.996	0.996	1.00
S96.B	0.993	0.993	0.994	0.994	0.994	0.995	0.995	1.00
S97.A	0.990	0.997	0.998	0.998	0.998	0.999	0.999	0.78
S97.B	0.989	0.989	0.990	0.990	0.990	0.991	0.991	1.00
S97.C	0.990	0.990	0.991	0.991	0.991	0.992	0.992	1.00
S98.A	0.990	0.997	0.998	0.998	0.998	0.999	0.999	0.78
S98.B	0.989	0.989	0.990	0.990	0.990	0.991	0.991	1.00
S98.C	0.990	0.990	0.991	0.991	0.991	0.992	0.992	1.00
S99.A	0.990	0.997	0.998	0.998	0.998	0.999	0.999	0.78
S99.B	0.989	0.989	0.990	0.990	0.990	0.991	0.991	1.00
S99.C	0.990	0.990	0.991	0.991	0.991	0.992	0.992	1.00
S9.A	0.996	0.997	0.997	0.997	0.997	0.998	0.998	1.00
S9r.A	0.996	0.997	0.997	0.997	0.997	0.998	0.998	1.00

Table F.12: Voltage magnitudes and Pearson coefficient values obtained for Scenario S6

Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S100.A	1.001	0.993	0.993	0.993	0.993	0.993	0.994	0.87	-0.66
S100.B	0.986	0.992	0.994	0.994	0.994	0.997	0.997	-0.99	0.96

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S100.C	0.989	1.000	1.001	1.001	1.001	1.003	1.002	-0.97	0.86
S101.A	1.001	0.993	0.993	0.993	0.993	0.993	0.993	0.87	-0.66
S101.B	0.986	0.992	0.994	0.994	0.994	0.997	0.997	-0.99	0.96
S101.C	0.989	1.000	1.001	1.001	1.001	1.003	1.002	-0.97	0.86
S102.C	0.989	1.000	1.001	1.001	1.001	1.003	1.002	-0.97	0.86
S103.C	0.989	1.000	1.001	1.001	1.001	1.003	1.002	-0.97	0.86
S104.C	0.989	1.000	1.001	1.001	1.001	1.003	1.002	-0.97	0.86
S105.A	1.001	0.993	0.993	0.993	0.993	0.993	0.994	0.87	-0.66
S105.B	0.986	0.992	0.994	0.994	0.994	0.997	0.997	-0.99	0.96
S105.C	0.989	1.000	1.001	1.001	1.001	1.003	1.002	-0.97	0.86
S106.B	0.986	0.992	0.994	0.994	0.994	0.997	0.997	-0.99	0.96
S107.B	0.986	0.992	0.994	0.994	0.994	0.997	0.997	-0.99	0.96
S108.A	1.001	0.993	0.993	0.993	0.993	0.993	0.994	0.87	-0.66
S108.B	0.986	0.992	0.994	0.994	0.994	0.997	0.997	-0.99	0.96
S108.C	0.989	1.000	1.001	1.001	1.001	1.003	1.002	-0.97	0.86
S109.A	1.001	0.993	0.993	0.993	0.993	0.993	0.994	0.87	-0.66
S10.A	1.000	0.999	0.996	0.996	0.996	0.992	0.992	0.88	-0.98
S110.A	1.001	0.993	0.993	0.993	0.993	0.993	0.994	0.87	-0.66
S111.A	1.001	0.993	0.993	0.993	0.993	0.993	0.994	0.87	-0.66
S112.A	1.001	0.993	0.993	0.993	0.993	0.993	0.994	0.87	-0.66
S113.A	1.001	0.993	0.993	0.993	0.993	0.993	0.994	0.87	-0.66
S114.A	1.001	0.993	0.993	0.993	0.993	0.993	0.994	0.87	-0.66
S11.A	1.000	0.999	0.996	0.996	0.996	0.992	0.992	0.88	-0.98
S12.B	0.997	0.997	0.997	0.997	0.997	0.998	0.998	-0.84	0.97
S135.A	1.010	1.009	1.005	1.005	1.005	1.000	1.000	0.88	-0.98
S135.B	0.997	0.998	0.998	0.998	0.998	0.999	0.999	-0.84	0.97
S135.C	0.976	0.978	0.989	0.989	0.989	0.999	0.999	-0.88	0.98
S13.A	1.010	1.009	1.005	1.005	1.005	1.000	1.000	0.88	-0.98
S13.B	0.997	0.998	0.998	0.998	0.998	0.999	0.999	-0.84	0.97
S13.C	0.976	0.978	0.989	0.989	0.989	0.999	0.999	-0.88	0.98
S149.A	0.994	0.994	0.994	0.994	0.994	0.994	0.994	-0.18	0.39
S149.B	0.994	0.994	0.994	0.994	0.994	0.994	0.994	-0.91	0.74
S149.C	0.994	0.994	0.994	0.994	0.994	0.994	0.994	-0.89	0.99
S14.A	1.000	0.999	0.996	0.996	0.996	0.992	0.992	0.88	-0.98
S151.A	1.010	1.009	1.005	1.005	1.005	1.000	1.000	0.88	-0.98
S151.B	0.997	0.998	0.998	0.998	0.998	0.999	0.999	-0.84	0.97
S151.C	0.976	0.978	0.989	0.989	0.989	0.999	0.999	-0.88	0.98
S152.A	1.010	1.009	1.005	1.005	1.005	1.000	1.000	0.88	-0.98
S152.B	0.997	0.998	0.998	0.998	0.998	0.999	0.999	-0.84	0.97
S152.C	0.976	0.978	0.989	0.989	0.989	0.999	0.999	-0.88	0.98

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S15.C	0.976	0.978	0.989	0.989	0.989	0.999	0.999	-0.88	0.98
S160.A	1.036	1.034	1.022	1.022	1.022	1.010	1.011	0.88	-0.98
S160.B	1.003	1.003	1.005	1.005	1.005	1.008	1.008	-0.83	0.97
S160.C	0.949	0.954	0.982	0.982	0.982	1.007	1.007	-0.88	0.98
S160r.A	0.998	0.989	0.990	0.990	0.990	0.991	0.992	0.74	-0.48
S160r.B	0.984	0.990	0.993	0.993	0.993	0.996	0.996	-0.99	0.96
S160r.C	0.990	1.001	1.001	1.001	1.001	1.001	1.001	-0.90	0.72
S16.C	0.976	0.978	0.989	0.989	0.989	0.999	0.999	-0.88	0.98
S17.C	0.976	0.978	0.989	0.989	0.989	0.999	0.999	-0.88	0.98
S18.A	1.010	1.009	1.005	1.005	1.005	1.000	1.000	0.88	-0.98
S18.B	0.997	0.998	0.998	0.998	0.998	0.999	0.999	-0.84	0.97
S18.C	0.976	0.978	0.989	0.989	0.989	0.999	0.999	-0.88	0.98
S197.A	1.001	0.993	0.993	0.993	0.993	0.993	0.993	0.87	-0.66
S197.B	0.986	0.992	0.994	0.994	0.994	0.997	0.997	-0.99	0.96
S197.C	0.989	1.000	1.001	1.001	1.001	1.003	1.002	-0.97	0.86
S19.A	1.010	1.009	1.005	1.005	1.005	1.000	1.000	0.88	-0.98
S1.A	0.999	0.999	0.997	0.997	0.997	0.996	0.996	0.88	-0.98
S1.B	0.995	0.995	0.995	0.995	0.995	0.996	0.996	-0.84	0.97
S1.C	0.988	0.988	0.992	0.992	0.992	0.996	0.996	-0.88	0.98
S20.A	1.010	1.009	1.005	1.005	1.005	1.000	1.000	0.88	-0.98
S21.A	1.010	1.009	1.005	1.005	1.005	1.000	1.000	0.88	-0.98
S21.B	0.997	0.998	0.998	0.998	0.998	0.999	0.999	-0.84	0.97
S21.C	0.976	0.978	0.989	0.989	0.989	0.999	0.999	-0.88	0.98
S22.B	0.997	0.998	0.998	0.998	0.998	0.999	0.999	-0.84	0.97
S23.A	1.010	1.009	1.005	1.005	1.005	1.000	1.000	0.88	-0.98
S23.B	0.997	0.998	0.998	0.998	0.998	0.999	0.999	-0.84	0.97
S23.C	0.976	0.978	0.989	0.989	0.989	0.999	0.999	-0.88	0.98
S24.C	0.976	0.978	0.989	0.989	0.989	0.999	0.999	-0.88	0.98
S250.A	1.010	1.009	1.005	1.005	1.005	1.000	1.000	0.88	-0.98
S250.B	0.997	0.998	0.998	0.998	0.998	0.999	0.999	-0.84	0.97
S250.C	0.976	0.978	0.989	0.989	0.989	0.999	0.999	-0.88	0.98
S25.A	1.010	1.009	1.005	1.005	1.005	1.000	1.000	0.88	-0.98
S25.B	0.997	0.998	0.998	0.998	0.998	0.999	0.999	-0.84	0.97
S25.C	0.976	0.978	0.989	0.989	0.989	0.999	0.999	-0.88	0.98
S25r.A	0.998	0.997	0.998	0.998	0.998	1.000	1.000	-0.67	0.87
S25r.C	1.000	1.002	1.002	1.002	1.002	0.999	0.999	0.12	-0.42
S26.A	0.998	0.997	0.998	0.998	0.998	1.000	1.000	-0.67	0.87
S26.C	1.000	1.002	1.002	1.002	1.002	0.999	0.999	0.12	-0.42
S27.A	0.998	0.997	0.998	0.998	0.998	1.000	1.000	-0.67	0.87
S27.C	1.000	1.002	1.002	1.002	1.002	0.999	0.999	0.12	-0.42

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S28.A	1.010	1.009	1.005	1.005	1.005	1.000	1.000	0.88	-0.98
S28.B	0.997	0.998	0.998	0.998	0.998	0.999	0.999	-0.84	0.97
S28.C	0.976	0.978	0.989	0.989	0.989	0.999	0.999	-0.88	0.98
S29.A	1.010	1.009	1.005	1.005	1.005	1.000	1.000	0.88	-0.98
S29.B	0.997	0.998	0.998	0.998	0.998	0.999	0.999	-0.84	0.97
S29.C	0.976	0.978	0.989	0.989	0.989	0.999	0.999	-0.88	0.98
S2.B	0.995	0.995	0.995	0.995	0.995	0.996	0.996	-0.84	0.97
S300.A	1.001	0.993	0.993	0.993	0.993	0.993	0.994	0.87	-0.66
S300.B	0.986	0.992	0.994	0.994	0.994	0.997	0.997	-0.99	0.96
S300.C	0.989	1.000	1.001	1.001	1.001	1.003	1.002	-0.97	0.86
S300 open.A	1.010	1.009	1.005	1.005	1.005	1.000	1.000	0.88	-0.98
S300 open.B	0.997	0.998	0.998	0.998	0.998	0.999	0.999	-0.84	0.97
S300 open.C	0.976	0.978	0.989	0.989	0.989	0.999	0.999	-0.88	0.98
S30.A	1.010	1.009	1.005	1.005	1.005	1.000	1.000	0.88	-0.98
S30.B	0.997	0.998	0.998	0.998	0.998	0.999	0.999	-0.84	0.97
S30.C	0.976	0.978	0.989	0.989	0.989	0.999	0.999	-0.88	0.98
S31.C	1.000	1.002	1.002	1.002	1.002	0.999	0.999	0.12	-0.42
S32.C	1.000	1.002	1.002	1.002	1.002	0.999	0.999	0.12	-0.42
S33.A	0.998	0.997	0.998	0.998	0.998	1.000	1.000	-0.67	0.87
S34.C	0.976	0.978	0.989	0.989	0.989	0.999	0.999	-0.88	0.98
S35.A	1.010	1.009	1.005	1.005	1.005	1.000	1.000	0.88	-0.98
S35.B	0.997	0.998	0.998	0.998	0.998	0.999	0.999	-0.84	0.97
S35.C	0.976	0.978	0.989	0.989	0.989	0.999	0.999	-0.88	0.98
S36.A	1.010	1.009	1.005	1.005	1.005	1.000	1.000	0.88	-0.98
S36.B	0.997	0.998	0.998	0.998	0.998	0.999	0.999	-0.84	0.97
S37.A	1.010	1.009	1.005	1.005	1.005	1.000	1.000	0.88	-0.98
S38.B	0.997	0.998	0.998	0.998	0.998	0.999	0.999	-0.84	0.97
S39.B	0.997	0.998	0.998	0.998	0.998	0.999	0.999	-0.84	0.97
S3.C	0.988	0.988	0.992	0.992	0.992	0.996	0.996	-0.88	0.98
S40.A	1.010	1.009	1.005	1.005	1.005	1.000	1.000	0.88	-0.98
S40.B	0.997	0.998	0.998	0.998	0.998	0.999	0.999	-0.84	0.97
S40.C	0.976	0.978	0.989	0.989	0.989	0.999	0.999	-0.88	0.98
S41.C	0.976	0.978	0.989	0.989	0.989	0.999	0.999	-0.88	0.98
S42.A	1.010	1.009	1.005	1.005	1.005	1.000	1.000	0.88	-0.98
S42.B	0.997	0.998	0.998	0.998	0.998	0.999	0.999	-0.84	0.97
S42.C	0.976	0.978	0.989	0.989	0.989	0.999	0.999	-0.88	0.98
S43.B	0.997	0.998	0.998	0.998	0.998	0.999	0.999	-0.84	0.97

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S44.A	1.010	1.009	1.005	1.005	1.005	1.000	1.000	0.88	-0.98
S44.B	0.997	0.998	0.998	0.998	0.998	0.999	0.999	-0.84	0.97
S44.C	0.976	0.978	0.989	0.989	0.989	0.999	0.999	-0.88	0.98
S450.A	1.001	0.993	0.993	0.993	0.993	0.993	0.994	0.87	-0.66
S450.B	0.986	0.992	0.994	0.994	0.994	0.997	0.997	-0.99	0.96
S450.C	0.989	1.000	1.001	1.001	1.001	1.003	1.002	-0.97	0.86
S45.A	1.010	1.009	1.005	1.005	1.005	1.000	1.000	0.88	-0.98
S46.A	1.010	1.009	1.005	1.005	1.005	1.000	1.000	0.88	-0.98
S47.A	1.010	1.009	1.005	1.005	1.005	1.000	1.000	0.88	-0.98
S47.B	0.997	0.998	0.998	0.998	0.998	0.999	0.999	-0.84	0.97
S47.C	0.976	0.978	0.989	0.989	0.989	0.999	0.999	-0.88	0.98
S48.A	1.010	1.009	1.005	1.005	1.005	1.000	1.000	0.88	-0.98
S48.B	0.997	0.998	0.998	0.998	0.998	0.999	0.999	-0.84	0.97
S48.C	0.976	0.978	0.989	0.989	0.989	0.999	0.999	-0.88	0.98
S49.A	1.010	1.009	1.005	1.005	1.005	1.000	1.000	0.88	-0.98
S49.B	0.997	0.998	0.998	0.998	0.998	0.999	0.999	-0.84	0.97
S49.C	0.976	0.978	0.989	0.989	0.989	0.999	0.999	-0.88	0.98
S4.C	0.988	0.988	0.992	0.992	0.992	0.996	0.996	-0.88	0.98
S50.A	1.010	1.009	1.005	1.005	1.005	1.000	1.000	0.88	-0.98
S50.B	0.997	0.998	0.998	0.998	0.998	0.999	0.999	-0.84	0.97
S50.C	0.976	0.978	0.989	0.989	0.989	0.999	0.999	-0.88	0.98
S51.A	1.010	1.009	1.005	1.005	1.005	1.000	1.000	0.88	-0.98
S51.B	0.997	0.998	0.998	0.998	0.998	0.999	0.999	-0.84	0.97
S51.C	0.976	0.978	0.989	0.989	0.989	0.999	0.999	-0.88	0.98
S52.A	1.016	1.014	1.008	1.008	1.008	1.002	1.002	0.88	-0.98
S52.B	0.999	0.999	1.000	1.000	1.000	1.001	1.001	-0.84	0.97
S52.C	0.970	0.973	0.988	0.988	0.988	1.001	1.001	-0.88	0.98
S53.A	1.018	1.017	1.010	1.010	1.010	1.003	1.004	0.88	-0.98
S53.B	0.999	1.000	1.001	1.001	1.001	1.002	1.002	-0.84	0.97
S53.C	0.967	0.970	0.987	0.987	0.987	1.002	1.002	-0.88	0.98
S54.A	1.020	1.019	1.011	1.011	1.011	1.004	1.004	0.88	-0.98
S54.B	1.000	1.000	1.001	1.001	1.001	1.003	1.003	-0.84	0.97
S54.C	0.965	0.968	0.987	0.987	0.987	1.003	1.003	-0.88	0.98
S55.A	1.020	1.019	1.011	1.011	1.011	1.004	1.004	0.88	-0.98
S55.B	1.000	1.000	1.001	1.001	1.001	1.003	1.003	-0.84	0.97
S55.C	0.965	0.968	0.987	0.987	0.987	1.003	1.003	-0.88	0.98
S56.A	1.020	1.019	1.011	1.011	1.011	1.004	1.004	0.88	-0.98
S56.B	1.000	1.000	1.001	1.001	1.001	1.003	1.003	-0.84	0.97
S56.C	0.965	0.968	0.987	0.987	0.987	1.003	1.003	-0.88	0.98
S57.A	1.025	1.024	1.014	1.014	1.014	1.006	1.006	0.88	-0.98

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S57.B	1.001	1.001	1.002	1.002	1.002	1.004	1.004	-0.84	0.97
S57.C	0.960	0.964	0.985	0.985	0.985	1.004	1.004	-0.88	0.98
S58.B	1.001	1.001	1.002	1.002	1.002	1.004	1.004	-0.84	0.97
S59.B	1.001	1.001	1.002	1.002	1.002	1.004	1.004	-0.84	0.97
S5.C	0.988	0.988	0.992	0.992	0.992	0.996	0.996	-0.88	0.98
S60.A	1.036	1.034	1.022	1.022	1.022	1.010	1.011	0.88	-0.98
S60.B	1.003	1.003	1.005	1.005	1.005	1.008	1.008	-0.83	0.97
S60.C	0.949	0.954	0.982	0.982	0.982	1.007	1.007	-0.88	0.98
S61.A	1.036	1.034	1.022	1.022	1.022	1.010	1.011	0.88	-0.98
S61.B	1.003	1.003	1.005	1.005	1.005	1.008	1.008	-0.83	0.97
S61.C	0.949	0.954	0.982	0.982	0.982	1.007	1.007	-0.88	0.98
S61s.A	1.036	1.034	1.022	1.022	1.022	1.010	1.011	0.88	-0.98
S61s.B	1.003	1.003	1.005	1.005	1.005	1.008	1.008	-0.83	0.97
S61s.C	0.949	0.954	0.982	0.982	0.982	1.007	1.007	-0.88	0.98
S62.A	1.037	1.035	1.022	1.022	1.022	1.010	1.011	0.88	-0.98
S62.B	1.003	1.004	1.006	1.006	1.006	1.008	1.008	-0.83	0.96
S62.C	0.944	0.950	0.980	0.980	0.980	1.007	1.007	-0.88	0.98
S63.A	1.037	1.035	1.022	1.022	1.022	1.010	1.011	0.88	-0.98
S63.B	1.004	1.004	1.006	1.006	1.006	1.008	1.008	-0.82	0.96
S63.C	0.941	0.947	0.979	0.979	0.979	1.007	1.007	-0.88	0.98
S64.A	1.038	1.036	1.023	1.023	1.023	1.010	1.011	0.88	-0.98
S64.B	1.005	1.005	1.006	1.006	1.006	1.008	1.008	-0.79	0.94
S64.C	0.935	0.941	0.976	0.976	0.976	1.007	1.006	-0.87	0.98
S65.A	1.039	1.037	1.023	1.023	1.023	1.010	1.011	0.88	-0.98
S65.B	1.007	1.007	1.007	1.007	1.007	1.008	1.008	-0.68	0.86
S65.C	0.928	0.934	0.972	0.972	0.972	1.007	1.006	-0.87	0.98
S66.A	1.040	1.038	1.023	1.024	1.024	1.010	1.011	0.87	-0.98
S66.B	1.008	1.008	1.008	1.008	1.008	1.008	1.008	-0.28	0.49
S66.C	0.922	0.928	0.969	0.969	0.969	1.006	1.006	-0.87	0.98
S67.A	1.001	0.993	0.993	0.993	0.993	0.993	0.993	0.87	-0.66
S67.B	0.986	0.992	0.994	0.994	0.994	0.997	0.997	-0.99	0.96
S67.C	0.989	1.000	1.001	1.001	1.001	1.003	1.002	-0.97	0.86
S68.A	1.001	0.993	0.993	0.993	0.993	0.993	0.993	0.87	-0.66
S69.A	1.001	0.993	0.993	0.993	0.993	0.993	0.993	0.87	-0.66
S6.C	0.988	0.988	0.992	0.992	0.992	0.996	0.996	-0.88	0.98
S70.A	1.001	0.993	0.993	0.993	0.993	0.993	0.993	0.87	-0.66
S71.A	1.001	0.993	0.993	0.993	0.993	0.993	0.993	0.87	-0.66
S72.A	1.004	0.995	0.995	0.995	0.995	0.995	0.995	0.92	-0.75
S72.B	0.987	0.993	0.996	0.996	0.996	0.999	0.999	-0.99	0.97
S72.C	0.987	0.999	1.001	1.001	1.001	1.004	1.004	-0.99	0.91

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S73.C	0.987	0.999	1.001	1.001	1.001	1.004	1.004	-0.99	0.91
S74.C	0.987	0.999	1.001	1.001	1.001	1.004	1.004	-0.99	0.91
S75.C	0.987	0.999	1.001	1.001	1.001	1.004	1.004	-0.99	0.91
S76.A	1.006	0.997	0.996	0.996	0.996	0.996	0.996	0.95	-0.80
S76.B	0.987	0.994	0.997	0.997	0.997	1.000	1.000	-0.99	0.97
S76.C	0.986	0.998	1.001	1.001	1.001	1.005	1.004	-1.00	0.94
S77.A	1.010	1.001	0.999	0.999	0.999	0.998	0.998	0.98	-0.88
S77.B	0.989	0.996	0.998	0.998	0.998	1.002	1.002	-0.99	0.97
S77.C	0.983	0.996	1.001	1.001	1.001	1.006	1.006	-1.00	0.97
S78.A	1.011	1.002	1.000	1.000	1.000	0.998	0.998	0.99	-0.89
S78.B	0.989	0.996	0.999	0.999	0.999	1.002	1.002	-0.99	0.97
S78.C	0.983	0.995	1.001	1.001	1.001	1.007	1.006	-0.99	0.97
S79.A	1.011	1.002	1.000	1.000	1.000	0.998	0.998	0.99	-0.89
S79.B	0.989	0.996	0.999	0.999	0.999	1.002	1.002	-0.99	0.97
S79.C	0.983	0.995	1.001	1.001	1.001	1.007	1.006	-0.99	0.97
S7.A	1.003	1.003	1.000	1.000	1.000	0.998	0.998	0.88	-0.98
S7.B	0.996	0.996	0.996	0.996	0.996	0.997	0.997	-0.84	0.97
S7.C	0.983	0.984	0.991	0.991	0.991	0.997	0.997	-0.88	0.98
S80.A	1.016	1.007	1.003	1.003	1.003	1.000	1.001	1.00	-0.93
S80.B	0.991	0.998	1.000	1.000	1.000	1.004	1.004	-0.99	0.98
S80.C	0.980	0.993	1.000	1.000	1.000	1.008	1.008	-0.99	0.99
S81.A	1.018	1.008	1.004	1.004	1.004	1.001	1.001	1.00	-0.95
S81.B	0.992	0.998	1.001	1.001	1.001	1.005	1.005	-0.99	0.98
S81.C	0.979	0.992	1.000	1.000	1.000	1.009	1.008	-0.98	0.99
S82.A	1.019	1.009	1.005	1.005	1.005	1.002	1.002	1.00	-0.95
S82.B	0.993	1.000	1.002	1.002	1.002	1.006	1.006	-0.99	0.98
S82.C	0.980	0.993	1.001	1.001	1.001	1.010	1.009	-0.98	0.99
S83.A	1.020	1.010	1.006	1.006	1.006	1.003	1.003	1.00	-0.95
S83.B	0.994	1.001	1.003	1.003	1.003	1.007	1.007	-0.99	0.98
S83.C	0.981	0.994	1.002	1.002	1.002	1.011	1.010	-0.98	0.99
S84.C	0.966	0.980	0.994	0.994	0.994	1.008	1.008	-0.96	1.00
S85.C	0.957	0.971	0.990	0.990	0.990	1.008	1.007	-0.95	1.00
S86.A	1.007	0.998	0.997	0.997	0.997	0.997	0.997	0.95	-0.80
S86.B	0.988	0.995	0.997	0.997	0.997	1.001	1.001	-0.99	0.97
S86.C	0.987	0.998	1.002	1.002	1.002	1.006	1.005	-1.00	0.94
S87.A	1.008	0.999	0.997	0.998	0.998	0.997	0.997	0.95	-0.80
S87.B	0.989	0.995	0.998	0.998	0.998	1.001	1.001	-0.99	0.97
S87.C	0.987	0.999	1.002	1.002	1.002	1.006	1.006	-1.00	0.94
S88.A	1.008	0.999	0.998	0.998	0.998	0.998	0.998	0.95	-0.80
S89.A	1.008	0.998	0.997	0.997	0.997	0.997	0.997	0.95	-0.80

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S89.B	0.989	0.996	0.998	0.998	0.998	1.001	1.001	-0.99	0.97
S89.C	0.987	0.999	1.003	1.002	1.002	1.006	1.006	-1.00	0.94
S8.A	1.006	1.005	1.002	1.002	1.002	0.999	0.999	0.88	-0.98
S8.B	0.997	0.997	0.997	0.997	0.997	0.998	0.998	-0.84	0.97
S8.C	0.980	0.982	0.990	0.990	0.990	0.998	0.998	-0.88	0.98
S90.B	0.990	0.996	0.999	0.999	0.999	1.002	1.002	-0.99	0.97
S91.A	1.008	0.998	0.997	0.997	0.997	0.997	0.997	0.95	-0.80
S91.B	0.989	0.995	0.998	0.998	0.998	1.001	1.001	-0.99	0.97
S91.C	0.988	1.000	1.003	1.003	1.003	1.007	1.006	-1.00	0.94
S92.C	0.988	1.000	1.004	1.003	1.003	1.008	1.007	-1.00	0.94
S93.A	1.008	0.998	0.997	0.997	0.997	0.997	0.997	0.95	-0.80
S93.B	0.989	0.995	0.998	0.998	0.998	1.001	1.001	-0.99	0.97
S93.C	0.988	1.000	1.003	1.003	1.003	1.007	1.006	-1.00	0.94
S94.A	1.008	0.998	0.997	0.997	0.997	0.997	0.997	0.95	-0.80
S94 open.A	1.020	1.019	1.011	1.011	1.011	1.004	1.004	0.88	-0.98
S95.A	1.008	0.998	0.997	0.997	0.997	0.997	0.997	0.95	-0.80
S95.B	0.989	0.995	0.998	0.998	0.998	1.001	1.001	-0.99	0.97
S95.C	0.988	1.000	1.003	1.003	1.003	1.007	1.006	-1.00	0.94
S96.B	0.989	0.995	0.998	0.998	0.998	1.001	1.001	-0.99	0.97
S97.A	1.001	0.993	0.993	0.993	0.993	0.993	0.993	0.87	-0.66
S97.B	0.986	0.992	0.994	0.994	0.994	0.997	0.997	-0.99	0.96
S97.C	0.989	1.000	1.001	1.001	1.001	1.003	1.002	-0.97	0.86
S98.A	1.001	0.993	0.993	0.993	0.993	0.993	0.993	0.87	-0.66
S98.B	0.986	0.992	0.994	0.994	0.994	0.997	0.997	-0.99	0.96
S98.C	0.989	1.000	1.001	1.001	1.001	1.003	1.002	-0.97	0.86
S99.A	1.001	0.993	0.993	0.993	0.993	0.993	0.994	0.87	-0.66
S99.B	0.986	0.992	0.994	0.994	0.994	0.997	0.997	-0.99	0.96
S99.C	0.989	1.000	1.001	1.001	1.001	1.003	1.002	-0.97	0.86
S9.A	1.006	1.005	1.002	1.002	1.002	0.999	0.999	0.88	-0.98
S9r.A	1.000	0.999	0.996	0.996	0.996	0.992	0.992	0.88	-0.98

F.0.3 Considering OLTCs connected without capacitors compensation and meshing the network from the switch between nodes S54A and S94A

Table F.13: Voltage magnitudes and Pearson coefficient values obtained for Scenario S1

Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S100.A	1.006	1.000	0.995	0.995	0.995	0.994	0.994	-0.90
S100.B	0.996	0.996	0.997	0.997	0.997	0.999	0.999	0.95
S100.C	0.997	1.005	1.003	1.002	1.002	1.004	1.004	0.64
S101.A	1.006	1.000	0.995	0.995	0.995	0.994	0.994	-0.90
S101.B	0.996	0.996	0.997	0.997	0.997	0.999	0.999	0.95
S101.C	0.997	1.005	1.003	1.002	1.002	1.004	1.004	0.64
S102.C	0.997	1.005	1.003	1.002	1.002	1.004	1.004	0.64
S103.C	0.997	1.005	1.003	1.002	1.002	1.004	1.004	0.64
S104.C	0.997	1.005	1.003	1.002	1.002	1.004	1.004	0.64
S105.A	1.006	1.000	0.995	0.995	0.995	0.994	0.994	-0.90
S105.B	0.996	0.996	0.997	0.997	0.997	0.999	0.999	0.95
S105.C	0.997	1.005	1.003	1.002	1.002	1.004	1.004	0.64
S106.B	0.996	0.996	0.997	0.997	0.997	0.999	0.999	0.95
S107.B	0.996	0.996	0.997	0.997	0.997	0.999	0.999	0.95
S108.A	1.006	1.000	0.995	0.995	0.995	0.994	0.994	-0.90
S108.B	0.996	0.996	0.997	0.997	0.997	0.999	0.999	0.95
S108.C	0.997	1.005	1.003	1.002	1.002	1.004	1.004	0.64
S109.A	1.006	1.000	0.995	0.995	0.995	0.994	0.994	-0.90
S10.A	0.997	0.997	0.995	0.995	0.995	0.994	0.994	-0.99
S110.A	1.006	1.000	0.995	0.995	0.995	0.994	0.994	-0.90
S111.A	1.006	1.000	0.995	0.995	0.995	0.994	0.994	-0.90
S112.A	1.006	1.000	0.995	0.995	0.995	0.994	0.994	-0.90
S113.A	1.006	1.000	0.995	0.995	0.995	0.994	0.994	-0.90
S114.A	1.006	1.000	0.995	0.995	0.995	0.994	0.994	-0.90
S11.A	0.997	0.997	0.995	0.995	0.995	0.994	0.994	-0.99
S12.B	1.005	1.006	1.006	1.006	1.006	1.006	1.006	0.99
S135.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-0.99
S135.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.99
S135.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.99
S13.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-0.99
S13.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.99
S13.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.99
S149.A	1.006	1.006	1.006	1.006	1.006	1.006	1.006	NaN
S149.B	1.006	1.006	1.006	1.006	1.006	1.006	1.006	NaN
S149.C	1.006	1.006	1.006	1.006	1.006	1.006	1.006	0.99
S14.A	0.997	0.997	0.995	0.995	0.995	0.994	0.994	-0.99
S151.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-0.99
S151.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.99

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S151.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.99
S152.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-0.99
S152.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.99
S152.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.99
S15.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.99
S160.A	1.022	1.023	1.018	1.018	1.018	1.011	1.011	-0.96
S160.B	1.003	1.002	1.004	1.004	1.004	1.005	1.005	0.96
S160.C	0.976	0.978	0.992	0.992	0.992	1.004	1.004	0.99
S160r.A	1.003	0.997	0.992	0.992	0.992	0.992	0.992	-0.84
S160r.B	0.996	0.996	0.997	0.997	0.997	0.999	0.999	0.96
S160r.C	1.000	1.008	1.004	1.004	1.004	1.004	1.004	0.23
S16.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.99
S17.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.99
S18.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-0.99
S18.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.99
S18.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.99
S197.A	1.006	1.000	0.995	0.995	0.995	0.994	0.994	-0.90
S197.B	0.996	0.996	0.997	0.997	0.997	0.999	0.999	0.95
S197.C	0.997	1.005	1.003	1.002	1.002	1.004	1.004	0.64
S19.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-0.99
S1.A	1.008	1.008	1.007	1.007	1.007	1.006	1.006	-0.99
S1.B	1.006	1.006	1.006	1.006	1.006	1.006	1.006	0.99
S1.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	0.99
S20.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-0.99
S21.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-0.99
S21.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.99
S21.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.99
S22.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.99
S23.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-0.99
S23.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.99
S23.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.99
S24.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.99
S250.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-0.99
S250.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.99
S250.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.99
S25.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-0.99
S25.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.99
S25.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.99
S25r.A	0.999	0.998	0.996	0.996	0.996	1.000	1.000	0.27
S25r.C	1.000	1.001	1.001	1.001	1.001	1.000	0.999	-0.63

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S26.A	0.999	0.998	0.996	0.996	0.996	1.000	1.000	0.27
S26.C	1.000	1.001	1.001	1.001	1.001	1.000	0.999	-0.63
S27.A	0.999	0.998	0.996	0.996	0.996	1.000	1.000	0.27
S27.C	1.000	1.001	1.001	1.001	1.001	1.000	0.999	-0.63
S28.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-0.99
S28.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.99
S28.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.99
S29.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-0.99
S29.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.99
S29.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.99
S2.B	1.006	1.006	1.006	1.006	1.006	1.006	1.006	0.99
S300.A	1.006	1.000	0.995	0.995	0.995	0.994	0.994	-0.90
S300.B	0.996	0.996	0.997	0.997	0.997	0.999	0.999	0.95
S300.C	0.997	1.005	1.003	1.002	1.002	1.004	1.004	0.64
S300 open.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-0.99
S300 open.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.99
S300 open.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.99
S30.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-0.99
S30.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.99
S30.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.99
S31.C	1.000	1.001	1.001	1.001	1.001	1.000	0.999	-0.63
S32.C	1.000	1.001	1.001	1.001	1.001	1.000	0.999	-0.63
S33.A	0.999	0.998	0.996	0.996	0.996	1.000	1.000	0.27
S34.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.99
S35.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-0.99
S35.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.99
S35.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.99
S36.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-0.99
S36.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.99
S37.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-0.99
S38.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.99
S39.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.99
S3.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	0.99
S40.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-0.99
S40.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.99
S40.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.99
S41.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.99

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S42.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-0.99
S42.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.99
S42.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.99
S43.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.99
S44.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-0.99
S44.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.99
S44.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.99
S450.A	1.006	1.000	0.995	0.995	0.995	0.994	0.994	-0.90
S450.B	0.996	0.996	0.997	0.997	0.997	0.999	0.999	0.95
S450.C	0.997	1.005	1.003	1.002	1.002	1.004	1.004	0.64
S45.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-0.99
S46.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-0.99
S47.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-0.99
S47.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.99
S47.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.99
S48.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-0.99
S48.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.99
S48.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.99
S49.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-0.99
S49.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.99
S49.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.99
S4.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	0.99
S50.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-0.99
S50.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.99
S50.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.99
S51.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-0.99
S51.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.99
S51.C	0.994	0.995	1.001	1.001	1.001	1.006	1.006	0.99
S52.A	1.013	1.012	1.009	1.009	1.009	1.006	1.006	-0.99
S52.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.99
S52.C	0.990	0.991	0.999	0.999	0.999	1.006	1.006	0.99
S53.A	1.014	1.013	1.010	1.010	1.010	1.006	1.006	-0.99
S53.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	0.99
S53.C	0.988	0.989	0.998	0.998	0.998	1.006	1.006	0.99
S54.A	1.014	1.014	1.010	1.010	1.010	1.006	1.006	-0.99
S54.B	1.005	1.005	1.005	1.005	1.005	1.006	1.006	0.99
S54.C	0.987	0.988	0.998	0.998	0.998	1.006	1.005	0.99
S55.A	1.014	1.014	1.010	1.010	1.010	1.006	1.006	-0.99
S55.B	1.005	1.005	1.005	1.005	1.005	1.006	1.006	0.99
S55.C	0.987	0.988	0.998	0.998	0.998	1.006	1.005	0.99

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S56.A	1.014	1.014	1.010	1.010	1.010	1.006	1.006	-0.99
S56.B	1.005	1.005	1.005	1.005	1.005	1.006	1.006	0.99
S56.C	0.987	0.988	0.998	0.998	0.998	1.006	1.005	0.99
S57.A	1.017	1.017	1.012	1.012	1.012	1.008	1.008	-0.98
S57.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	0.98
S57.C	0.983	0.985	0.996	0.996	0.996	1.005	1.005	0.99
S58.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	0.98
S59.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	0.98
S5.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	0.99
S60.A	1.022	1.023	1.018	1.018	1.018	1.011	1.011	-0.96
S60.B	1.003	1.002	1.004	1.004	1.004	1.005	1.005	0.96
S60.C	0.976	0.978	0.992	0.992	0.992	1.004	1.004	0.99
S61.A	1.022	1.023	1.018	1.018	1.018	1.011	1.011	-0.96
S61.B	1.003	1.002	1.004	1.004	1.004	1.005	1.005	0.96
S61.C	0.976	0.978	0.992	0.992	0.992	1.004	1.004	0.99
S61s.A	1.022	1.023	1.018	1.018	1.018	1.011	1.011	-0.96
S61s.B	1.003	1.002	1.004	1.004	1.004	1.005	1.005	0.96
S61s.C	0.976	0.978	0.992	0.992	0.992	1.004	1.004	0.99
S62.A	1.022	1.023	1.018	1.018	1.018	1.011	1.011	-0.96
S62.B	1.003	1.002	1.004	1.004	1.004	1.005	1.005	0.96
S62.C	0.976	0.978	0.992	0.992	0.992	1.004	1.004	0.99
S63.A	1.022	1.023	1.018	1.018	1.018	1.011	1.011	-0.96
S63.B	1.003	1.002	1.004	1.004	1.004	1.005	1.005	0.96
S63.C	0.976	0.978	0.992	0.992	0.992	1.004	1.004	0.99
S64.A	1.022	1.023	1.018	1.018	1.018	1.011	1.011	-0.96
S64.B	1.003	1.002	1.004	1.004	1.004	1.005	1.005	0.96
S64.C	0.976	0.978	0.992	0.992	0.992	1.004	1.004	0.99
S65.A	1.022	1.023	1.018	1.018	1.018	1.011	1.011	-0.96
S65.B	1.003	1.002	1.004	1.004	1.004	1.005	1.005	0.96
S65.C	0.976	0.978	0.992	0.992	0.992	1.004	1.004	0.99
S66.A	1.022	1.023	1.018	1.018	1.018	1.011	1.011	-0.96
S66.B	1.003	1.002	1.004	1.004	1.004	1.005	1.005	0.96
S66.C	0.976	0.978	0.992	0.992	0.992	1.004	1.004	0.99
S67.A	1.006	1.000	0.995	0.995	0.995	0.994	0.994	-0.90
S67.B	0.996	0.996	0.997	0.997	0.997	0.999	0.999	0.95
S67.C	0.997	1.005	1.003	1.002	1.002	1.004	1.004	0.64
S68.A	1.006	1.000	0.995	0.995	0.995	0.994	0.994	-0.90
S69.A	1.006	1.000	0.995	0.995	0.995	0.994	0.994	-0.90
S6.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	0.99
S70.A	1.006	1.000	0.995	0.995	0.995	0.994	0.994	-0.90

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S71.A	1.006	1.000	0.995	0.995	0.995	0.994	0.994	-0.90
S72.A	1.007	1.003	0.997	0.997	0.997	0.995	0.995	-0.93
S72.B	0.995	0.995	0.996	0.996	0.996	0.998	0.998	0.94
S72.C	0.994	1.002	1.001	1.001	1.001	1.004	1.004	0.81
S73.C	0.994	1.002	1.001	1.001	1.001	1.004	1.004	0.81
S74.C	0.994	1.002	1.001	1.001	1.001	1.004	1.004	0.81
S75.C	0.994	1.002	1.001	1.001	1.001	1.004	1.004	0.81
S76.A	1.009	1.004	0.998	0.998	0.998	0.996	0.996	-0.94
S76.B	0.995	0.995	0.996	0.996	0.996	0.998	0.998	0.94
S76.C	0.992	1.001	1.000	1.000	1.000	1.004	1.003	0.88
S77.A	1.011	1.006	0.999	0.999	0.999	0.996	0.996	-0.96
S77.B	0.995	0.994	0.996	0.996	0.996	0.998	0.998	0.94
S77.C	0.988	0.997	0.998	0.998	0.998	1.003	1.003	0.95
S78.A	1.012	1.007	0.999	0.999	0.999	0.996	0.996	-0.96
S78.B	0.994	0.994	0.996	0.996	0.996	0.998	0.998	0.94
S78.C	0.987	0.996	0.998	0.998	0.998	1.003	1.003	0.96
S79.A	1.012	1.007	0.999	0.999	0.999	0.996	0.996	-0.96
S79.B	0.994	0.994	0.996	0.996	0.996	0.998	0.998	0.94
S79.C	0.987	0.996	0.998	0.998	0.998	1.003	1.003	0.96
S7.A	1.009	1.009	1.008	1.008	1.008	1.006	1.006	-0.99
S7.B	1.006	1.006	1.006	1.006	1.006	1.006	1.006	0.99
S7.C	0.999	1.000	1.003	1.003	1.003	1.006	1.006	0.99
S80.A	1.014	1.009	1.001	1.001	1.001	0.996	0.997	-0.97
S80.B	0.994	0.994	0.996	0.996	0.996	0.998	0.998	0.95
S80.C	0.983	0.992	0.996	0.996	0.996	1.003	1.003	0.98
S81.A	1.015	1.010	1.001	1.001	1.001	0.996	0.997	-0.98
S81.B	0.994	0.994	0.996	0.995	0.995	0.998	0.998	0.95
S81.C	0.981	0.990	0.995	0.995	0.995	1.003	1.003	0.99
S82.A	1.015	1.010	1.001	1.001	1.001	0.996	0.997	-0.98
S82.B	0.994	0.994	0.996	0.995	0.995	0.998	0.998	0.95
S82.C	0.981	0.990	0.995	0.995	0.995	1.003	1.003	0.99
S83.A	1.015	1.010	1.001	1.001	1.001	0.996	0.997	-0.98
S83.B	0.994	0.994	0.996	0.995	0.995	0.998	0.998	0.95
S83.C	0.981	0.990	0.995	0.995	0.995	1.003	1.003	0.99
S84.C	0.968	0.978	0.989	0.989	0.989	1.003	1.002	1.00
S85.C	0.959	0.970	0.985	0.985	0.985	1.002	1.002	1.00
S86.A	1.010	1.007	1.002	1.002	1.002	0.999	0.999	-0.97
S86.B	0.994	0.994	0.995	0.995	0.995	0.998	0.998	0.91
S86.C	0.992	1.000	1.000	1.000	1.000	1.003	1.003	0.87
S87.A	1.012	1.009	1.004	1.004	1.004	1.001	1.001	-0.98

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S87.B	0.994	0.993	0.995	0.995	0.995	0.997	0.997	0.90
S87.C	0.992	1.000	0.999	0.999	0.999	1.003	1.002	0.87
S88.A	1.012	1.009	1.004	1.004	1.004	1.001	1.001	-0.98
S89.A	1.012	1.010	1.005	1.005	1.005	1.003	1.003	-0.98
S89.B	0.994	0.993	0.994	0.994	0.994	0.997	0.997	0.88
S89.C	0.992	1.000	0.999	0.999	0.999	1.002	1.002	0.86
S8.A	1.010	1.010	1.008	1.008	1.008	1.006	1.006	-0.99
S8.B	1.005	1.006	1.006	1.006	1.006	1.006	1.006	0.99
S8.C	0.997	0.998	1.002	1.002	1.002	1.006	1.006	0.99
S90.B	0.994	0.993	0.994	0.994	0.994	0.997	0.997	0.88
S91.A	1.013	1.011	1.006	1.006	1.006	1.004	1.004	-0.99
S91.B	0.994	0.993	0.994	0.994	0.994	0.997	0.997	0.87
S91.C	0.992	1.000	0.999	0.999	0.999	1.002	1.002	0.86
S92.C	0.992	1.000	0.999	0.999	0.999	1.002	1.002	0.86
S93.A	1.013	1.012	1.008	1.008	1.008	1.005	1.005	-0.99
S93.B	0.994	0.993	0.994	0.994	0.994	0.997	0.996	0.86
S93.C	0.992	1.000	0.999	0.999	0.999	1.002	1.002	0.86
S94.A	1.014	1.014	1.010	1.010	1.010	1.006	1.006	-0.99
S95.A	1.013	1.012	1.008	1.008	1.008	1.005	1.005	-0.99
S95.B	0.994	0.993	0.994	0.994	0.994	0.997	0.996	0.86
S95.C	0.992	1.000	0.999	0.999	0.999	1.002	1.002	0.86
S96.B	0.994	0.993	0.994	0.994	0.994	0.997	0.996	0.86
S97.A	1.006	1.000	0.995	0.995	0.995	0.994	0.994	-0.90
S97.B	0.996	0.996	0.997	0.997	0.997	0.999	0.999	0.95
S97.C	0.997	1.005	1.003	1.002	1.002	1.004	1.004	0.64
S98.A	1.006	1.000	0.995	0.995	0.995	0.994	0.994	-0.90
S98.B	0.996	0.996	0.997	0.997	0.997	0.999	0.999	0.95
S98.C	0.997	1.005	1.003	1.002	1.002	1.004	1.004	0.64
S99.A	1.006	1.000	0.995	0.995	0.995	0.994	0.994	-0.90
S99.B	0.996	0.996	0.997	0.997	0.997	0.999	0.999	0.95
S99.C	0.997	1.005	1.003	1.002	1.002	1.004	1.004	0.64
S9.A	1.010	1.010	1.008	1.008	1.008	1.006	1.006	-0.99
S9r.A	0.997	0.997	0.995	0.995	0.995	0.994	0.994	-0.99

Table F.14: Voltage magnitudes and Pearson coefficient values obtained for Scenario S2

Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
S100.A	0.991	0.992	0.991	0.998	1.002	0.991	0.991	-0.99
S100.B	0.999	0.999	1.000	0.997	0.995	0.999	0.999	0.94
S100.C	1.006	1.001	1.005	0.995	0.992	1.006	1.006	0.99
S101.A	0.991	0.992	0.991	0.998	1.002	0.991	0.991	-0.99
S101.B	0.999	0.999	1.000	0.997	0.995	0.999	0.999	0.94
S101.C	1.006	1.001	1.005	0.995	0.992	1.006	1.006	0.99
S102.C	1.006	1.001	1.005	0.995	0.992	1.006	1.006	0.99
S103.C	1.006	1.001	1.005	0.995	0.992	1.006	1.006	0.99
S104.C	1.006	1.001	1.005	0.995	0.992	1.006	1.006	0.99
S105.A	0.991	0.992	0.991	0.998	1.002	0.991	0.991	-0.99
S105.B	0.999	0.999	1.000	0.997	0.995	0.999	0.999	0.94
S105.C	1.006	1.001	1.005	0.995	0.992	1.006	1.006	0.99
S106.B	0.999	0.999	1.000	0.997	0.995	0.999	0.999	0.94
S107.B	0.999	0.999	1.000	0.997	0.995	0.999	0.999	0.94
S108.A	0.991	0.992	0.991	0.998	1.002	0.991	0.991	-0.99
S108.B	0.999	0.999	1.000	0.997	0.995	0.999	0.999	0.94
S108.C	1.006	1.001	1.005	0.995	0.992	1.006	1.006	0.99
S109.A	0.991	0.992	0.991	0.998	1.002	0.991	0.991	-0.99
S10.A	0.995	0.996	0.995	0.997	0.999	0.995	0.995	-0.99
S110.A	0.991	0.992	0.991	0.998	1.002	0.991	0.991	-0.99
S111.A	0.991	0.992	0.991	0.998	1.002	0.991	0.991	-0.99
S112.A	0.991	0.992	0.991	0.998	1.002	0.991	0.991	-0.99
S113.A	0.991	0.992	0.991	0.998	1.002	0.991	0.991	-0.99
S114.A	0.991	0.992	0.991	0.998	1.002	0.991	0.991	-0.99
S11.A	0.995	0.996	0.995	0.997	0.999	0.995	0.995	-0.99
S12.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S135.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S135.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S135.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S13.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S13.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S13.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S149.A	1.006	1.006	1.006	1.006	1.006	1.006	1.006	NaN
S149.B	1.006	1.006	1.006	1.006	1.006	1.006	1.006	NaN
S149.C	1.006	1.006	1.006	1.006	1.006	1.006	1.006	0.99
S14.A	0.995	0.996	0.995	0.997	0.999	0.995	0.995	-0.99
S151.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S151.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
S151.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S152.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S152.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S152.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S15.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S160.A	0.993	0.994	0.993	0.999	1.002	0.993	0.993	-0.99
S160.B	1.011	1.011	1.012	1.009	1.008	1.011	1.011	0.94
S160.C	1.041	1.037	1.040	1.025	1.017	1.041	1.041	1.00
S160r.A	0.993	0.994	0.993	0.999	1.002	0.993	0.993	-0.99
S160r.B	0.998	0.999	0.999	0.997	0.995	0.998	0.998	0.94
S160r.C	1.002	0.998	1.001	0.993	0.991	1.002	1.002	0.98
S16.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S17.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S18.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S18.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S18.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S197.A	0.991	0.992	0.991	0.998	1.002	0.991	0.991	-0.99
S197.B	0.999	0.999	1.000	0.997	0.995	0.999	0.999	0.94
S197.C	1.006	1.001	1.005	0.995	0.992	1.006	1.006	0.99
S19.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S1.A	1.004	1.004	1.004	1.005	1.006	1.004	1.004	-0.99
S1.B	1.007	1.007	1.007	1.007	1.006	1.007	1.007	0.92
S1.C	1.011	1.010	1.011	1.009	1.008	1.011	1.011	1.00
S20.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S21.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S21.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S21.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S22.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S23.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S23.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S23.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S24.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S250.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S250.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S250.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S25.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S25.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S25.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S25r.A	1.000	1.000	1.000	1.003	0.998	1.000	1.000	0.07
S25r.C	1.001	0.999	1.001	1.001	0.998	1.001	1.001	0.69

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
S26.A	1.000	1.000	1.000	1.003	0.998	1.000	1.000	0.07
S26.C	1.001	0.999	1.001	1.001	0.998	1.001	1.001	0.69
S27.A	1.000	1.000	1.000	1.003	0.998	1.000	1.000	0.07
S27.C	1.001	0.999	1.001	1.001	0.998	1.001	1.001	0.69
S28.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S28.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S28.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S29.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S29.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S29.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S2.B	1.007	1.007	1.007	1.007	1.006	1.007	1.007	0.92
S300.A	0.991	0.992	0.991	0.998	1.002	0.991	0.991	-0.99
S300.B	0.999	0.999	1.000	0.997	0.995	0.999	0.999	0.94
S300.C	1.006	1.001	1.005	0.995	0.992	1.006	1.006	0.99
S300 open.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S300 open.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S300 open.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S30.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S30.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S30.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S31.C	1.001	0.999	1.001	1.001	0.998	1.001	1.001	0.69
S32.C	1.001	0.999	1.001	1.001	0.998	1.001	1.001	0.69
S33.A	1.000	1.000	1.000	1.003	0.998	1.000	1.000	0.07
S34.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S35.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S35.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S35.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S36.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S36.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S37.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S38.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S39.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S3.C	1.011	1.010	1.011	1.009	1.008	1.011	1.011	1.00
S40.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S40.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S40.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S41.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
S42.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S42.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S42.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S43.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S44.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S44.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S44.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S450.A	0.991	0.992	0.991	0.998	1.002	0.991	0.991	-0.99
S450.B	0.999	0.999	1.000	0.997	0.995	0.999	0.999	0.94
S450.C	1.006	1.001	1.005	0.995	0.992	1.006	1.006	0.99
S45.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S46.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S47.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S47.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S47.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S48.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S48.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S48.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S49.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S49.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S49.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S4.C	1.011	1.010	1.011	1.009	1.008	1.011	1.011	1.00
S50.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S50.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S50.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S51.A	1.000	1.000	1.000	1.003	1.004	1.000	1.000	-0.99
S51.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S51.C	1.020	1.018	1.020	1.014	1.010	1.020	1.020	1.00
S52.A	0.998	0.998	0.998	1.002	1.004	0.998	0.998	-0.99
S52.B	1.009	1.009	1.009	1.008	1.007	1.009	1.009	0.93
S52.C	1.025	1.023	1.024	1.016	1.012	1.025	1.025	1.00
S53.A	0.997	0.998	0.997	1.001	1.003	0.997	0.997	-0.99
S53.B	1.009	1.009	1.009	1.008	1.007	1.009	1.009	0.93
S53.C	1.027	1.025	1.027	1.018	1.013	1.027	1.027	1.00
S54.A	0.996	0.997	0.996	1.001	1.003	0.996	0.996	-0.99
S54.B	1.009	1.009	1.010	1.008	1.007	1.009	1.009	0.93
S54.C	1.029	1.026	1.028	1.019	1.013	1.029	1.029	1.00
S55.A	0.996	0.997	0.996	1.001	1.003	0.996	0.996	-0.99
S55.B	1.009	1.009	1.010	1.008	1.007	1.009	1.009	0.93
S55.C	1.029	1.026	1.028	1.019	1.013	1.029	1.029	1.00

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
S56.A	0.996	0.997	0.996	1.001	1.003	0.996	0.996	-0.99
S56.B	1.009	1.009	1.010	1.008	1.007	1.009	1.009	0.93
S56.C	1.029	1.026	1.028	1.019	1.013	1.029	1.029	1.00
S57.A	0.995	0.996	0.995	1.000	1.003	0.995	0.995	-0.99
S57.B	1.010	1.010	1.010	1.008	1.007	1.010	1.010	0.93
S57.C	1.033	1.029	1.032	1.021	1.014	1.033	1.033	1.00
S58.B	1.010	1.010	1.010	1.008	1.007	1.010	1.010	0.93
S59.B	1.010	1.010	1.010	1.008	1.007	1.010	1.010	0.93
S5.C	1.011	1.010	1.011	1.009	1.008	1.011	1.011	1.00
S60.A	0.993	0.994	0.993	0.999	1.002	0.993	0.993	-0.99
S60.B	1.011	1.011	1.012	1.009	1.008	1.011	1.011	0.94
S60.C	1.041	1.037	1.040	1.025	1.017	1.041	1.041	1.00
S61.A	0.993	0.994	0.993	0.999	1.002	0.993	0.993	-0.99
S61.B	1.011	1.011	1.012	1.009	1.008	1.011	1.011	0.94
S61.C	1.041	1.037	1.040	1.025	1.017	1.041	1.041	1.00
S61s.A	0.993	0.994	0.993	0.999	1.002	0.993	0.993	-0.99
S61s.B	1.011	1.011	1.012	1.009	1.008	1.011	1.011	0.94
S61s.C	1.041	1.037	1.040	1.025	1.017	1.041	1.041	1.00
S62.A	0.993	0.994	0.993	0.999	1.002	0.993	0.993	-0.99
S62.B	1.011	1.011	1.012	1.009	1.008	1.011	1.011	0.94
S62.C	1.041	1.037	1.040	1.025	1.017	1.041	1.041	1.00
S63.A	0.993	0.994	0.993	0.999	1.002	0.993	0.993	-0.99
S63.B	1.011	1.011	1.012	1.009	1.008	1.011	1.011	0.94
S63.C	1.041	1.037	1.040	1.025	1.017	1.041	1.041	1.00
S64.A	0.993	0.994	0.993	0.999	1.002	0.993	0.993	-0.99
S64.B	1.011	1.011	1.012	1.009	1.008	1.011	1.011	0.94
S64.C	1.041	1.037	1.040	1.025	1.017	1.041	1.041	1.00
S65.A	0.993	0.994	0.993	0.999	1.002	0.993	0.993	-0.99
S65.B	1.011	1.011	1.012	1.009	1.008	1.011	1.011	0.94
S65.C	1.041	1.037	1.040	1.025	1.017	1.041	1.041	1.00
S66.A	0.993	0.994	0.993	0.999	1.002	0.993	0.993	-0.99
S66.B	1.011	1.011	1.012	1.009	1.008	1.011	1.011	0.94
S66.C	1.041	1.037	1.040	1.025	1.017	1.041	1.041	1.00
S67.A	0.991	0.992	0.991	0.998	1.002	0.991	0.991	-0.99
S67.B	0.999	0.999	1.000	0.997	0.995	0.999	0.999	0.94
S67.C	1.006	1.001	1.005	0.995	0.992	1.006	1.006	0.99
S68.A	0.991	0.992	0.991	0.998	1.002	0.991	0.991	-0.99
S69.A	0.991	0.992	0.991	0.998	1.002	0.991	0.991	-0.99
S6.C	1.011	1.010	1.011	1.009	1.008	1.011	1.011	1.00
S70.A	0.991	0.992	0.991	0.998	1.002	0.991	0.991	-0.99

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
S71.A	0.991	0.992	0.991	0.998	1.002	0.991	0.991	-0.99
S72.A	0.990	0.992	0.990	0.997	1.001	0.990	0.990	-0.99
S72.B	0.999	1.000	1.000	0.997	0.995	0.999	0.999	0.94
S72.C	1.009	1.004	1.008	0.997	0.993	1.009	1.009	0.99
S73.C	1.009	1.004	1.008	0.997	0.993	1.009	1.009	0.99
S74.C	1.009	1.004	1.008	0.997	0.993	1.009	1.009	0.99
S75.C	1.009	1.004	1.008	0.997	0.993	1.009	1.009	0.99
S76.A	0.990	0.991	0.990	0.997	1.001	0.990	0.990	-0.99
S76.B	1.000	1.000	1.001	0.997	0.996	1.000	1.000	0.94
S76.C	1.012	1.006	1.010	0.998	0.994	1.012	1.012	0.99
S77.A	0.987	0.988	0.987	0.995	1.000	0.987	0.987	-0.99
S77.B	1.000	1.001	1.002	0.998	0.996	1.000	1.000	0.94
S77.C	1.017	1.010	1.015	1.001	0.996	1.017	1.017	1.00
S78.A	0.986	0.988	0.986	0.995	1.000	0.986	0.986	-0.99
S78.B	1.001	1.001	1.002	0.998	0.996	1.001	1.001	0.94
S78.C	1.018	1.012	1.016	1.002	0.996	1.018	1.018	1.00
S79.A	0.986	0.988	0.986	0.995	1.000	0.986	0.986	-0.99
S79.B	1.001	1.001	1.002	0.998	0.996	1.001	1.001	0.94
S79.C	1.018	1.012	1.016	1.002	0.996	1.018	1.018	1.00
S7.A	1.003	1.003	1.003	1.004	1.005	1.003	1.003	-0.99
S7.B	1.007	1.007	1.007	1.007	1.007	1.007	1.007	0.93
S7.C	1.014	1.013	1.014	1.011	1.009	1.014	1.014	1.00
S80.A	0.983	0.985	0.983	0.993	0.999	0.983	0.983	-0.99
S80.B	1.001	1.002	1.003	0.998	0.996	1.001	1.001	0.94
S80.C	1.024	1.017	1.022	1.005	0.998	1.024	1.024	1.00
S81.A	0.982	0.984	0.981	0.992	0.999	0.982	0.982	-0.99
S81.B	1.002	1.002	1.003	0.999	0.996	1.002	1.002	0.94
S81.C	1.026	1.019	1.024	1.006	0.998	1.026	1.026	1.00
S82.A	0.982	0.984	0.981	0.992	0.999	0.982	0.982	-0.99
S82.B	1.002	1.002	1.003	0.999	0.996	1.002	1.002	0.94
S82.C	1.026	1.019	1.024	1.006	0.998	1.026	1.026	1.00
S83.A	0.982	0.984	0.981	0.992	0.999	0.982	0.982	-0.99
S83.B	1.002	1.002	1.003	0.999	0.996	1.002	1.002	0.94
S83.C	1.026	1.019	1.024	1.006	0.998	1.026	1.026	1.00
S84.C	1.043	1.034	1.041	1.015	1.003	1.043	1.043	1.00
S85.C	1.055	1.044	1.053	1.022	1.007	1.055	1.055	1.00
S86.A	0.992	0.993	0.992	0.998	1.002	0.992	0.992	-0.99
S86.B	1.000	1.000	1.001	0.997	0.996	1.000	1.000	0.94
S86.C	1.011	1.006	1.010	0.998	0.994	1.011	1.011	0.99
S87.A	0.993	0.994	0.993	0.999	1.002	0.993	0.993	-0.99

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S85.C})$
	t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
S87.B	0.999	1.000	1.000	0.997	0.995	0.999	0.999	0.94
S87.C	1.011	1.005	1.009	0.998	0.994	1.011	1.011	0.99
S88.A	0.993	0.994	0.993	0.999	1.002	0.993	0.993	-0.99
S89.A	0.994	0.995	0.994	0.999	1.002	0.994	0.994	-0.99
S89.B	0.999	1.000	1.000	0.997	0.995	0.999	0.999	0.94
S89.C	1.011	1.005	1.009	0.998	0.994	1.011	1.011	0.99
S8.A	1.002	1.002	1.001	1.004	1.005	1.002	1.002	-0.99
S8.B	1.008	1.008	1.008	1.007	1.007	1.008	1.008	0.93
S8.C	1.017	1.015	1.016	1.012	1.009	1.017	1.017	1.00
S90.B	0.999	1.000	1.000	0.997	0.995	0.999	0.999	0.94
S91.A	0.994	0.995	0.994	1.000	1.003	0.994	0.994	-0.99
S91.B	0.999	1.000	1.000	0.997	0.995	0.999	0.999	0.94
S91.C	1.011	1.005	1.009	0.998	0.994	1.011	1.011	0.99
S92.C	1.011	1.005	1.009	0.998	0.994	1.011	1.011	0.99
S93.A	0.995	0.996	0.995	1.000	1.003	0.995	0.995	-0.99
S93.B	0.999	1.000	1.000	0.997	0.995	0.999	0.999	0.94
S93.C	1.010	1.005	1.009	0.997	0.994	1.010	1.010	0.99
S94.A	0.996	0.997	0.996	1.001	1.003	0.996	0.996	-0.99
S95.A	0.995	0.996	0.995	1.000	1.003	0.995	0.995	-0.99
S95.B	0.999	1.000	1.000	0.997	0.995	0.999	0.999	0.94
S95.C	1.010	1.005	1.009	0.997	0.994	1.010	1.010	0.99
S96.B	0.999	1.000	1.000	0.997	0.995	0.999	0.999	0.94
S97.A	0.991	0.992	0.991	0.998	1.002	0.991	0.991	-0.99
S97.B	0.999	0.999	1.000	0.997	0.995	0.999	0.999	0.94
S97.C	1.006	1.001	1.005	0.995	0.992	1.006	1.006	0.99
S98.A	0.991	0.992	0.991	0.998	1.002	0.991	0.991	-0.99
S98.B	0.999	0.999	1.000	0.997	0.995	0.999	0.999	0.94
S98.C	1.006	1.001	1.005	0.995	0.992	1.006	1.006	0.99
S99.A	0.991	0.992	0.991	0.998	1.002	0.991	0.991	-0.99
S99.B	0.999	0.999	1.000	0.997	0.995	0.999	0.999	0.94
S99.C	1.006	1.001	1.005	0.995	0.992	1.006	1.006	0.99
S9.A	1.002	1.002	1.001	1.004	1.005	1.002	1.002	-0.99
S9r.A	0.995	0.996	0.995	0.997	0.999	0.995	0.995	-0.99

Table F.15: Voltage magnitudes and Pearson coefficient values obtained for Scenario S3

Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S100.A	1.005	1.000	0.994	0.994	0.994	0.994	0.994	-0.85
S100.B	0.996	0.995	0.997	0.997	0.997	0.999	0.999	0.98
S100.C	0.995	1.002	1.004	1.004	1.004	1.004	1.004	0.69
S101.A	1.005	1.000	0.994	0.994	0.994	0.994	0.994	-0.85
S101.B	0.996	0.995	0.997	0.997	0.997	0.999	0.999	0.98
S101.C	0.995	1.002	1.004	1.004	1.004	1.004	1.004	0.69
S102.C	0.995	1.002	1.004	1.004	1.004	1.004	1.004	0.69
S103.C	0.995	1.002	1.004	1.004	1.004	1.004	1.004	0.69
S104.C	0.995	1.002	1.004	1.004	1.004	1.004	1.004	0.69
S105.A	1.005	1.000	0.994	0.994	0.994	0.994	0.994	-0.85
S105.B	0.996	0.995	0.997	0.997	0.997	0.999	0.999	0.98
S105.C	0.995	1.002	1.004	1.004	1.004	1.004	1.004	0.69
S106.B	0.996	0.995	0.997	0.997	0.997	0.999	0.999	0.98
S107.B	0.996	0.995	0.997	0.997	0.997	0.999	0.999	0.98
S108.A	1.005	1.000	0.994	0.994	0.994	0.994	0.994	-0.85
S108.B	0.996	0.995	0.997	0.997	0.997	0.999	0.999	0.98
S108.C	0.995	1.002	1.004	1.004	1.004	1.004	1.004	0.69
S109.A	1.005	1.000	0.994	0.994	0.994	0.994	0.994	-0.85
S10.A	0.997	0.997	0.995	0.995	0.995	0.994	0.994	-1.00
S110.A	1.005	1.000	0.994	0.994	0.994	0.994	0.994	-0.85
S111.A	1.005	1.000	0.994	0.994	0.994	0.994	0.994	-0.85
S112.A	1.005	1.000	0.994	0.994	0.994	0.994	0.994	-0.85
S113.A	1.005	1.000	0.994	0.994	0.994	0.994	0.994	-0.85
S114.A	1.005	1.000	0.994	0.994	0.994	0.994	0.994	-0.85
S11.A	0.997	0.997	0.995	0.995	0.995	0.994	0.994	-1.00
S12.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S135.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-1.00
S135.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S135.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S13.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-1.00
S13.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S13.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S149.A	1.006	1.006	1.006	1.006	1.006	1.006	1.006	NaN
S149.B	1.006	1.006	1.006	1.006	1.006	1.006	1.006	NaN
S149.C	1.006	1.006	1.006	1.006	1.006	1.006	1.006	1.00
S14.A	0.997	0.997	0.995	0.995	0.995	0.994	0.994	-1.00
S151.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-1.00
S151.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S151.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S152.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-1.00
S152.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S152.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S15.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S160.A	1.023	1.024	1.018	1.018	1.018	1.011	1.011	-0.99
S160.B	1.002	1.002	1.003	1.003	1.003	1.005	1.005	0.99
S160.C	0.976	0.978	0.992	0.992	0.992	1.004	1.004	1.00
S160r.A	1.004	0.998	0.993	0.993	0.993	0.992	0.993	-0.82
S160r.B	0.996	0.996	0.997	0.997	0.997	0.999	0.999	0.99
S160r.C	0.995	1.003	1.004	1.004	1.004	1.004	1.004	0.69
S16.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S17.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S18.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-1.00
S18.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S18.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S197.A	1.005	1.000	0.994	0.994	0.994	0.994	0.994	-0.85
S197.B	0.996	0.995	0.997	0.997	0.997	0.999	0.999	0.98
S197.C	0.995	1.002	1.004	1.004	1.004	1.004	1.004	0.69
S19.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-1.00
S1.A	1.008	1.008	1.007	1.007	1.007	1.006	1.006	-1.00
S1.B	1.006	1.006	1.006	1.006	1.006	1.006	1.006	1.00
S1.C	1.002	1.003	1.004	1.004	1.004	1.006	1.006	1.00
S20.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-1.00
S21.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-1.00
S21.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S21.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S22.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S23.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-1.00
S23.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S23.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S24.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S250.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-1.00
S250.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S250.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S25.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-1.00
S25.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S25.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S25r.A	0.999	0.998	0.996	0.996	0.996	1.000	1.000	0.29
S25r.C	1.001	1.002	1.001	1.001	1.001	1.000	0.999	-0.82

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S26.A	0.999	0.998	0.996	0.996	0.996	1.000	1.000	0.29
S26.C	1.001	1.002	1.001	1.001	1.001	1.000	0.999	-0.82
S27.A	0.999	0.998	0.996	0.996	0.996	1.000	1.000	0.29
S27.C	1.001	1.002	1.001	1.001	1.001	1.000	0.999	-0.82
S28.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-1.00
S28.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S28.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S29.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-1.00
S29.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S29.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S2.B	1.006	1.006	1.006	1.006	1.006	1.006	1.006	1.00
S300.A	1.005	1.000	0.994	0.994	0.994	0.994	0.994	-0.85
S300.B	0.996	0.995	0.997	0.997	0.997	0.999	0.999	0.98
S300.C	0.995	1.002	1.004	1.004	1.004	1.004	1.004	0.69
S300 open.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-1.00
S300 open.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S300 open.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S30.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-1.00
S30.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S30.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S31.C	1.001	1.002	1.001	1.001	1.001	1.000	0.999	-0.82
S32.C	1.001	1.002	1.001	1.001	1.001	1.000	0.999	-0.82
S33.A	0.999	0.998	0.996	0.996	0.996	1.000	1.000	0.29
S34.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S35.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-1.00
S35.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S35.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S36.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-1.00
S36.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S37.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-1.00
S38.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S39.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S3.C	1.002	1.003	1.004	1.004	1.004	1.006	1.006	1.00
S40.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-1.00
S40.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S40.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S41.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S42.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-1.00
S42.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S42.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S43.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S44.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-1.00
S44.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S44.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S450.A	1.005	1.000	0.994	0.994	0.994	0.994	0.994	-0.85
S450.B	0.996	0.995	0.997	0.997	0.997	0.999	0.999	0.98
S450.C	0.995	1.002	1.004	1.004	1.004	1.004	1.004	0.69
S45.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-1.00
S46.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-1.00
S47.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-1.00
S47.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S47.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S48.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-1.00
S48.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S48.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S49.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-1.00
S49.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S49.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S4.C	1.002	1.003	1.004	1.004	1.004	1.006	1.006	1.00
S50.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-1.00
S50.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S50.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S51.A	1.011	1.011	1.008	1.008	1.008	1.006	1.006	-1.00
S51.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S51.C	0.995	0.995	1.001	1.001	1.001	1.006	1.006	1.00
S52.A	1.013	1.012	1.009	1.009	1.009	1.006	1.006	-1.00
S52.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S52.C	0.991	0.992	0.999	0.999	0.999	1.006	1.006	1.00
S53.A	1.014	1.013	1.010	1.010	1.010	1.006	1.006	-1.00
S53.B	1.005	1.005	1.005	1.005	1.005	1.006	1.006	1.00
S53.C	0.989	0.990	0.998	0.998	0.998	1.006	1.006	1.00
S54.A	1.014	1.014	1.010	1.010	1.010	1.006	1.006	-1.00
S54.B	1.004	1.005	1.005	1.005	1.005	1.006	1.006	1.00
S54.C	0.987	0.989	0.998	0.998	0.998	1.006	1.005	1.00
S55.A	1.014	1.014	1.010	1.010	1.010	1.006	1.006	-1.00
S55.B	1.004	1.005	1.005	1.005	1.005	1.006	1.006	1.00
S55.C	0.987	0.989	0.998	0.998	0.998	1.006	1.005	1.00

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S56.A	1.014	1.014	1.010	1.010	1.010	1.006	1.006	-1.00
S56.B	1.004	1.005	1.005	1.005	1.005	1.006	1.006	1.00
S56.C	0.987	0.989	0.998	0.998	0.998	1.006	1.005	1.00
S57.A	1.017	1.017	1.012	1.012	1.012	1.008	1.008	-1.00
S57.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S57.C	0.984	0.985	0.996	0.996	0.996	1.005	1.005	1.00
S58.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S59.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S5.C	1.002	1.003	1.004	1.004	1.004	1.006	1.006	1.00
S60.A	1.023	1.024	1.018	1.018	1.018	1.011	1.011	-0.99
S60.B	1.002	1.002	1.003	1.003	1.003	1.005	1.005	0.99
S60.C	0.976	0.978	0.992	0.992	0.992	1.004	1.004	1.00
S61.A	1.023	1.024	1.018	1.018	1.018	1.011	1.011	-0.99
S61.B	1.002	1.002	1.003	1.003	1.003	1.005	1.005	0.99
S61.C	0.976	0.978	0.992	0.992	0.992	1.004	1.004	1.00
S61s.A	1.023	1.024	1.018	1.018	1.018	1.011	1.011	-0.99
S61s.B	1.002	1.002	1.003	1.003	1.003	1.005	1.005	0.99
S61s.C	0.976	0.978	0.992	0.992	0.992	1.004	1.004	1.00
S62.A	1.024	1.024	1.018	1.018	1.018	1.011	1.012	-0.99
S62.B	1.003	1.003	1.004	1.004	1.004	1.005	1.005	0.98
S62.C	0.972	0.974	0.990	0.990	0.990	1.004	1.004	1.00
S63.A	1.024	1.025	1.018	1.019	1.019	1.011	1.012	-0.99
S63.B	1.004	1.003	1.004	1.004	1.004	1.005	1.005	0.97
S63.C	0.969	0.971	0.988	0.988	0.988	1.004	1.004	1.00
S64.A	1.025	1.025	1.019	1.019	1.019	1.011	1.012	-0.99
S64.B	1.005	1.004	1.005	1.005	1.005	1.005	1.005	0.82
S64.C	0.962	0.965	0.985	0.985	0.985	1.004	1.004	1.00
S65.A	1.026	1.027	1.019	1.019	1.019	1.012	1.012	-0.99
S65.B	1.006	1.006	1.005	1.005	1.005	1.005	1.005	-0.74
S65.C	0.954	0.958	0.982	0.982	0.982	1.004	1.003	1.00
S66.A	1.027	1.027	1.020	1.020	1.020	1.012	1.012	-0.99
S66.B	1.007	1.007	1.006	1.006	1.006	1.005	1.005	-0.94
S66.C	0.948	0.952	0.979	0.979	0.979	1.003	1.003	1.00
S67.A	1.005	1.000	0.994	0.994	0.994	0.994	0.994	-0.85
S67.B	0.996	0.995	0.997	0.997	0.997	0.999	0.999	0.98
S67.C	0.995	1.002	1.004	1.004	1.004	1.004	1.004	0.69
S68.A	1.005	1.000	0.994	0.994	0.994	0.994	0.994	-0.85
S69.A	1.005	1.000	0.994	0.994	0.994	0.994	0.994	-0.85
S6.C	1.002	1.003	1.004	1.004	1.004	1.006	1.006	1.00
S70.A	1.005	1.000	0.994	0.994	0.994	0.994	0.994	-0.85

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S71.A	1.005	1.000	0.994	0.994	0.994	0.994	0.994	-0.85
S72.A	1.006	1.001	0.996	0.996	0.996	0.995	0.995	-0.87
S72.B	0.995	0.995	0.997	0.996	0.996	0.998	0.998	0.98
S72.C	0.995	1.002	1.004	1.004	1.004	1.004	1.004	0.69
S73.C	0.995	1.002	1.004	1.004	1.004	1.004	1.004	0.69
S74.C	0.995	1.002	1.004	1.004	1.004	1.004	1.004	0.69
S75.C	0.995	1.002	1.004	1.004	1.004	1.004	1.004	0.69
S76.A	1.007	1.002	0.997	0.997	0.997	0.996	0.996	-0.88
S76.B	0.995	0.995	0.996	0.996	0.996	0.998	0.998	0.97
S76.C	0.994	1.002	1.004	1.004	1.004	1.004	1.004	0.69
S77.A	1.007	1.002	0.997	0.997	0.997	0.996	0.996	-0.88
S77.B	0.995	0.995	0.996	0.996	0.996	0.998	0.998	0.97
S77.C	0.994	1.002	1.004	1.004	1.004	1.004	1.004	0.69
S78.A	1.007	1.002	0.997	0.997	0.997	0.996	0.996	-0.88
S78.B	0.995	0.995	0.996	0.996	0.996	0.998	0.998	0.97
S78.C	0.994	1.002	1.004	1.004	1.004	1.004	1.004	0.69
S79.A	1.007	1.002	0.997	0.997	0.997	0.996	0.996	-0.88
S79.B	0.995	0.995	0.996	0.996	0.996	0.998	0.998	0.97
S79.C	0.994	1.002	1.004	1.004	1.004	1.004	1.004	0.69
S7.A	1.009	1.009	1.008	1.008	1.008	1.006	1.006	-1.00
S7.B	1.006	1.006	1.006	1.006	1.006	1.006	1.006	1.00
S7.C	0.999	1.000	1.003	1.003	1.003	1.006	1.006	1.00
S80.A	1.007	1.002	0.997	0.997	0.997	0.996	0.996	-0.88
S80.B	0.995	0.995	0.996	0.996	0.996	0.998	0.998	0.97
S80.C	0.994	1.002	1.004	1.004	1.004	1.004	1.004	0.69
S81.A	1.007	1.002	0.997	0.997	0.997	0.996	0.996	-0.88
S81.B	0.995	0.995	0.996	0.996	0.996	0.998	0.998	0.97
S81.C	0.994	1.002	1.004	1.004	1.004	1.004	1.004	0.69
S82.A	1.007	1.002	0.997	0.997	0.997	0.996	0.996	-0.88
S82.B	0.995	0.995	0.996	0.996	0.996	0.998	0.998	0.97
S82.C	0.994	1.002	1.004	1.004	1.004	1.004	1.004	0.69
S83.A	1.007	1.002	0.997	0.997	0.997	0.996	0.996	-0.88
S83.B	0.995	0.995	0.996	0.996	0.996	0.998	0.998	0.97
S83.C	0.994	1.002	1.004	1.004	1.004	1.004	1.004	0.69
S84.C	0.994	1.002	1.004	1.004	1.004	1.004	1.004	0.69
S85.C	0.994	1.002	1.004	1.004	1.004	1.004	1.004	0.69
S86.A	1.009	1.006	1.001	1.001	1.001	0.999	0.999	-0.93
S86.B	0.995	0.994	0.995	0.995	0.995	0.998	0.998	0.95
S86.C	0.994	1.002	1.003	1.003	1.003	1.003	1.003	0.69
S87.A	1.010	1.008	1.003	1.003	1.003	1.001	1.001	-0.96

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S87.B	0.994	0.994	0.995	0.995	0.995	0.997	0.997	0.94
S87.C	0.994	1.001	1.003	1.003	1.003	1.003	1.003	0.70
S88.A	1.010	1.008	1.003	1.003	1.003	1.001	1.001	-0.96
S89.A	1.011	1.009	1.005	1.005	1.005	1.003	1.003	-0.97
S89.B	0.994	0.993	0.995	0.995	0.995	0.997	0.997	0.92
S89.C	0.994	1.001	1.003	1.003	1.003	1.003	1.003	0.70
S8.A	1.010	1.010	1.008	1.008	1.008	1.006	1.006	-1.00
S8.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S8.C	0.997	0.998	1.002	1.002	1.002	1.006	1.006	1.00
S90.B	0.994	0.993	0.995	0.995	0.995	0.997	0.997	0.92
S91.A	1.012	1.010	1.006	1.006	1.006	1.004	1.004	-0.98
S91.B	0.994	0.993	0.994	0.994	0.994	0.997	0.997	0.92
S91.C	0.994	1.001	1.002	1.002	1.002	1.003	1.002	0.70
S92.C	0.994	1.001	1.002	1.002	1.002	1.003	1.002	0.70
S93.A	1.013	1.011	1.007	1.007	1.007	1.005	1.005	-0.99
S93.B	0.994	0.993	0.994	0.994	0.994	0.997	0.997	0.91
S93.C	0.994	1.001	1.002	1.002	1.002	1.002	1.002	0.70
S94.A	1.014	1.014	1.010	1.010	1.010	1.006	1.006	-1.00
S95.A	1.013	1.011	1.007	1.007	1.007	1.005	1.005	-0.99
S95.B	0.994	0.993	0.994	0.994	0.994	0.997	0.997	0.91
S95.C	0.994	1.001	1.002	1.002	1.002	1.002	1.002	0.70
S96.B	0.994	0.993	0.994	0.994	0.994	0.997	0.997	0.91
S97.A	1.005	1.000	0.994	0.994	0.994	0.994	0.994	-0.85
S97.B	0.996	0.995	0.997	0.997	0.997	0.999	0.999	0.98
S97.C	0.995	1.002	1.004	1.004	1.004	1.004	1.004	0.69
S98.A	1.005	1.000	0.994	0.994	0.994	0.994	0.994	-0.85
S98.B	0.996	0.995	0.997	0.997	0.997	0.999	0.999	0.98
S98.C	0.995	1.002	1.004	1.004	1.004	1.004	1.004	0.69
S99.A	1.005	1.000	0.994	0.994	0.994	0.994	0.994	-0.85
S99.B	0.996	0.995	0.997	0.997	0.997	0.999	0.999	0.98
S99.C	0.995	1.002	1.004	1.004	1.004	1.004	1.004	0.69
S9.A	1.010	1.010	1.008	1.008	1.008	1.006	1.006	-1.00
S9r.A	0.997	0.997	0.995	0.995	0.995	0.994	0.994	-1.00

Table F.16: Voltage magnitudes and Pearson coefficient values obtained for Scenario S4

Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S82.A})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S100.A	0.996	1.005	1.008	1.008	1.008	1.006	1.006	0.86	0.66
S100.B	1.004	0.998	0.993	0.993	0.993	0.994	0.994	-0.94	-0.79
S100.C	0.996	1.006	1.004	1.004	1.004	1.005	1.005	0.76	0.66
S101.A	0.996	1.005	1.008	1.008	1.008	1.006	1.006	0.86	0.66
S101.B	1.004	0.998	0.993	0.993	0.993	0.994	0.994	-0.94	-0.79
S101.C	0.996	1.006	1.004	1.004	1.004	1.005	1.005	0.76	0.66
S102.C	0.996	1.006	1.004	1.004	1.004	1.005	1.005	0.76	0.66
S103.C	0.996	1.006	1.004	1.004	1.004	1.005	1.005	0.76	0.66
S104.C	0.996	1.006	1.004	1.004	1.004	1.005	1.005	0.76	0.66
S105.A	0.996	1.005	1.008	1.008	1.008	1.006	1.006	0.86	0.66
S105.B	1.004	0.998	0.993	0.993	0.993	0.994	0.994	-0.94	-0.79
S105.C	0.996	1.006	1.004	1.004	1.004	1.005	1.005	0.76	0.66
S106.B	1.004	0.998	0.993	0.993	0.993	0.994	0.994	-0.94	-0.79
S107.B	1.004	0.998	0.993	0.993	0.993	0.994	0.994	-0.94	-0.79
S108.A	0.996	1.005	1.008	1.008	1.008	1.006	1.006	0.86	0.66
S108.B	1.004	0.998	0.993	0.993	0.993	0.994	0.994	-0.94	-0.79
S108.C	0.996	1.006	1.004	1.004	1.004	1.005	1.005	0.76	0.66
S109.A	0.996	1.005	1.008	1.008	1.008	1.006	1.006	0.86	0.66
S10.A	0.995	0.995	0.998	0.998	0.998	1.000	1.000	0.90	0.98
S110.A	0.996	1.005	1.008	1.008	1.008	1.006	1.006	0.86	0.66
S111.A	0.996	1.005	1.008	1.008	1.008	1.006	1.006	0.86	0.66
S112.A	0.996	1.005	1.008	1.008	1.008	1.006	1.006	0.86	0.66
S113.A	0.996	1.005	1.008	1.008	1.008	1.006	1.006	0.86	0.66
S114.A	0.996	1.005	1.008	1.008	1.008	1.006	1.006	0.86	0.66
S11.A	0.995	0.995	0.998	0.998	0.998	1.000	1.000	0.90	0.98
S12.B	1.010	1.010	1.008	1.008	1.008	1.006	1.006	-0.90	-0.98
S135.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.90	0.98
S135.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.90	-0.98
S135.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.91	0.99
S13.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.90	0.98
S13.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.90	-0.98
S13.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.91	0.99
S149.A	1.006	1.006	1.006	1.006	1.006	1.006	1.006	0.91	0.98
S149.B	1.006	1.006	1.006	1.006	1.006	1.006	1.006	NaN	NaN
S149.C	1.006	1.006	1.006	1.006	1.006	1.006	1.006	0.91	0.99
S14.A	0.995	0.995	0.998	0.998	0.998	1.000	1.000	0.90	0.98
S151.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.90	0.98
S151.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.90	-0.98

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S82.A})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S151.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.91	0.99
S152.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.90	0.98
S152.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.90	-0.98
S152.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.91	0.99
S15.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.91	0.99
S160.A	0.991	0.989	0.997	0.997	0.997	1.006	1.006	0.78	0.93
S160.B	1.016	1.016	1.011	1.011	1.011	1.007	1.007	-0.87	-0.97
S160.C	0.975	0.978	0.993	0.993	0.993	1.005	1.005	0.92	0.99
S160r.A	0.998	1.007	1.009	1.009	1.009	1.006	1.006	0.75	0.51
S160r.B	1.003	0.997	0.992	0.992	0.992	0.994	0.994	-0.92	-0.75
S160r.C	1.000	1.009	1.005	1.005	1.005	1.005	1.005	0.48	0.34
S16.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.91	0.99
S17.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.91	0.99
S18.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.90	0.98
S18.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.90	-0.98
S18.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.91	0.99
S197.A	0.996	1.005	1.008	1.008	1.008	1.006	1.006	0.86	0.66
S197.B	1.004	0.998	0.993	0.993	0.993	0.994	0.994	-0.94	-0.79
S197.C	0.996	1.006	1.004	1.004	1.004	1.005	1.005	0.76	0.66
S19.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.90	0.98
S1.A	1.004	1.004	1.005	1.005	1.005	1.006	1.006	0.90	0.98
S1.B	1.008	1.008	1.007	1.007	1.007	1.006	1.006	-0.90	-0.98
S1.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	0.91	0.99
S20.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.90	0.98
S21.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.90	0.98
S21.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.90	-0.98
S21.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.91	0.99
S22.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.90	-0.98
S23.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.90	0.98
S23.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.90	-0.98
S23.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.91	0.99
S24.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.91	0.99
S250.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.90	0.98
S250.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.90	-0.98
S250.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.91	0.99
S25.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.90	0.98
S25.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.90	-0.98
S25.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.91	0.99
S25r.A	1.000	1.000	1.003	1.003	1.003	1.000	1.000	0.29	0.01
S25r.C	1.000	1.001	1.000	1.000	1.000	0.999	0.999	-0.04	-0.34

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S82.A})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S26.A	1.000	1.000	1.003	1.003	1.003	1.000	1.000	0.29	0.01
S26.C	1.000	1.001	1.000	1.000	1.000	0.999	0.999	-0.04	-0.34
S27.A	1.000	1.000	1.003	1.003	1.003	1.000	1.000	0.29	0.01
S27.C	1.000	1.001	1.000	1.000	1.000	0.999	0.999	-0.04	-0.34
S28.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.90	0.98
S28.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.90	-0.98
S28.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.91	0.99
S29.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.90	0.98
S29.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.90	-0.98
S29.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.91	0.99
S2.B	1.008	1.008	1.007	1.007	1.007	1.006	1.006	-0.90	-0.98
S300.A	0.996	1.005	1.008	1.008	1.008	1.006	1.006	0.86	0.66
S300.B	1.004	0.998	0.993	0.993	0.993	0.994	0.994	-0.94	-0.79
S300.C	0.996	1.006	1.004	1.004	1.004	1.005	1.005	0.76	0.66
S300 open.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.90	0.98
S300 open.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.90	-0.98
S300 open.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.91	0.99
S30.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.90	0.98
S30.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.90	-0.98
S30.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.91	0.99
S31.C	1.000	1.001	1.000	1.000	1.000	0.999	0.999	-0.04	-0.34
S32.C	1.000	1.001	1.000	1.000	1.000	0.999	0.999	-0.04	-0.34
S33.A	1.000	1.000	1.003	1.003	1.003	1.000	1.000	0.29	0.01
S34.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.91	0.99
S35.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.90	0.98
S35.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.90	-0.98
S35.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.91	0.99
S36.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.90	0.98
S36.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.90	-0.98
S37.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.90	0.98
S38.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.90	-0.98
S39.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.90	-0.98
S3.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	0.91	0.99
S40.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.90	0.98
S40.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.90	-0.98
S40.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.91	0.99
S41.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.91	0.99

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S82.A})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S42.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.90	0.98
S42.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.90	-0.98
S42.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.91	0.99
S43.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.90	-0.98
S44.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.90	0.98
S44.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.90	-0.98
S44.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.91	0.99
S450.A	0.996	1.005	1.008	1.008	1.008	1.006	1.006	0.86	0.66
S450.B	1.004	0.998	0.993	0.993	0.993	0.994	0.994	-0.94	-0.79
S450.C	0.996	1.006	1.004	1.004	1.004	1.005	1.005	0.76	0.66
S45.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.90	0.98
S46.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.90	0.98
S47.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.90	0.98
S47.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.90	-0.98
S47.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.91	0.99
S48.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.90	0.98
S48.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.90	-0.98
S48.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.91	0.99
S49.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.90	0.98
S49.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.90	-0.98
S49.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.91	0.99
S4.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	0.91	0.99
S50.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.90	0.98
S50.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.90	-0.98
S50.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.91	0.99
S51.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	0.90	0.98
S51.B	1.011	1.011	1.009	1.009	1.009	1.006	1.006	-0.90	-0.98
S51.C	0.993	0.994	1.000	1.000	1.000	1.006	1.006	0.91	0.99
S52.A	0.998	0.998	1.002	1.002	1.002	1.006	1.006	0.90	0.98
S52.B	1.013	1.013	1.009	1.009	1.009	1.007	1.007	-0.90	-0.98
S52.C	0.989	0.990	0.999	0.998	0.998	1.006	1.006	0.91	0.99
S53.A	0.997	0.997	1.002	1.002	1.002	1.006	1.006	0.90	0.98
S53.B	1.014	1.013	1.010	1.010	1.010	1.007	1.007	-0.90	-0.98
S53.C	0.987	0.988	0.998	0.998	0.998	1.006	1.005	0.91	0.99
S54.A	0.996	0.997	1.001	1.001	1.001	1.006	1.006	0.90	0.98
S54.B	1.015	1.014	1.010	1.010	1.010	1.007	1.007	-0.90	-0.98
S54.C	0.986	0.987	0.997	0.997	0.997	1.005	1.005	0.91	0.99
S55.A	0.996	0.997	1.001	1.001	1.001	1.006	1.006	0.90	0.98
S55.B	1.015	1.014	1.010	1.010	1.010	1.007	1.007	-0.90	-0.98
S55.C	0.986	0.987	0.997	0.997	0.997	1.005	1.005	0.91	0.99

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S82.A})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S56.A	0.996	0.997	1.001	1.001	1.001	1.006	1.006	0.90	0.98
S56.B	1.015	1.014	1.010	1.010	1.010	1.007	1.007	-0.90	-0.98
S56.C	0.986	0.987	0.997	0.997	0.997	1.005	1.005	0.91	0.99
S57.A	0.995	0.994	1.000	1.000	1.000	1.006	1.006	0.85	0.96
S57.B	1.015	1.015	1.010	1.010	1.010	1.007	1.007	-0.89	-0.98
S57.C	0.982	0.984	0.996	0.996	0.996	1.005	1.005	0.91	0.99
S58.B	1.015	1.015	1.010	1.010	1.010	1.007	1.007	-0.89	-0.98
S59.B	1.015	1.015	1.010	1.010	1.010	1.007	1.007	-0.89	-0.98
S5.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	0.91	0.99
S60.A	0.991	0.989	0.997	0.997	0.997	1.006	1.006	0.78	0.93
S60.B	1.016	1.016	1.011	1.011	1.011	1.007	1.007	-0.87	-0.97
S60.C	0.975	0.978	0.993	0.993	0.993	1.005	1.005	0.92	0.99
S61.A	0.991	0.989	0.997	0.997	0.997	1.006	1.006	0.78	0.93
S61.B	1.016	1.016	1.011	1.011	1.011	1.007	1.007	-0.87	-0.97
S61.C	0.975	0.978	0.993	0.993	0.993	1.005	1.005	0.92	0.99
S61s.A	0.991	0.989	0.997	0.997	0.997	1.006	1.006	0.78	0.93
S61s.B	1.016	1.016	1.011	1.011	1.011	1.007	1.007	-0.87	-0.97
S61s.C	0.975	0.978	0.993	0.993	0.993	1.005	1.005	0.92	0.99
S62.A	0.991	0.989	0.997	0.997	0.997	1.006	1.006	0.78	0.93
S62.B	1.016	1.016	1.011	1.011	1.011	1.007	1.007	-0.87	-0.97
S62.C	0.975	0.978	0.993	0.993	0.993	1.005	1.005	0.92	0.99
S63.A	0.991	0.989	0.997	0.997	0.997	1.006	1.006	0.78	0.93
S63.B	1.016	1.016	1.011	1.011	1.011	1.007	1.007	-0.87	-0.97
S63.C	0.975	0.978	0.993	0.993	0.993	1.005	1.005	0.92	0.99
S64.A	0.991	0.989	0.997	0.997	0.997	1.006	1.006	0.78	0.93
S64.B	1.016	1.016	1.011	1.011	1.011	1.007	1.007	-0.87	-0.97
S64.C	0.975	0.978	0.993	0.993	0.993	1.005	1.005	0.92	0.99
S65.A	0.991	0.989	0.997	0.997	0.997	1.006	1.006	0.78	0.93
S65.B	1.016	1.016	1.011	1.011	1.011	1.007	1.007	-0.87	-0.97
S65.C	0.975	0.978	0.993	0.993	0.993	1.005	1.005	0.92	0.99
S66.A	0.991	0.989	0.997	0.997	0.997	1.006	1.006	0.78	0.93
S66.B	1.016	1.016	1.011	1.011	1.011	1.007	1.007	-0.87	-0.97
S66.C	0.975	0.978	0.993	0.993	0.993	1.005	1.005	0.92	0.99
S67.A	0.996	1.005	1.008	1.008	1.008	1.006	1.006	0.86	0.66
S67.B	1.004	0.998	0.993	0.993	0.993	0.994	0.994	-0.94	-0.79
S67.C	0.996	1.006	1.004	1.004	1.004	1.005	1.005	0.76	0.66
S68.A	0.996	1.005	1.008	1.008	1.008	1.006	1.006	0.86	0.66
S69.A	0.996	1.005	1.008	1.008	1.008	1.006	1.006	0.86	0.66
S6.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	0.91	0.99
S70.A	0.996	1.005	1.008	1.008	1.008	1.006	1.006	0.86	0.66

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S82.A})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S71.A	0.996	1.005	1.008	1.008	1.008	1.006	1.006	0.86	0.66
S72.A	0.995	1.003	1.007	1.007	1.007	1.006	1.006	0.93	0.78
S72.B	1.004	0.998	0.993	0.993	0.993	0.994	0.994	-0.95	-0.81
S72.C	0.994	1.004	1.003	1.003	1.003	1.005	1.005	0.87	0.8
S73.C	0.994	1.004	1.003	1.003	1.003	1.005	1.005	0.87	0.8
S74.C	0.994	1.004	1.003	1.003	1.003	1.005	1.005	0.87	0.8
S75.C	0.994	1.004	1.003	1.003	1.003	1.005	1.005	0.87	0.8
S76.A	0.994	1.002	1.006	1.006	1.006	1.006	1.006	0.97	0.84
S76.B	1.004	0.998	0.993	0.993	0.993	0.994	0.994	-0.96	-0.82
S76.C	0.992	1.002	1.002	1.002	1.002	1.005	1.005	0.91	0.86
S77.A	0.993	1.000	1.005	1.005	1.005	1.006	1.005	0.98	0.88
S77.B	1.006	1.000	0.994	0.994	0.994	0.994	0.994	-0.97	-0.86
S77.C	0.988	0.998	1.000	1.000	1.000	1.005	1.004	0.95	0.94
S78.A	0.992	1.000	1.005	1.005	1.005	1.006	1.005	0.99	0.89
S78.B	1.006	1.000	0.994	0.994	0.994	0.994	0.994	-0.98	-0.86
S78.C	0.987	0.997	0.999	0.999	0.999	1.005	1.004	0.96	0.95
S79.A	0.992	1.000	1.005	1.005	1.005	1.006	1.005	0.99	0.89
S79.B	1.006	1.000	0.994	0.994	0.994	0.994	0.994	-0.98	-0.86
S79.C	0.987	0.997	0.999	0.999	0.999	1.005	1.004	0.96	0.95
S7.A	1.003	1.003	1.004	1.004	1.004	1.006	1.006	0.90	0.98
S7.B	1.009	1.009	1.008	1.008	1.008	1.006	1.006	-0.90	-0.98
S7.C	0.999	0.999	1.003	1.003	1.003	1.006	1.006	0.91	0.99
S80.A	0.991	0.998	1.004	1.004	1.004	1.006	1.005	1.00	0.92
S80.B	1.007	1.001	0.995	0.995	0.995	0.994	0.994	-0.99	-0.89
S80.C	0.981	0.992	0.997	0.997	0.997	1.004	1.004	0.97	0.98
S81.A	0.990	0.998	1.004	1.004	1.004	1.005	1.005	1.00	0.93
S81.B	1.008	1.002	0.995	0.995	0.995	0.994	0.994	-0.99	-0.9
S81.C	0.979	0.991	0.996	0.996	0.996	1.004	1.004	0.97	0.99
S82.A	0.988	0.996	1.003	1.003	1.003	1.005	1.005	1.00	0.95
S82.B	1.009	1.003	0.995	0.995	0.995	0.994	0.994	-0.99	-0.92
S82.C	0.979	0.990	0.996	0.996	0.996	1.004	1.004	0.97	0.99
S83.A	0.988	0.996	1.003	1.003	1.003	1.005	1.005	1.00	0.95
S83.B	1.009	1.003	0.995	0.995	0.995	0.994	0.994	-0.99	-0.92
S83.C	0.979	0.990	0.996	0.996	0.996	1.004	1.004	0.97	0.99
S84.C	0.966	0.979	0.990	0.990	0.990	1.004	1.003	0.96	1
S85.C	0.957	0.970	0.986	0.986	0.986	1.003	1.003	0.95	1
S86.A	0.995	1.000	1.004	1.004	1.004	1.006	1.006	1.00	0.93
S86.B	1.003	0.998	0.993	0.993	0.993	0.994	0.994	-0.95	-0.81
S86.C	0.993	1.003	1.003	1.003	1.003	1.005	1.005	0.88	0.81
S87.A	0.995	0.999	1.003	1.003	1.003	1.006	1.006	1.00	0.97

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S82.A})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S87.B	1.003	0.998	0.993	0.993	0.993	0.994	0.994	-0.95	-0.8
S87.C	0.994	1.004	1.003	1.003	1.003	1.005	1.005	0.86	0.77
S88.A	0.995	0.999	1.003	1.003	1.003	1.006	1.006	1.00	0.97
S89.A	0.995	0.998	1.003	1.003	1.003	1.006	1.006	0.98	0.99
S89.B	1.002	0.997	0.993	0.993	0.993	0.994	0.994	-0.95	-0.8
S89.C	0.994	1.005	1.003	1.003	1.003	1.005	1.005	0.83	0.74
S8.A	1.001	1.002	1.004	1.004	1.004	1.006	1.006	0.90	0.98
S8.B	1.010	1.010	1.008	1.008	1.008	1.006	1.006	-0.90	-0.98
S8.C	0.997	0.997	1.002	1.002	1.002	1.006	1.006	0.91	0.99
S90.B	1.002	0.997	0.993	0.993	0.993	0.994	0.994	-0.95	-0.8
S91.A	0.995	0.998	1.002	1.002	1.002	1.006	1.006	0.97	0.99
S91.B	1.002	0.997	0.993	0.993	0.993	0.994	0.994	-0.94	-0.79
S91.C	0.995	1.005	1.004	1.004	1.004	1.005	1.005	0.82	0.71
S92.C	0.995	1.005	1.004	1.004	1.004	1.005	1.005	0.82	0.71
S93.A	0.995	0.997	1.002	1.002	1.002	1.006	1.006	0.95	0.99
S93.B	1.002	0.997	0.993	0.993	0.993	0.994	0.994	-0.94	-0.79
S93.C	0.995	1.006	1.004	1.004	1.004	1.005	1.005	0.79	0.68
S94.A	0.996	0.997	1.001	1.001	1.001	1.006	1.006	0.90	0.98
S95.A	0.995	0.997	1.002	1.002	1.002	1.006	1.006	0.95	0.99
S95.B	1.002	0.997	0.993	0.993	0.993	0.994	0.994	-0.94	-0.79
S95.C	0.995	1.006	1.004	1.004	1.004	1.005	1.005	0.79	0.68
S96.B	1.002	0.997	0.993	0.993	0.993	0.994	0.994	-0.94	-0.79
S97.A	0.996	1.005	1.008	1.008	1.008	1.006	1.006	0.86	0.66
S97.B	1.004	0.998	0.993	0.993	0.993	0.994	0.994	-0.94	-0.79
S97.C	0.996	1.006	1.004	1.004	1.004	1.005	1.005	0.76	0.66
S98.A	0.996	1.005	1.008	1.008	1.008	1.006	1.006	0.86	0.66
S98.B	1.004	0.998	0.993	0.993	0.993	0.994	0.994	-0.94	-0.79
S98.C	0.996	1.006	1.004	1.004	1.004	1.005	1.005	0.76	0.66
S99.A	0.996	1.005	1.008	1.008	1.008	1.006	1.006	0.86	0.66
S99.B	1.004	0.998	0.993	0.993	0.993	0.994	0.994	-0.94	-0.79
S99.C	0.996	1.006	1.004	1.004	1.004	1.005	1.005	0.76	0.66
S9.A	1.001	1.002	1.004	1.004	1.004	1.006	1.006	0.90	0.98
S9r.A	0.995	0.995	0.998	0.998	0.998	1.000	1.000	0.90	0.98

Table F.17: Voltage magnitudes and Pearson coefficient values obtained for Scenario S5

Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S48})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S100.A	0.991	0.995	0.997	0.997	0.997	0.998	0.998	0.83
S100.B	0.997	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S100.C	0.997	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S101.A	0.991	0.995	0.997	0.997	0.997	0.998	0.998	0.83
S101.B	0.997	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S101.C	0.997	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S102.C	0.997	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S103.C	0.997	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S104.C	0.997	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S105.A	0.991	0.995	0.997	0.997	0.997	0.998	0.998	0.83
S105.B	0.997	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S105.C	0.997	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S106.B	0.997	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S107.B	0.997	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S108.A	0.991	0.995	0.997	0.997	0.997	0.998	0.998	0.83
S108.B	0.997	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S108.C	0.997	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S109.A	0.991	0.995	0.997	0.997	0.997	0.998	0.998	0.83
S10.A	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S110.A	0.991	0.995	0.997	0.997	0.997	0.998	0.998	0.83
S111.A	0.991	0.995	0.997	0.997	0.997	0.998	0.998	0.83
S112.A	0.991	0.995	0.997	0.997	0.997	0.998	0.998	0.83
S113.A	0.991	0.995	0.997	0.997	0.997	0.998	0.998	0.83
S114.A	0.991	0.995	0.997	0.997	0.997	0.998	0.998	0.83
S11.A	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S12.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S135.A	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S135.B	1.003	1.003	1.005	1.005	1.005	1.006	1.006	1.00
S135.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S13.A	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S13.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S13.C	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S149.A	1.006	1.006	1.006	1.006	1.006	1.006	1.006	1.00
S149.B	1.006	1.006	1.006	1.006	1.006	1.006	1.006	1.00
S149.C	1.006	1.006	1.006	1.006	1.006	1.006	1.006	1.00
S14.A	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75
S151.A	0.999	1.000	1.003	1.003	1.003	1.006	1.006	1.00
S151.B	1.000	1.001	1.004	1.003	1.003	1.006	1.006	1.00

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S48})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S151.C	1.000	1.000	1.003	1.003	1.003	1.006	1.006	1.00
S152.A	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S152.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S152.C	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S15.C	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S160.A	1.008	1.007	1.008	1.008	1.008	1.009	1.009	0.82
S160.B	1.003	1.004	1.005	1.005	1.005	1.006	1.006	0.99
S160.C	1.003	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S160r.A	0.989	0.994	0.996	0.996	0.996	0.997	0.997	0.82
S160r.B	0.997	0.998	0.998	0.998	0.998	0.999	0.999	0.99
S160r.C	0.997	0.997	0.998	0.998	0.998	0.999	0.999	1.00
S16.C	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S17.C	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S18.A	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S18.B	1.003	1.003	1.005	1.005	1.005	1.006	1.006	1.00
S18.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S197.A	0.991	0.995	0.997	0.997	0.997	0.998	0.998	0.83
S197.B	0.997	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S197.C	0.997	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S19.A	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S1.A	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S1.B	1.006	1.006	1.006	1.006	1.006	1.006	1.006	1.00
S1.C	1.006	1.006	1.006	1.006	1.006	1.006	1.006	1.00
S20.A	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S21.A	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S21.B	1.003	1.003	1.005	1.005	1.005	1.006	1.006	1.00
S21.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S22.B	1.003	1.003	1.005	1.005	1.005	1.006	1.006	1.00
S23.A	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S23.B	1.003	1.003	1.005	1.005	1.005	1.006	1.006	1.00
S23.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S24.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S250.A	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S250.B	1.003	1.003	1.005	1.005	1.005	1.006	1.006	1.00
S250.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S25.A	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S25.B	1.003	1.003	1.005	1.005	1.005	1.006	1.006	1.00
S25.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S25r.A	0.996	1.002	0.998	0.998	0.998	1.000	1.000	0.14
S25r.C	0.996	1.002	0.998	0.998	0.998	1.000	1.000	0.14

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S48})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S26.A	0.996	1.002	0.998	0.998	0.998	1.000	1.000	0.14
S26.C	0.996	1.002	0.998	0.998	0.998	1.000	1.000	0.14
S27.A	0.996	1.002	0.998	0.998	0.998	1.000	1.000	0.14
S27.C	0.996	1.002	0.998	0.998	0.998	1.000	1.000	0.14
S28.A	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S28.B	1.003	1.003	1.005	1.005	1.005	1.006	1.006	1.00
S28.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S29.A	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S29.B	1.003	1.003	1.005	1.005	1.005	1.006	1.006	1.00
S29.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S2.B	1.006	1.006	1.006	1.006	1.006	1.006	1.006	1.00
S300.A	0.991	0.995	0.997	0.997	0.997	0.998	0.998	0.83
S300.B	0.997	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S300.C	0.997	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S300 open.A	0.999	1.000	1.003	1.003	1.003	1.006	1.006	1.00
S300 open.B	1.000	1.001	1.004	1.003	1.003	1.006	1.006	1.00
S300 open.C	1.000	1.000	1.003	1.003	1.003	1.006	1.006	1.00
S30.A	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S30.B	1.003	1.003	1.005	1.005	1.005	1.006	1.006	1.00
S30.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S31.C	0.996	1.002	0.998	0.998	0.998	1.000	1.000	0.14
S32.C	0.996	1.002	0.998	0.998	0.998	1.000	1.000	0.14
S33.A	0.996	1.002	0.998	0.998	0.998	1.000	1.000	0.14
S34.C	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S35.A	1.001	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S35.B	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S35.C	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S36.A	1.001	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S36.B	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S37.A	1.001	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S38.B	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S39.B	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S3.C	1.006	1.006	1.006	1.006	1.006	1.006	1.006	1.00
S40.A	1.001	1.001	1.004	1.004	1.004	1.006	1.006	1.00
S40.B	1.002	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S40.C	1.001	1.001	1.004	1.004	1.004	1.006	1.006	1.00
S41.C	1.001	1.001	1.004	1.004	1.004	1.006	1.006	1.00

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S48})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S42.A	1.000	1.001	1.003	1.003	1.003	1.006	1.006	1.00
S42.B	1.001	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S42.C	1.001	1.001	1.004	1.004	1.004	1.006	1.006	1.00
S43.B	1.001	1.002	1.004	1.004	1.004	1.006	1.006	1.00
S44.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	1.00
S44.B	1.001	1.001	1.004	1.004	1.004	1.006	1.006	1.00
S44.C	1.000	1.001	1.003	1.003	1.003	1.006	1.006	1.00
S450.A	0.991	0.995	0.997	0.997	0.997	0.998	0.998	0.83
S450.B	0.997	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S450.C	0.997	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S45.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	1.00
S46.A	1.000	1.000	1.003	1.003	1.003	1.006	1.006	1.00
S47.A	0.999	1.000	1.003	1.003	1.003	1.006	1.006	1.00
S47.B	1.000	1.001	1.004	1.003	1.003	1.006	1.006	1.00
S47.C	1.000	1.000	1.003	1.003	1.003	1.006	1.006	1.00
S48.A	0.999	1.000	1.003	1.003	1.003	1.006	1.006	1.00
S48.B	1.000	1.001	1.003	1.003	1.003	1.006	1.006	1.00
S48.C	1.000	1.000	1.003	1.003	1.003	1.006	1.006	1.00
S49.A	0.999	1.000	1.003	1.003	1.003	1.006	1.006	1.00
S49.B	1.000	1.001	1.004	1.003	1.003	1.006	1.006	1.00
S49.C	1.000	1.000	1.003	1.003	1.003	1.006	1.006	1.00
S4.C	1.006	1.006	1.006	1.006	1.006	1.006	1.006	1.00
S50.A	0.999	1.000	1.003	1.003	1.003	1.006	1.006	1.00
S50.B	1.000	1.001	1.004	1.003	1.003	1.006	1.006	1.00
S50.C	1.000	1.000	1.003	1.003	1.003	1.006	1.006	1.00
S51.A	0.999	1.000	1.003	1.003	1.003	1.006	1.006	1.00
S51.B	1.000	1.001	1.004	1.003	1.003	1.006	1.006	1.00
S51.C	1.000	1.000	1.003	1.003	1.003	1.006	1.006	1.00
S52.A	1.003	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S52.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S52.C	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S53.A	1.003	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S53.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S53.C	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S54.A	1.003	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S54.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S54.C	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S55.A	1.003	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S55.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S55.C	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S48})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S56.A	1.003	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S56.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S56.C	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S57.A	1.005	1.005	1.006	1.006	1.006	1.007	1.007	0.99
S57.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S57.C	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S58.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S59.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S5.C	1.006	1.006	1.006	1.006	1.006	1.006	1.006	1.00
S60.A	1.008	1.007	1.008	1.008	1.008	1.009	1.009	0.82
S60.B	1.003	1.004	1.005	1.005	1.005	1.006	1.006	0.99
S60.C	1.003	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S61.A	1.008	1.007	1.008	1.008	1.008	1.009	1.009	0.82
S61.B	1.003	1.004	1.005	1.005	1.005	1.006	1.006	0.99
S61.C	1.003	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S61s.A	1.008	1.007	1.008	1.008	1.008	1.009	1.009	0.82
S61s.B	1.003	1.004	1.005	1.005	1.005	1.006	1.006	0.99
S61s.C	1.003	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S62.A	1.008	1.007	1.008	1.008	1.008	1.009	1.009	0.82
S62.B	1.003	1.004	1.005	1.005	1.005	1.006	1.006	0.99
S62.C	1.003	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S63.A	1.008	1.007	1.008	1.008	1.008	1.009	1.009	0.82
S63.B	1.003	1.004	1.005	1.005	1.005	1.006	1.006	0.99
S63.C	1.003	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S64.A	1.008	1.007	1.008	1.008	1.008	1.009	1.009	0.82
S64.B	1.003	1.004	1.005	1.005	1.005	1.006	1.006	0.99
S64.C	1.003	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S65.A	1.008	1.007	1.008	1.008	1.008	1.009	1.009	0.82
S65.B	1.003	1.004	1.005	1.005	1.005	1.006	1.006	0.99
S65.C	1.003	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S66.A	1.008	1.007	1.008	1.008	1.008	1.009	1.009	0.82
S66.B	1.003	1.004	1.005	1.005	1.005	1.006	1.006	0.99
S66.C	1.003	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S67.A	0.991	0.995	0.997	0.997	0.997	0.998	0.998	0.83
S67.B	0.997	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S67.C	0.997	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S68.A	0.991	0.995	0.997	0.997	0.997	0.998	0.998	0.83
S69.A	0.991	0.995	0.997	0.997	0.997	0.998	0.998	0.83
S6.C	1.006	1.006	1.006	1.006	1.006	1.006	1.006	1.00
S70.A	0.991	0.995	0.997	0.997	0.997	0.998	0.998	0.83

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S48})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S71.A	0.991	0.995	0.997	0.997	0.997	0.998	0.998	0.83
S72.A	0.992	0.996	0.997	0.997	0.997	0.999	0.999	0.84
S72.B	0.997	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S72.C	0.997	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S73.C	0.997	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S74.C	0.997	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S75.C	0.997	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S76.A	0.993	0.997	0.998	0.998	0.998	0.999	0.999	0.85
S76.B	0.996	0.997	0.998	0.998	0.998	0.999	0.999	0.98
S76.C	0.996	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S77.A	0.993	0.997	0.998	0.998	0.998	0.999	0.999	0.85
S77.B	0.996	0.997	0.998	0.998	0.998	0.999	0.999	0.98
S77.C	0.996	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S78.A	0.993	0.997	0.998	0.998	0.998	0.999	0.999	0.85
S78.B	0.996	0.997	0.998	0.998	0.998	0.999	0.999	0.98
S78.C	0.996	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S79.A	0.993	0.997	0.998	0.998	0.998	0.999	0.999	0.85
S79.B	0.996	0.997	0.998	0.998	0.998	0.999	0.999	0.98
S79.C	0.996	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S7.A	1.005	1.005	1.005	1.005	1.005	1.006	1.006	1.00
S7.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S7.C	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S80.A	0.993	0.997	0.998	0.998	0.998	0.999	0.999	0.85
S80.B	0.996	0.997	0.998	0.998	0.998	0.999	0.999	0.98
S80.C	0.996	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S81.A	0.993	0.997	0.998	0.998	0.998	0.999	0.999	0.85
S81.B	0.996	0.997	0.998	0.998	0.998	0.999	0.999	0.98
S81.C	0.996	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S82.A	0.993	0.997	0.998	0.998	0.998	0.999	0.999	0.85
S82.B	0.996	0.997	0.998	0.998	0.998	0.999	0.999	0.98
S82.C	0.996	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S83.A	0.993	0.997	0.998	0.998	0.998	0.999	0.999	0.85
S83.B	0.996	0.997	0.998	0.998	0.998	0.999	0.999	0.98
S83.C	0.996	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S84.C	0.996	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S85.C	0.996	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S86.A	0.996	0.999	1.000	1.000	1.000	1.001	1.001	0.90
S86.B	0.996	0.997	0.998	0.998	0.998	0.998	0.998	0.97
S86.C	0.996	0.997	0.998	0.998	0.998	0.999	0.999	0.98
S87.A	0.998	1.000	1.001	1.001	1.001	1.003	1.003	0.93

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S48})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
S87.B	0.995	0.996	0.997	0.997	0.997	0.998	0.998	0.96
S87.C	0.996	0.996	0.997	0.997	0.997	0.998	0.998	0.98
S88.A	0.998	1.000	1.001	1.001	1.001	1.003	1.003	0.93
S89.A	1.000	1.001	1.002	1.002	1.002	1.003	1.003	0.95
S89.B	0.995	0.996	0.997	0.997	0.997	0.998	0.998	0.96
S89.C	0.995	0.996	0.997	0.997	0.997	0.998	0.998	0.97
S8.A	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S8.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	1.00
S8.C	1.005	1.005	1.005	1.005	1.005	1.006	1.006	1.00
S90.B	0.995	0.996	0.997	0.997	0.997	0.998	0.998	0.96
S91.A	1.001	1.002	1.003	1.003	1.003	1.004	1.004	0.97
S91.B	0.995	0.996	0.997	0.997	0.997	0.998	0.998	0.95
S91.C	0.995	0.996	0.997	0.997	0.997	0.998	0.998	0.97
S92.C	0.995	0.996	0.997	0.997	0.997	0.998	0.998	0.97
S93.A	1.002	1.002	1.004	1.004	1.004	1.005	1.005	0.98
S93.B	0.995	0.996	0.997	0.997	0.997	0.998	0.998	0.95
S93.C	0.995	0.996	0.997	0.997	0.997	0.998	0.998	0.97
S94.A	1.003	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S95.A	1.002	1.002	1.004	1.004	1.004	1.005	1.005	0.98
S95.B	0.995	0.996	0.997	0.997	0.997	0.998	0.998	0.95
S95.C	0.995	0.996	0.997	0.997	0.997	0.998	0.998	0.97
S96.B	0.995	0.996	0.997	0.997	0.997	0.998	0.998	0.95
S97.A	0.991	0.995	0.997	0.997	0.997	0.998	0.998	0.83
S97.B	0.997	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S97.C	0.997	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S98.A	0.991	0.995	0.997	0.997	0.997	0.998	0.998	0.83
S98.B	0.997	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S98.C	0.997	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S99.A	0.991	0.995	0.997	0.997	0.997	0.998	0.998	0.83
S99.B	0.997	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S99.C	0.997	0.997	0.998	0.998	0.998	0.999	0.999	0.99
S9.A	1.004	1.004	1.005	1.005	1.005	1.006	1.006	1.00
S9r.A	0.992	0.998	0.999	0.999	0.999	1.000	1.000	0.75

Table F.18: Voltage magnitudes and Pearson coefficient values obtained for Scenario S6

Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S100.A	1.008	0.997	0.996	0.996	0.996	0.994	0.995	0.93	-0.87
S100.B	0.993	0.992	0.995	0.995	0.995	0.998	0.998	-0.85	0.9
S100.C	0.995	1.005	1.007	1.007	1.007	1.003	1.003	-0.62	0.54
S101.A	1.008	0.997	0.996	0.996	0.996	0.994	0.995	0.93	-0.87
S101.B	0.993	0.992	0.995	0.995	0.995	0.998	0.998	-0.85	0.9
S101.C	0.995	1.005	1.007	1.007	1.007	1.003	1.003	-0.62	0.54
S102.C	0.995	1.005	1.007	1.007	1.007	1.003	1.003	-0.62	0.54
S103.C	0.995	1.005	1.007	1.007	1.007	1.003	1.003	-0.62	0.54
S104.C	0.995	1.005	1.007	1.007	1.007	1.003	1.003	-0.62	0.54
S105.A	1.008	0.997	0.996	0.996	0.996	0.994	0.995	0.93	-0.87
S105.B	0.993	0.992	0.995	0.995	0.995	0.998	0.998	-0.85	0.9
S105.C	0.995	1.005	1.007	1.007	1.007	1.003	1.003	-0.62	0.54
S106.B	0.993	0.992	0.995	0.995	0.995	0.998	0.998	-0.85	0.9
S107.B	0.993	0.992	0.995	0.995	0.995	0.998	0.998	-0.85	0.9
S108.A	1.008	0.997	0.996	0.996	0.996	0.994	0.995	0.93	-0.87
S108.B	0.993	0.992	0.995	0.995	0.995	0.998	0.998	-0.85	0.9
S108.C	0.995	1.005	1.007	1.007	1.007	1.003	1.003	-0.62	0.54
S109.A	1.008	0.997	0.996	0.996	0.996	0.994	0.995	0.93	-0.87
S10.A	1.001	1.000	0.997	0.997	0.997	0.994	0.994	0.94	-0.97
S110.A	1.008	0.997	0.996	0.996	0.996	0.994	0.995	0.93	-0.87
S111.A	1.008	0.997	0.996	0.996	0.996	0.994	0.995	0.93	-0.87
S112.A	1.008	0.997	0.996	0.996	0.996	0.994	0.995	0.93	-0.87
S113.A	1.008	0.997	0.996	0.996	0.996	0.994	0.995	0.93	-0.87
S114.A	1.008	0.997	0.996	0.996	0.996	0.994	0.995	0.93	-0.87
S11.A	1.001	1.000	0.997	0.997	0.997	0.994	0.994	0.94	-0.97
S12.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	-0.91	0.95
S135.A	1.016	1.015	1.011	1.011	1.011	1.007	1.007	0.94	-0.97
S135.B	1.004	1.005	1.005	1.005	1.005	1.006	1.006	-0.91	0.95
S135.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	-0.93	0.97
S13.A	1.016	1.015	1.011	1.011	1.011	1.007	1.007	0.94	-0.97
S13.B	1.004	1.005	1.005	1.005	1.005	1.006	1.006	-0.91	0.95
S13.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	-0.93	0.97
S149.A	1.006	1.006	1.006	1.006	1.006	1.006	1.006	-0.27	0.42
S149.B	1.006	1.006	1.006	1.006	1.006	1.006	1.006	NaN	NaN
S149.C	1.006	1.006	1.006	1.006	1.006	1.006	1.006	-0.94	0.98
S14.A	1.001	1.000	0.997	0.997	0.997	0.994	0.994	0.94	-0.97
S151.A	1.016	1.015	1.011	1.011	1.011	1.007	1.007	0.94	-0.97
S151.B	1.004	1.005	1.005	1.005	1.005	1.006	1.006	-0.91	0.95

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S151.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	-0.93	0.97
S152.A	1.016	1.015	1.011	1.011	1.011	1.007	1.007	0.94	-0.97
S152.B	1.004	1.005	1.005	1.005	1.005	1.006	1.006	-0.91	0.95
S152.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	-0.93	0.97
S15.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	-0.93	0.97
S160.A	1.037	1.038	1.025	1.025	1.025	1.012	1.012	0.89	-0.94
S160.B	1.000	0.999	1.002	1.002	1.002	1.005	1.005	-0.87	0.91
S160.C	0.946	0.949	0.978	0.978	0.978	1.003	1.003	-0.93	0.97
S160r.A	1.004	0.993	0.993	0.993	0.993	0.993	0.993	0.84	-0.76
S160r.B	0.993	0.993	0.996	0.996	0.996	0.999	0.999	-0.87	0.91
S160r.C	0.999	1.009	1.008	1.008	1.008	1.003	1.003	-0.35	0.25
S16.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	-0.93	0.97
S17.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	-0.93	0.97
S18.A	1.016	1.015	1.011	1.011	1.011	1.007	1.007	0.94	-0.97
S18.B	1.004	1.005	1.005	1.005	1.005	1.006	1.006	-0.91	0.95
S18.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	-0.93	0.97
S197.A	1.008	0.997	0.996	0.996	0.996	0.994	0.995	0.93	-0.87
S197.B	0.993	0.992	0.995	0.995	0.995	0.998	0.998	-0.85	0.9
S197.C	0.995	1.005	1.007	1.007	1.007	1.003	1.003	-0.62	0.54
S19.A	1.016	1.015	1.011	1.011	1.011	1.007	1.007	0.94	-0.97
S1.A	1.010	1.009	1.008	1.008	1.008	1.006	1.006	0.94	-0.97
S1.B	1.006	1.006	1.006	1.006	1.006	1.006	1.006	-0.92	0.95
S1.C	0.998	0.999	1.003	1.003	1.003	1.006	1.006	-0.93	0.97
S20.A	1.016	1.015	1.011	1.011	1.011	1.007	1.007	0.94	-0.97
S21.A	1.016	1.015	1.011	1.011	1.011	1.007	1.007	0.94	-0.97
S21.B	1.004	1.005	1.005	1.005	1.005	1.006	1.006	-0.91	0.95
S21.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	-0.93	0.97
S22.B	1.004	1.005	1.005	1.005	1.005	1.006	1.006	-0.91	0.95
S23.A	1.016	1.015	1.011	1.011	1.011	1.007	1.007	0.94	-0.97
S23.B	1.004	1.005	1.005	1.005	1.005	1.006	1.006	-0.91	0.95
S23.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	-0.93	0.97
S24.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	-0.93	0.97
S250.A	1.016	1.015	1.011	1.011	1.011	1.007	1.007	0.94	-0.97
S250.B	1.004	1.005	1.005	1.005	1.005	1.006	1.006	-0.91	0.95
S250.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	-0.93	0.97
S25.A	1.016	1.015	1.011	1.011	1.011	1.007	1.007	0.94	-0.97
S25.B	1.004	1.005	1.005	1.005	1.005	1.006	1.006	-0.91	0.95
S25.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	-0.93	0.97
S25r.A	0.997	0.996	0.998	0.998	0.998	1.000	1.000	-0.80	0.86
S25r.C	1.000	1.002	1.001	1.001	1.001	0.999	0.999	0.40	-0.49

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S26.A	0.997	0.996	0.998	0.998	0.998	1.000	1.000	-0.80	0.86
S26.C	1.000	1.002	1.001	1.001	1.001	0.999	0.999	0.40	-0.49
S27.A	0.997	0.996	0.998	0.998	0.998	1.000	1.000	-0.80	0.86
S27.C	1.000	1.002	1.001	1.001	1.001	0.999	0.999	0.40	-0.49
S28.A	1.016	1.015	1.011	1.011	1.011	1.007	1.007	0.94	-0.97
S28.B	1.004	1.005	1.005	1.005	1.005	1.006	1.006	-0.91	0.95
S28.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	-0.93	0.97
S29.A	1.016	1.015	1.011	1.011	1.011	1.007	1.007	0.94	-0.97
S29.B	1.004	1.005	1.005	1.005	1.005	1.006	1.006	-0.91	0.95
S29.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	-0.93	0.97
S2.B	1.006	1.006	1.006	1.006	1.006	1.006	1.006	-0.92	0.95
S300.A	1.008	0.997	0.996	0.996	0.996	0.994	0.995	0.93	-0.87
S300.B	0.993	0.992	0.995	0.995	0.995	0.998	0.998	-0.85	0.9
S300.C	0.995	1.005	1.007	1.007	1.007	1.003	1.003	-0.62	0.54
S300 open.A	1.016	1.015	1.011	1.011	1.011	1.007	1.007	0.94	-0.97
S300 open.B	1.004	1.005	1.005	1.005	1.005	1.006	1.006	-0.91	0.95
S300 open.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	-0.93	0.97
S30.A	1.016	1.015	1.011	1.011	1.011	1.007	1.007	0.94	-0.97
S30.B	1.004	1.005	1.005	1.005	1.005	1.006	1.006	-0.91	0.95
S30.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	-0.93	0.97
S31.C	1.000	1.002	1.001	1.001	1.001	0.999	0.999	0.40	-0.49
S32.C	1.000	1.002	1.001	1.001	1.001	0.999	0.999	0.40	-0.49
S33.A	0.997	0.996	0.998	0.998	0.998	1.000	1.000	-0.80	0.86
S34.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	-0.93	0.97
S35.A	1.016	1.015	1.011	1.011	1.011	1.007	1.007	0.94	-0.97
S35.B	1.004	1.005	1.005	1.005	1.005	1.006	1.006	-0.91	0.95
S35.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	-0.93	0.97
S36.A	1.016	1.015	1.011	1.011	1.011	1.007	1.007	0.94	-0.97
S36.B	1.004	1.005	1.005	1.005	1.005	1.006	1.006	-0.91	0.95
S37.A	1.016	1.015	1.011	1.011	1.011	1.007	1.007	0.94	-0.97
S38.B	1.004	1.005	1.005	1.005	1.005	1.006	1.006	-0.91	0.95
S39.B	1.004	1.005	1.005	1.005	1.005	1.006	1.006	-0.91	0.95
S3.C	0.998	0.999	1.003	1.003	1.003	1.006	1.006	-0.93	0.97
S40.A	1.016	1.015	1.011	1.011	1.011	1.007	1.007	0.94	-0.97
S40.B	1.004	1.005	1.005	1.005	1.005	1.006	1.006	-0.91	0.95
S40.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	-0.93	0.97
S41.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	-0.93	0.97

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S42.A	1.016	1.015	1.011	1.011	1.011	1.007	1.007	0.94	-0.97
S42.B	1.004	1.005	1.005	1.005	1.005	1.006	1.006	-0.91	0.95
S42.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	-0.93	0.97
S43.B	1.004	1.005	1.005	1.005	1.005	1.006	1.006	-0.91	0.95
S44.A	1.016	1.015	1.011	1.011	1.011	1.007	1.007	0.94	-0.97
S44.B	1.004	1.005	1.005	1.005	1.005	1.006	1.006	-0.91	0.95
S44.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	-0.93	0.97
S450.A	1.008	0.997	0.996	0.996	0.996	0.994	0.995	0.93	-0.87
S450.B	0.993	0.992	0.995	0.995	0.995	0.998	0.998	-0.85	0.9
S450.C	0.995	1.005	1.007	1.007	1.007	1.003	1.003	-0.62	0.54
S45.A	1.016	1.015	1.011	1.011	1.011	1.007	1.007	0.94	-0.97
S46.A	1.016	1.015	1.011	1.011	1.011	1.007	1.007	0.94	-0.97
S47.A	1.016	1.015	1.011	1.011	1.011	1.007	1.007	0.94	-0.97
S47.B	1.004	1.005	1.005	1.005	1.005	1.006	1.006	-0.91	0.95
S47.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	-0.93	0.97
S48.A	1.016	1.015	1.011	1.011	1.011	1.007	1.007	0.94	-0.97
S48.B	1.004	1.005	1.005	1.005	1.005	1.006	1.006	-0.91	0.95
S48.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	-0.93	0.97
S49.A	1.016	1.015	1.011	1.011	1.011	1.007	1.007	0.94	-0.97
S49.B	1.004	1.005	1.005	1.005	1.005	1.006	1.006	-0.91	0.95
S49.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	-0.93	0.97
S4.C	0.998	0.999	1.003	1.003	1.003	1.006	1.006	-0.93	0.97
S50.A	1.016	1.015	1.011	1.011	1.011	1.007	1.007	0.94	-0.97
S50.B	1.004	1.005	1.005	1.005	1.005	1.006	1.006	-0.91	0.95
S50.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	-0.93	0.97
S51.A	1.016	1.015	1.011	1.011	1.011	1.007	1.007	0.94	-0.97
S51.B	1.004	1.005	1.005	1.005	1.005	1.006	1.006	-0.91	0.95
S51.C	0.982	0.984	0.995	0.995	0.995	1.005	1.005	-0.93	0.97
S52.A	1.019	1.018	1.012	1.012	1.012	1.007	1.007	0.94	-0.97
S52.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	-0.91	0.94
S52.C	0.974	0.976	0.992	0.992	0.992	1.005	1.005	-0.93	0.97
S53.A	1.021	1.020	1.013	1.013	1.013	1.007	1.007	0.94	-0.97
S53.B	1.004	1.004	1.005	1.005	1.005	1.006	1.006	-0.91	0.94
S53.C	0.970	0.973	0.990	0.990	0.990	1.005	1.005	-0.93	0.97
S54.A	1.022	1.021	1.013	1.014	1.014	1.007	1.007	0.94	-0.97
S54.B	1.003	1.004	1.005	1.005	1.005	1.006	1.006	-0.91	0.94
S54.C	0.968	0.970	0.989	0.989	0.989	1.005	1.005	-0.93	0.97
S55.A	1.022	1.021	1.013	1.014	1.014	1.007	1.007	0.94	-0.97
S55.B	1.003	1.004	1.005	1.005	1.005	1.006	1.006	-0.91	0.94
S55.C	0.968	0.970	0.989	0.989	0.989	1.005	1.005	-0.93	0.97

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S56.A	1.022	1.021	1.013	1.014	1.014	1.007	1.007	0.94	-0.97
S56.B	1.003	1.004	1.005	1.005	1.005	1.006	1.006	-0.91	0.94
S56.C	0.968	0.970	0.989	0.989	0.989	1.005	1.005	-0.93	0.97
S57.A	1.027	1.026	1.017	1.017	1.017	1.008	1.008	0.92	-0.96
S57.B	1.002	1.002	1.004	1.004	1.004	1.006	1.006	-0.89	0.93
S57.C	0.961	0.964	0.985	0.985	0.985	1.004	1.004	-0.93	0.97
S58.B	1.002	1.002	1.004	1.004	1.004	1.006	1.006	-0.89	0.93
S59.B	1.002	1.002	1.004	1.004	1.004	1.006	1.006	-0.89	0.93
S5.C	0.998	0.999	1.003	1.003	1.003	1.006	1.006	-0.93	0.97
S60.A	1.037	1.038	1.025	1.025	1.025	1.012	1.012	0.89	-0.94
S60.B	1.000	0.999	1.002	1.002	1.002	1.005	1.005	-0.87	0.91
S60.C	0.946	0.949	0.978	0.978	0.978	1.003	1.003	-0.93	0.97
S61.A	1.037	1.038	1.025	1.025	1.025	1.012	1.012	0.89	-0.94
S61.B	1.000	0.999	1.002	1.002	1.002	1.005	1.005	-0.87	0.91
S61.C	0.946	0.949	0.978	0.978	0.978	1.003	1.003	-0.93	0.97
S61s.A	1.037	1.038	1.025	1.025	1.025	1.012	1.012	0.89	-0.94
S61s.B	1.000	0.999	1.002	1.002	1.002	1.005	1.005	-0.87	0.91
S61s.C	0.946	0.949	0.978	0.978	0.978	1.003	1.003	-0.93	0.97
S62.A	1.037	1.039	1.025	1.025	1.025	1.012	1.012	0.89	-0.94
S62.B	1.001	1.000	1.002	1.002	1.002	1.005	1.005	-0.85	0.9
S62.C	0.941	0.945	0.976	0.976	0.976	1.003	1.003	-0.93	0.97
S63.A	1.038	1.039	1.025	1.025	1.025	1.012	1.012	0.89	-0.94
S63.B	1.001	1.001	1.003	1.003	1.003	1.005	1.005	-0.84	0.89
S63.C	0.938	0.942	0.974	0.974	0.974	1.003	1.003	-0.93	0.97
S64.A	1.039	1.040	1.026	1.026	1.026	1.012	1.012	0.89	-0.94
S64.B	1.002	1.002	1.003	1.003	1.003	1.005	1.005	-0.79	0.84
S64.C	0.932	0.936	0.971	0.971	0.971	1.003	1.002	-0.93	0.97
S65.A	1.040	1.041	1.026	1.026	1.026	1.012	1.012	0.89	-0.94
S65.B	1.004	1.003	1.004	1.004	1.004	1.005	1.005	-0.63	0.69
S65.C	0.924	0.929	0.968	0.967	0.967	1.002	1.002	-0.93	0.97
S66.A	1.040	1.042	1.026	1.027	1.027	1.012	1.012	0.89	-0.94
S66.B	1.005	1.004	1.004	1.004	1.004	1.005	1.005	-0.20	0.26
S66.C	0.919	0.924	0.965	0.965	0.965	1.002	1.002	-0.93	0.97
S67.A	1.008	0.997	0.996	0.996	0.996	0.994	0.995	0.93	-0.87
S67.B	0.993	0.992	0.995	0.995	0.995	0.998	0.998	-0.85	0.9
S67.C	0.995	1.005	1.007	1.007	1.007	1.003	1.003	-0.62	0.54
S68.A	1.008	0.997	0.996	0.996	0.996	0.994	0.995	0.93	-0.87
S69.A	1.008	0.997	0.996	0.996	0.996	0.994	0.995	0.93	-0.87
S6.C	0.998	0.999	1.003	1.003	1.003	1.006	1.006	-0.93	0.97
S70.A	1.008	0.997	0.996	0.996	0.996	0.994	0.995	0.93	-0.87

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S71.A	1.008	0.997	0.996	0.996	0.996	0.994	0.995	0.93	-0.87
S72.A	1.010	1.000	0.998	0.998	0.998	0.996	0.996	0.97	-0.93
S72.B	0.992	0.992	0.995	0.995	0.995	0.998	0.998	-0.85	0.9
S72.C	0.993	1.003	1.005	1.005	1.005	1.003	1.002	-0.77	0.7
S73.C	0.993	1.003	1.005	1.005	1.005	1.003	1.002	-0.77	0.7
S74.C	0.993	1.003	1.005	1.005	1.005	1.003	1.002	-0.77	0.7
S75.C	0.993	1.003	1.005	1.005	1.005	1.003	1.002	-0.77	0.7
S76.A	1.012	1.003	0.999	1.000	1.000	0.997	0.997	0.99	-0.95
S76.B	0.992	0.991	0.994	0.994	0.994	0.998	0.998	-0.84	0.89
S76.C	0.991	1.001	1.004	1.004	1.004	1.002	1.002	-0.84	0.79
S77.A	1.014	1.005	1.000	1.001	1.001	0.997	0.997	1.00	-0.97
S77.B	0.992	0.991	0.994	0.994	0.994	0.998	0.998	-0.84	0.89
S77.C	0.987	0.997	1.002	1.002	1.002	1.002	1.002	-0.93	0.89
S78.A	1.015	1.005	1.001	1.001	1.001	0.997	0.997	1.00	-0.97
S78.B	0.992	0.991	0.994	0.994	0.994	0.998	0.998	-0.84	0.89
S78.C	0.986	0.996	1.002	1.002	1.002	1.002	1.002	-0.94	0.91
S79.A	1.015	1.005	1.001	1.001	1.001	0.997	0.997	1.00	-0.97
S79.B	0.992	0.991	0.994	0.994	0.994	0.998	0.998	-0.84	0.89
S79.C	0.986	0.996	1.002	1.002	1.002	1.002	1.002	-0.94	0.91
S7.A	1.012	1.011	1.009	1.009	1.009	1.006	1.006	0.94	-0.97
S7.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	-0.91	0.95
S7.C	0.992	0.993	1.000	1.000	1.000	1.006	1.006	-0.93	0.97
S80.A	1.017	1.008	1.002	1.002	1.002	0.997	0.997	1.00	-0.99
S80.B	0.991	0.991	0.994	0.994	0.994	0.998	0.998	-0.84	0.89
S80.C	0.981	0.992	1.000	1.000	1.000	1.002	1.002	-0.98	0.96
S81.A	1.018	1.009	1.002	1.002	1.002	0.997	0.997	1.00	-0.99
S81.B	0.991	0.991	0.994	0.994	0.994	0.998	0.998	-0.84	0.89
S81.C	0.980	0.991	0.999	0.999	0.999	1.002	1.002	-0.98	0.97
S82.A	1.018	1.009	1.002	1.002	1.002	0.997	0.997	1.00	-0.99
S82.B	0.991	0.991	0.994	0.994	0.994	0.998	0.998	-0.84	0.89
S82.C	0.980	0.991	0.999	0.999	0.999	1.002	1.002	-0.98	0.97
S83.A	1.018	1.009	1.002	1.002	1.002	0.997	0.997	1.00	-0.99
S83.B	0.991	0.991	0.994	0.994	0.994	0.998	0.998	-0.84	0.89
S83.C	0.980	0.991	0.999	0.999	0.999	1.002	1.002	-0.98	0.97
S84.C	0.967	0.979	0.993	0.993	0.993	1.001	1.001	-0.99	1
S85.C	0.958	0.970	0.989	0.989	0.989	1.001	1.001	-0.99	1
S86.A	1.015	1.008	1.004	1.004	1.004	1.000	1.000	1.00	-0.99
S86.B	0.991	0.990	0.993	0.993	0.993	0.997	0.997	-0.82	0.88
S86.C	0.991	1.000	1.004	1.004	1.004	1.002	1.002	-0.84	0.79
S87.A	1.017	1.012	1.006	1.006	1.006	1.002	1.002	0.99	-1

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Node	Voltage magnitude $V(t_k, t_{k+1})$ in pu							$\rho(V_i, V_{S66.C})$	$\rho(V_i, V_{S85.C})$
	t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min		
S87.B	0.991	0.989	0.993	0.993	0.993	0.997	0.997	-0.81	0.87
S87.C	0.991	1.000	1.003	1.003	1.003	1.002	1.001	-0.84	0.79
S88.A	1.017	1.012	1.006	1.006	1.006	1.002	1.002	0.99	-1
S89.A	1.018	1.014	1.008	1.008	1.008	1.003	1.003	0.98	-1
S89.B	0.990	0.989	0.992	0.992	0.992	0.997	0.997	-0.80	0.86
S89.C	0.991	1.000	1.003	1.003	1.003	1.001	1.001	-0.84	0.79
S8.A	1.014	1.013	1.010	1.010	1.010	1.006	1.007	0.94	-0.97
S8.B	1.005	1.005	1.006	1.006	1.006	1.006	1.006	-0.91	0.95
S8.C	0.988	0.989	0.998	0.998	0.998	1.006	1.005	-0.93	0.97
S90.B	0.990	0.989	0.992	0.992	0.992	0.997	0.997	-0.80	0.86
S91.A	1.019	1.016	1.009	1.010	1.010	1.004	1.004	0.98	-0.99
S91.B	0.990	0.988	0.992	0.992	0.992	0.997	0.997	-0.80	0.86
S91.C	0.991	1.000	1.003	1.003	1.003	1.001	1.001	-0.84	0.79
S92.C	0.991	1.000	1.003	1.003	1.003	1.001	1.001	-0.84	0.79
S93.A	1.020	1.017	1.011	1.011	1.011	1.005	1.005	0.96	-0.99
S93.B	0.990	0.988	0.992	0.992	0.992	0.996	0.996	-0.79	0.85
S93.C	0.991	0.999	1.003	1.003	1.003	1.001	1.001	-0.84	0.79
S94.A	1.022	1.021	1.013	1.014	1.014	1.007	1.007	0.94	-0.97
S95.A	1.020	1.017	1.011	1.011	1.011	1.005	1.005	0.96	-0.99
S95.B	0.990	0.988	0.992	0.992	0.992	0.996	0.996	-0.79	0.85
S95.C	0.991	0.999	1.003	1.003	1.003	1.001	1.001	-0.84	0.79
S96.B	0.990	0.988	0.992	0.992	0.992	0.996	0.996	-0.79	0.85
S97.A	1.008	0.997	0.996	0.996	0.996	0.994	0.995	0.93	-0.87
S97.B	0.993	0.992	0.995	0.995	0.995	0.998	0.998	-0.85	0.9
S97.C	0.995	1.005	1.007	1.007	1.007	1.003	1.003	-0.62	0.54
S98.A	1.008	0.997	0.996	0.996	0.996	0.994	0.995	0.93	-0.87
S98.B	0.993	0.992	0.995	0.995	0.995	0.998	0.998	-0.85	0.9
S98.C	0.995	1.005	1.007	1.007	1.007	1.003	1.003	-0.62	0.54
S99.A	1.008	0.997	0.996	0.996	0.996	0.994	0.995	0.93	-0.87
S99.B	0.993	0.992	0.995	0.995	0.995	0.998	0.998	-0.85	0.9
S99.C	0.995	1.005	1.007	1.007	1.007	1.003	1.003	-0.62	0.54
S9.A	1.014	1.013	1.010	1.010	1.010	1.006	1.007	0.94	-0.97
S9r.A	1.001	1.000	0.997	0.997	0.997	0.994	0.994	0.94	-0.97

Appendix G

Results of simulations scenarios presented on Chapter 3 - Impedance and electric distance

G.0.1 Considering OLTCs connected without capacitors compensation in radial configuration

Table G.1: Impedance obtained for Scenario S1

Impedance (Ω)					
149.A	2.40e+4	149.B	2.57e+4	85.C	0.00e+0
1.A	2.43e+4	1.B	2.60e+4	84.C	2.00e-1
7.A	2.46e+4	7.B	2.63e+4	60.C	4.00e-1
8.A	2.47e+4	8.B	2.64e+4	160.C	4.00e-1
13.A	2.55e+4	13.B	2.68e+4	81.C	4.00e-1
152.A	3.21e+4	152.B	3.33e+4	80.C	4.00e-1
52.A	3.26e+4	52.B	3.38e+4	57.C	5.00e-1
53.A	3.29e+4	53.B	3.41e+4	78.C	5.00e-1
54.A	3.30e+4	54.B	3.43e+4	77.C	6.00e-1
57.A	3.41e+4	57.B	3.55e+4	54.C	6.00e-1
60.A	3.52e+4	60.B	3.70e+4	53.C	6.00e-1
62.A	7.39e+4	62.B	7.39e+4	76.C	7.00e-1
160r.A	8.37e+4	63.B	8.57e+4	52.C	7.00e-1
63.A	8.57e+4	160r.B	9.63e+4	72.C	7.00e-1
160.A	8.58e+4	160.B	9.75e+4	13.C	7.00e-1
67.A	8.66e+4	67.B	9.96e+4	152.C	8.00e-1
64.A	1.26e+5	64.B	1.26e+5	67.C	8.00e-1
18.A	1.40e+5	18.B	1.54e+5	8.C	8.00e-1
97.A	1.86e+5	97.B	2.10e+5	160r.C	8.00e-1

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Impedance (Ω)					
72.A	2.05e+5	72.B	2.13e+5	7.C	9.00e-1
76.A	2.14e+5	76.B	2.24e+5	1.C	9.00e-1
135.A	2.75e+5	135.B	2.34e+5	149.C	1.00e+0
197.A	2.88e+5	35.B	2.57e+5	62.C	7.39e+4
65.A	2.90e+5	65.B	2.90e+5	63.C	8.57e+4
35.A	3.00e+5	40.B	3.80e+5	64.C	1.26e+5
101.A	3.10e+5	197.B	3.81e+5	18.C	1.53e+5
105.A	3.38e+5	101.B	4.26e+5	97.C	1.85e+5
21.A	3.64e+5	42.B	4.26e+5	65.C	2.90e+5
108.A	3.80e+5	105.B	4.90e+5	135.C	3.17e+5
23.A	4.07e+5	21.B	5.13e+5	197.C	3.23e+5
40.A	4.40e+5	98.B	5.44e+5	21.C	3.24e+5
25.A	4.69e+5	86.B	5.54e+5	23.C	3.56e+5
42.A	4.98e+5	44.B	5.62e+5	101.C	3.57e+5
86.A	5.18e+5	47.B	6.62e+5	35.C	3.65e+5
44.A	5.56e+5	77.B	6.74e+5	40.C	4.02e+5
98.A	6.10e+5	78.B	7.23e+5	25.C	4.72e+5
77.A	6.21e+5	87.B	7.40e+5	42.C	4.98e+5
78.A	6.66e+5	23.B	7.54e+5	86.C	5.08e+5
87.A	6.95e+5	99.B	8.17e+5	98.C	5.08e+5
109.A	7.58e+5	108.B	8.98e+5	44.C	5.53e+5
47.A	8.37e+5	49.B	9.27e+5	105.C	6.33e+5
110.A	9.05e+5	89.B	9.31e+5	47.C	6.42e+5
99.A	9.16e+5	25.B	9.51e+5	87.C	6.97e+5
89.A	9.86e+5	100.B	1.12e+6	99.C	7.62e+5
28.A	9.99e+5	28.B	1.18e+6	108.C	8.38e+5
25r.A	1.09e+6	50.B	1.24e+6	49.C	8.99e+5
49.A	1.17e+6	80.B	1.47e+6	89.C	9.04e+5
100.A	1.26e+6	91.B	1.49e+6	100.C	1.05e+6
91.A	1.30e+6	29.B	1.82e+6	28.C	1.06e+6
80.A	1.36e+6	51.B	1.85e+6	25r.C	1.06e+6
9r.A	1.52e+6	81.B	1.99e+6	91.C	1.19e+6
29.A	1.54e+6	93.B	2.25e+6	50.C	1.20e+6
9.A	1.55e+6	36.B	2.44e+6	102.C	1.37e+6
50.A	1.56e+6	106.B	2.44e+6	26.C	1.61e+6
68.A	1.60e+6	55.B	3.07e+6	29.C	1.64e+6
112.A	1.65e+6	82.B	3.98e+6	34.C	1.70e+6
26.A	1.66e+6	38.B	4.31e+6	51.C	1.80e+6
81.A	1.84e+6	30.B	4.99e+6	3.C	1.81e+6
93.A	1.91e+6	58.B	5.61e+6	73.C	1.87e+6
69.A	2.34e+6	95.B	7.01e+6	15.C	1.93e+6
51.A	2.34e+6	61s.B	1.72e+8	103.C	2.00e+6
27.A	2.80e+6	61.B	1.73e+8	93.C	2.80e+6

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Impedance (Ω)					
14.A	2.80e+6	151.B	1.67e+11	82.C	3.35e+6
55.A	3.31e+6	48.B	8.77e+13	74.C	3.51e+6
82.A	3.68e+6	66.B	2.20e+14	55.C	3.61e+6
30.A	4.25e+6	83.B	2.44e+14	30.C	4.51e+6
19.A	4.31e+6	250.B	2.65e+14	31.C	4.67e+6
113.A	4.31e+6	56.B	2.88e+14	5.C	5.61e+6
45.A	4.67e+6	96.B	3.19e+14	61s.C	1.67e+8
36.A	4.67e+6	59.B	4.69e+14	61.C	1.71e+8
70.A	5.10e+6	12.B	5.94e+14	151.C	1.37e+11
61s.A	1.75e+8	2.B	6.64e+14	48.C	7.34e+13
61.A	1.75e+8	450.B	8.32e+14	83.C	1.61e+14
151.A	3.19e+10	79.B	1.31e+15	66.C	3.02e+14
48.A	6.40e+13	90.B	1.32e+15	79.C	3.24e+14
83.A	7.46e+13	300.B	1.86e+15	56.C	3.26e+14
79.A	2.23e+14	22.B	2.65e+15	450.C	3.27e+14
66.A	3.85e+14	39.B	2.65e+15	250.C	3.28e+14
71.A	4.71e+14	107.B	5.26e+15	16.C	5.25e+14
88.A	4.72e+14	300_open.B	Inf	92.C	5.82e+14
114.A	5.96e+14	43.B	Inf	95.C	6.51e+14
250.A	5.97e+14			6.C	6.62e+14
95.A	6.47e+14			75.C	7.24e+14
94.A	6.67e+14			32.C	8.81e+14
56.A	6.70e+14			300.C	9.25e+14
300.A	7.94e+14			104.C	1.17e+15
450.A	1.29e+15			17.C	2.63e+15
111.A	1.33e+15			24.C	2.63e+15
37.A	1.34e+15			27.C	Inf
46.A	1.34e+15			300_open.C	Inf
10.A	Inf			41.C	Inf
11.A	Inf			4.C	Inf
20.A	Inf				
300_open.A	Inf				
33.A	Inf				
94_open.A	Inf				

Table G.2: Electric distance obtained for Scenario S1

Electric distance with loads					
68.A	0.7	81.B	2.1	85.C	0
81.A	2.2	80.B	2.1	84.C	0.1
80.A	2.2	82.B	2.1	81.C	0.3
82.A	2.2	83.B	2.2	80.C	0.3

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Electric distance with loads					
83.A	2.3	78.B	2.2	82.C	0.4
78.A	2.3	77.B	2.2	83.C	0.4
77.A	2.4	79.B	2.3	78.C	0.4
79.A	2.4	76.B	2.3	77.C	0.5
76.A	2.5	72.B	2.4	79.C	0.5
72.A	2.6	36.B	2.4	76.C	0.6
67.A	2.7	86.B	2.5	72.C	0.6
86.A	2.7	97.B	2.5	73.C	0.7
97.A	2.7	197.B	2.5	86.C	0.7
197.A	2.7	60.B	2.6	97.C	0.8
87.A	2.8	160.B	2.6	197.C	0.8
101.A	2.8	160r.B	2.6	160r.C	0.8
98.A	2.8	87.B	2.6	160.C	0.8
60.A	2.8	101.B	2.6	60.C	0.8
160.A	2.8	98.B	2.6	87.C	0.8
160r.A	2.8	89.B	2.6	101.C	0.8
88.A	2.8	62.B	2.7	98.C	0.8
89.A	2.8	91.B	2.7	74.C	0.9
69.A	2.8	105.B	2.7	89.C	0.9
105.A	2.9	90.B	2.7	62.C	0.9
91.A	2.9	93.B	2.7	105.C	0.9
62.A	2.9	63.B	2.7	102.C	0.9
93.A	2.9	67.B	2.7	91.C	0.9
99.A	2.9	61.B	2.7	63.C	1
108.A	2.9	61s.B	2.7	93.C	1
63.A	3	99.B	2.8	99.C	1
95.A	3	108.B	2.8	61.C	1
70.A	3	106.B	2.8	61s.C	1
61.A	3	95.B	2.8	108.C	1
61s.A	3	96.B	2.8	75.C	1
94.A	3	100.B	2.8	92.C	1
100.A	3	64.B	2.8	95.C	1
71.A	3.1	57.B	2.9	103.C	1
64.A	3.1	107.B	3	100.C	1
109.A	3.1	300.B	3	64.C	1.1
57.A	3.1	65.B	3	57.C	1.1
300.A	3.1	450.B	3	300.C	1.2
450.A	3.2	66.B	3.1	450.C	1.2
110.A	3.2	58.B	3.1	65.C	1.2
65.A	3.2	54.B	3.1	104.C	1.2
112.A	3.2	53.B	3.2	54.C	1.3
66.A	3.3	59.B	3.2	66.C	1.3
111.A	3.3	55.B	3.3	53.C	1.3

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Electric distance with loads					
54.A	3.3	52.B	3.3	55.C	1.4
94_open.A	3.3	56.B	3.4	52.C	1.4
113.A	3.3	13.B	3.6	56.C	1.5
53.A	3.4	152.B	3.6	152.C	1.7
114.A	3.4	8.B	3.9	13.C	1.7
55.A	3.5	18.B	4.1	34.C	1.9
52.A	3.5	135.B	4.1	15.C	2
56.A	3.6	7.B	4.1	8.C	2
13.A	3.8	12.B	4.2	18.C	2.3
152.A	3.8	21.B	4.3	135.C	2.3
8.A	4.1	35.B	4.3	7.C	2.3
18.A	4.3	23.B	4.4	17.C	2.3
135.A	4.3	40.B	4.4	16.C	2.3
7.A	4.3	25.B	4.5	21.C	2.4
9.A	4.4	42.B	4.5	67.C	2.5
9r.A	4.4	28.B	4.5	23.C	2.5
21.A	4.5	44.B	4.6	40.C	2.5
35.A	4.5	22.B	4.6	25.C	2.6
19.A	4.5	47.B	4.6	25r.C	2.6
36.A	4.5	29.B	4.6	42.C	2.6
23.A	4.6	38.B	4.7	28.C	2.7
40.A	4.6	48.B	4.7	44.C	2.7
25.A	4.7	1.B	4.7	41.C	2.7
25r.A	4.7	49.B	4.7	26.C	2.7
42.A	4.7	43.B	4.7	47.C	2.8
20.A	4.7	30.B	4.7	29.C	2.8
28.A	4.7	50.B	4.8	24.C	2.8
44.A	4.7	250.B	4.8	27.C	2.8
26.A	4.8	39.B	4.8	48.C	2.8
29.A	4.8	51.B	4.8	31.C	2.8
47.A	4.8	151.B	5	1.C	2.8
45.A	4.8	300_open.B	5	49.C	2.8
14.A	4.9	2.B	5.2	30.C	2.9
27.A	4.9	149.B	33.4	50.C	2.9
48.A	4.9			250.C	2.9
37.A	4.9			32.C	2.9
49.A	4.9			51.C	3
1.A	4.9			151.C	3.1
30.A	4.9			300_open.C	3.1
50.A	5			3.C	3.5
46.A	5			4.C	3.9
250.A	5			5.C	4
51.A	5			6.C	4.3

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Electric distance with loads					
10.A	5			35.C	4.7
11.A	5			149.C	9.3
33.A	5.1				
151.A	5.1				
300_open.A	5.1				
149.A	33.5				

Table G.3: Impedance obtained for Scenario S2

Impedance (Ω)					
149.A	2.42e+4	149.B	2.56e+4	85.C	0.00e+0
1.A	2.44e+4	1.B	2.60e+4	84.C	2.00e-1
7.A	2.46e+4	7.B	2.63e+4	81.C	4.00e-1
8.A	2.47e+4	8.B	2.65e+4	80.C	4.00e-1
13.A	2.54e+4	13.B	2.69e+4	60.C	5.00e-1
152.A	3.20e+4	152.B	3.34e+4	160.C	5.00e-1
52.A	3.24e+4	52.B	3.40e+4	57.C	5.00e-1
53.A	3.26e+4	53.B	3.43e+4	78.C	5.00e-1
54.A	3.27e+4	54.B	3.44e+4	54.C	6.00e-1
57.A	3.37e+4	57.B	3.57e+4	77.C	6.00e-1
60.A	3.44e+4	60.B	3.74e+4	53.C	6.00e-1
62.A	7.39e+4	62.B	7.39e+4	52.C	6.00e-1
160.A	8.19e+4	63.B	8.57e+4	13.C	6.00e-1
160r.A	8.29e+4	160r.B	9.73e+4	152.C	6.00e-1
67.A	8.55e+4	160.B	9.97e+4	76.C	7.00e-1
63.A	8.57e+4	67.B	1.01e+5	8.C	7.00e-1
64.A	1.26e+5	64.B	1.26e+5	72.C	7.00e-1
18.A	1.39e+5	18.B	1.54e+5	7.C	7.00e-1
97.A	1.84e+5	97.B	2.12e+5	67.C	8.00e-1
72.A	2.01e+5	72.B	2.15e+5	1.C	8.00e-1
76.A	2.09e+5	76.B	2.26e+5	149.C	8.00e-1
135.A	2.74e+5	135.B	2.34e+5	160r.C	8.00e-1
197.A	2.85e+5	35.B	2.57e+5	62.C	7.39e+4
65.A	2.90e+5	65.B	2.90e+5	63.C	8.57e+4
35.A	2.99e+5	40.B	3.81e+5	64.C	1.26e+5
101.A	3.07e+5	197.B	3.85e+5	18.C	1.55e+5
105.A	3.36e+5	42.B	4.27e+5	97.C	1.88e+5
21.A	3.58e+5	101.B	4.31e+5	65.C	2.90e+5
108.A	3.78e+5	105.B	4.95e+5	135.C	3.20e+5
23.A	4.00e+5	21.B	5.13e+5	197.C	3.27e+5
40.A	4.38e+5	98.B	5.52e+5	21.C	3.30e+5
25.A	4.61e+5	86.B	5.59e+5	101.C	3.61e+5

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Impedance (Ω)					
42.A	4.97e+5	44.B	5.63e+5	23.C	3.63e+5
86.A	5.07e+5	47.B	6.64e+5	35.C	3.68e+5
44.A	5.55e+5	77.B	6.82e+5	40.C	4.05e+5
98.A	6.01e+5	78.B	7.31e+5	25.C	4.84e+5
77.A	6.04e+5	87.B	7.46e+5	42.C	5.03e+5
78.A	6.47e+5	23.B	7.55e+5	86.C	5.13e+5
87.A	6.81e+5	99.B	8.28e+5	98.C	5.17e+5
109.A	7.58e+5	108.B	9.11e+5	44.C	5.59e+5
47.A	8.36e+5	49.B	9.30e+5	105.C	6.43e+5
99.A	9.01e+5	89.B	9.38e+5	47.C	6.49e+5
110.A	9.05e+5	25.B	9.52e+5	87.C	7.05e+5
89.A	9.66e+5	100.B	1.14e+6	99.C	7.75e+5
28.A	9.87e+5	28.B	1.18e+6	108.C	8.52e+5
25r.A	1.09e+6	50.B	1.24e+6	49.C	9.09e+5
49.A	1.17e+6	80.B	1.49e+6	89.C	9.13e+5
100.A	1.24e+6	91.B	1.50e+6	25r.C	1.06e+6
91.A	1.28e+6	29.B	1.82e+6	100.C	1.07e+6
80.A	1.31e+6	51.B	1.86e+6	28.C	1.07e+6
9r.A	1.52e+6	81.B	2.01e+6	91.C	1.20e+6
29.A	1.53e+6	93.B	2.27e+6	50.C	1.21e+6
9.A	1.53e+6	106.B	2.44e+6	102.C	1.37e+6
50.A	1.56e+6	36.B	2.44e+6	26.C	1.60e+6
68.A	1.60e+6	55.B	3.08e+6	29.C	1.65e+6
112.A	1.65e+6	82.B	4.03e+6	34.C	1.70e+6
26.A	1.66e+6	38.B	4.31e+6	3.C	1.81e+6
81.A	1.77e+6	30.B	5.00e+6	51.C	1.82e+6
93.A	1.88e+6	58.B	5.61e+6	73.C	1.87e+6
69.A	2.34e+6	95.B	7.01e+6	15.C	1.93e+6
51.A	2.34e+6	61.B	1.71e+8	103.C	2.00e+6
27.A	2.80e+6	61.B	1.73e+8	93.C	2.83e+6
14.A	2.80e+6	151.B	1.67e+11	82.C	3.42e+6
55.A	3.26e+6	250.B	8.07e+13	74.C	3.51e+6
82.A	3.54e+6	48.B	1.85e+14	55.C	3.66e+6
30.A	4.20e+6	96.B	2.95e+14	30.C	4.53e+6
19.A	4.31e+6	79.B	2.96e+14	31.C	4.67e+6
113.A	4.31e+6	83.B	3.21e+14	5.C	5.61e+6
45.A	4.67e+6	39.B	3.33e+14	61.C	1.73e+8
36.A	4.67e+6	56.B	4.21e+14	61.C	1.75e+8
70.A	5.10e+6	90.B	5.91e+14	151.C	1.37e+11
61.A	1.71e+8	12.B	5.95e+14	83.C	1.36e+14
61.A	1.71e+8	107.B	6.60e+14	56.C	1.52e+14
151.A	3.19e+10	300.B	6.60e+14	27.C	1.60e+14
83.A	1.24e+14	22.B	6.65e+14	79.C	1.68e+14

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Impedance (Ω)					
48.A	2.09e+14	66.B	1.07e+15	48.C	1.68e+14
250.A	2.20e+14	450.B	1.32e+15	450.C	2.61e+14
79.A	2.61e+14	59.B	1.33e+15	95.C	2.99e+14
56.A	2.63e+14	43.B	2.66e+15	250.C	3.37e+14
95.A	3.63e+14	2.B	Inf	41.C	5.39e+14
94.A	4.62e+14	300_open.B	Inf	300.C	6.45e+14
71.A	4.64e+14			16.C	6.54e+14
66.A	5.01e+14			66.C	9.17e+14
300.A	5.22e+14			24.C	1.21e+15
20.A	5.90e+14			32.C	1.32e+15
10.A	6.57e+14			75.C	1.33e+15
11.A	6.57e+14			6.C	1.33e+15
111.A	9.28e+14			92.C	1.34e+15
46.A	9.34e+14			17.C	2.69e+15
114.A	1.31e+15			104.C	5.32e+15
33.A	1.32e+15			300_open.C	Inf
450.A	2.62e+15			4.C	Inf
300_open.A	Inf				
37.A	Inf				
88.A	Inf				
94_open.A	Inf				

Table G.4: Electric distance obtained for Scenario S2

Electric distance with loads					
68.A	0.7	81.B	2.1	85.C	0
81.A	2.2	80.B	2.1	84.C	0.1
80.A	2.2	82.B	2.1	81.C	0.3
82.A	2.2	83.B	2.2	80.C	0.3
83.A	2.3	78.B	2.2	82.C	0.4
78.A	2.3	77.B	2.2	83.C	0.4
77.A	2.4	79.B	2.3	78.C	0.4
79.A	2.4	76.B	2.3	77.C	0.5
76.A	2.5	72.B	2.4	79.C	0.5
72.A	2.6	36.B	2.4	76.C	0.6
67.A	2.7	86.B	2.5	72.C	0.6
86.A	2.7	97.B	2.6	73.C	0.7
97.A	2.7	197.B	2.6	86.C	0.7
197.A	2.7	60.B	2.6	97.C	0.8
87.A	2.8	160.B	2.6	197.C	0.8
101.A	2.8	160r.B	2.6	160r.C	0.8
98.A	2.8	87.B	2.6	160.C	0.8

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Electric distance with loads					
60.A	2.8	101.B	2.6	60.C	0.8
160.A	2.8	98.B	2.6	87.C	0.8
160r.A	2.8	89.B	2.6	101.C	0.8
88.A	2.8	62.B	2.7	98.C	0.9
89.A	2.8	91.B	2.7	74.C	0.9
69.A	2.8	105.B	2.7	89.C	0.9
105.A	2.9	90.B	2.7	62.C	0.9
91.A	2.9	93.B	2.7	105.C	0.9
62.A	2.9	63.B	2.7	91.C	0.9
93.A	2.9	67.B	2.7	102.C	0.9
99.A	2.9	61.B	2.7	63.C	1
108.A	2.9	61.B	2.7	93.C	1
95.A	3	99.B	2.8	61.C	1
63.A	3	108.B	2.8	61.C	1
70.A	3	106.B	2.8	99.C	1
61.A	3	95.B	2.8	108.C	1
61.A	3	96.B	2.8	75.C	1
94.A	3	100.B	2.8	92.C	1
100.A	3	64.B	2.8	95.C	1
71.A	3.1	57.B	2.9	103.C	1
109.A	3.1	107.B	3	100.C	1.1
64.A	3.1	65.B	3	64.C	1.1
300.A	3.1	300.B	3	57.C	1.1
57.A	3.1	450.B	3	300.C	1.2
450.A	3.1	66.B	3.1	450.C	1.2
110.A	3.2	58.B	3.1	65.C	1.2
112.A	3.2	54.B	3.1	104.C	1.3
65.A	3.2	53.B	3.2	54.C	1.3
66.A	3.3	59.B	3.2	66.C	1.3
111.A	3.3	55.B	3.3	53.C	1.3
113.A	3.3	52.B	3.3	55.C	1.4
54.A	3.3	56.B	3.4	52.C	1.4
94_open.A	3.3	13.B	3.6	56.C	1.5
53.A	3.4	152.B	3.6	152.C	1.7
114.A	3.4	8.B	3.9	13.C	1.7
55.A	3.5	18.B	4.1	34.C	1.9
52.A	3.5	135.B	4.1	15.C	2
56.A	3.6	7.B	4.1	8.C	2
13.A	3.8	12.B	4.2	18.C	2.3
152.A	3.8	21.B	4.3	135.C	2.3
8.A	4.1	35.B	4.3	7.C	2.3
18.A	4.3	23.B	4.4	17.C	2.3
135.A	4.3	40.B	4.4	16.C	2.3

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Electric distance with loads					
7.A	4.3	25.B	4.5	21.C	2.4
9.A	4.4	42.B	4.5	67.C	2.5
9r.A	4.4	28.B	4.5	23.C	2.5
21.A	4.5	44.B	4.6	40.C	2.5
35.A	4.5	22.B	4.6	25.C	2.6
19.A	4.5	47.B	4.6	25r.C	2.6
36.A	4.5	29.B	4.6	42.C	2.6
23.A	4.6	38.B	4.7	28.C	2.7
40.A	4.6	48.B	4.7	44.C	2.7
25.A	4.7	1.B	4.7	41.C	2.7
25r.A	4.7	49.B	4.7	26.C	2.7
42.A	4.7	43.B	4.7	47.C	2.8
20.A	4.7	30.B	4.7	29.C	2.8
28.A	4.7	50.B	4.8	24.C	2.8
44.A	4.7	250.B	4.8	27.C	2.8
26.A	4.8	39.B	4.8	48.C	2.8
29.A	4.8	51.B	4.8	31.C	2.8
47.A	4.8	151.B	5	1.C	2.8
45.A	4.8	300_open.B	5	49.C	2.8
14.A	4.9	2.B	5.2	30.C	2.9
27.A	4.9	149.B	33.4	50.C	2.9
48.A	4.9			250.C	2.9
37.A	4.9			32.C	2.9
49.A	4.9			51.C	3
1.A	4.9			151.C	3.1
30.A	4.9			300_open.C	3.1
50.A	5			3.C	3.5
46.A	5			4.C	3.9
250.A	5			5.C	4
51.A	5			6.C	4.3
10.A	5			35.C	4.7
11.A	5			149.C	9.3
33.A	5.1				
151.A	5.1				
300_open.A	5.1				
149.A	33.5				

Table G.5: Impedance obtained for Scenario S3

Impedance (Ω)					
149.A	2.40e+4	149.B	2.56e+4	66.C	0.00e+0
1.A	2.43e+4	1.B	2.59e+4	65.C	1.00e-1

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Impedance (Ω)					
7.A	2.46e+4	7.B	2.62e+4	64.C	2.00e-1
8.A	2.47e+4	8.B	2.64e+4	63.C	4.00e-1
13.A	2.55e+4	13.B	2.68e+4	62.C	4.00e-1
152.A	3.21e+4	152.B	3.33e+4	60.C	5.00e-1
52.A	3.26e+4	52.B	3.38e+4	57.C	6.00e-1
53.A	3.28e+4	53.B	3.41e+4	54.C	7.00e-1
54.A	3.30e+4	54.B	3.42e+4	53.C	7.00e-1
57.A	3.41e+4	57.B	3.55e+4	52.C	8.00e-1
60.A	3.51e+4	60.B	3.70e+4	152.C	8.00e-1
62.A	7.38e+4	62.B	7.38e+4	13.C	8.00e-1
160r.A	8.37e+4	63.B	8.55e+4	8.C	9.00e-1
63.A	8.56e+4	160r.B	9.63e+4	7.C	9.00e-1
160.A	8.59e+4	160.B	9.75e+4	1.C	1.00e+0
67.A	8.65e+4	67.B	9.96e+4	149.C	1.10e+0
64.A	1.26e+5	64.B	1.26e+5	160.C	7.29e+4
18.A	1.40e+5	18.B	1.54e+5	160r.C	7.57e+4
97.A	1.85e+5	97.B	2.10e+5	67.C	7.81e+4
72.A	2.05e+5	72.B	2.13e+5	72.C	1.47e+5
76.A	2.13e+5	76.B	2.24e+5	18.C	1.53e+5
135.A	2.75e+5	135.B	2.34e+5	76.C	1.71e+5
197.A	2.88e+5	35.B	2.57e+5	97.C	1.86e+5
65.A	2.90e+5	65.B	2.90e+5	135.C	3.17e+5
35.A	3.00e+5	40.B	3.80e+5	197.C	3.23e+5
101.A	3.10e+5	197.B	3.81e+5	21.C	3.24e+5
105.A	3.38e+5	101.B	4.26e+5	23.C	3.56e+5
21.A	3.64e+5	42.B	4.26e+5	101.C	3.58e+5
108.A	3.80e+5	105.B	4.90e+5	35.C	3.65e+5
23.A	4.07e+5	21.B	5.13e+5	77.C	3.89e+5
40.A	4.40e+5	98.B	5.44e+5	40.C	4.02e+5
25.A	4.69e+5	86.B	5.55e+5	78.C	4.08e+5
42.A	4.98e+5	44.B	5.62e+5	25.C	4.73e+5
86.A	5.16e+5	47.B	6.62e+5	42.C	4.98e+5
44.A	5.56e+5	77.B	6.75e+5	98.C	5.09e+5
98.A	6.10e+5	78.B	7.24e+5	86.C	5.09e+5
77.A	6.18e+5	87.B	7.40e+5	44.C	5.53e+5
78.A	6.63e+5	23.B	7.54e+5	80.C	6.17e+5
87.A	6.93e+5	99.B	8.17e+5	105.C	6.34e+5
109.A	7.58e+5	108.B	8.98e+5	47.C	6.43e+5
47.A	8.37e+5	49.B	9.27e+5	87.C	6.99e+5
110.A	9.05e+5	89.B	9.31e+5	81.C	7.08e+5
99.A	9.14e+5	25.B	9.51e+5	99.C	7.63e+5
89.A	9.83e+5	100.B	1.12e+6	108.C	8.40e+5
28.A	9.99e+5	28.B	1.17e+6	49.C	9.00e+5

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Impedance (Ω)					
25r.A	1.09e+6	50.B	1.24e+6	89.C	9.06e+5
49.A	1.17e+6	80.B	1.47e+6	100.C	1.05e+6
100.A	1.26e+6	91.B	1.49e+6	28.C	1.06e+6
91.A	1.30e+6	29.B	1.82e+6	25r.C	1.06e+6
80.A	1.35e+6	51.B	1.85e+6	91.C	1.19e+6
9r.A	1.52e+6	81.B	1.99e+6	50.C	1.20e+6
29.A	1.54e+6	93.B	2.25e+6	102.C	1.37e+6
9.A	1.55e+6	36.B	2.44e+6	26.C	1.61e+6
50.A	1.56e+6	106.B	2.44e+6	29.C	1.64e+6
68.A	1.60e+6	55.B	3.07e+6	34.C	1.70e+6
112.A	1.65e+6	82.B	3.98e+6	51.C	1.80e+6
26.A	1.66e+6	38.B	4.31e+6	3.C	1.81e+6
81.A	1.82e+6	30.B	4.99e+6	73.C	1.87e+6
93.A	1.91e+6	58.B	5.61e+6	15.C	1.93e+6
69.A	2.34e+6	95.B	7.01e+6	103.C	2.00e+6
51.A	2.34e+6	61.B	1.70e+8	93.C	2.81e+6
14.A	2.80e+6	61.B	1.73e+8	84.C	2.95e+6
27.A	2.80e+6	151.B	1.67e+11	82.C	3.37e+6
55.A	3.31e+6	48.B	6.51e+13	74.C	3.51e+6
82.A	3.64e+6	79.B	7.69e+13	55.C	3.61e+6
30.A	4.25e+6	56.B	9.94e+13	30.C	4.51e+6
19.A	4.31e+6	250.B	1.65e+14	31.C	4.67e+6
113.A	4.31e+6	83.B	1.86e+14	5.C	5.61e+6
36.A	4.67e+6	2.B	2.66e+14	61.C	1.71e+8
45.A	4.67e+6	59.B	2.96e+14	61.C	1.72e+8
70.A	5.10e+6	12.B	3.32e+14	151.C	1.37e+11
61.A	1.75e+8	450.B	3.62e+14	48.C	7.34e+13
61.A	1.75e+8	66.B	5.01e+14	250.C	1.09e+14
151.A	3.19e+10	39.B	6.64e+14	56.C	1.46e+14
95.A	1.42e+14	22.B	1.19e+15	83.C	1.47e+14
79.A	1.66e+14	43.B	1.19e+15	95.C	1.64e+14
48.A	1.91e+14	90.B	1.32e+15	450.C	3.64e+14
56.A	1.93e+14	96.B	1.32e+15	16.C	6.57e+14
83.A	2.97e+14	107.B	Inf	32.C	6.61e+14
88.A	4.70e+14	300.B	Inf	4.C	6.62e+14
37.A	4.72e+14	300_open.B	Inf	6.C	6.62e+14
250.A	4.72e+14			17.C	8.75e+14
66.A	4.83e+14			75.C	8.76e+14
46.A	5.97e+14			104.C	1.18e+15
10.A	6.58e+14			300.C	1.31e+15
11.A	6.58e+14			24.C	2.63e+15
94.A	6.65e+14			85.C	2.63e+15
111.A	6.65e+14			27.C	Inf

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Impedance (Ω)					
33.A	9.32e+14			300_open.C	Inf
114.A	9.40e+14			41.C	Inf
300.A	9.87e+14			79.C	Inf
450.A	2.66e+15			92.C	Inf
20.A	Inf				
300_open.A	Inf				
71.A	Inf				
94_open.A	Inf				

Table G.6: Electric distance obtained for Scenario S3

Electric distance with loads					
68.A	0.6	66.B	1.9	66.C	0
66.A	2.1	65.B	2	65.C	0.1
65.A	2.2	64.B	2.1	64.C	0.2
64.A	2.3	36.B	2.1	63.C	0.3
63.A	2.4	63.B	2.2	62.C	0.4
62.A	2.4	62.B	2.2	60.C	0.5
60.A	2.5	60.B	2.3	160.C	0.5
160.A	2.5	160.B	2.3	160r.C	0.5
160r.A	2.5	160r.B	2.3	61.C	0.7
67.A	2.6	61.B	2.4	61.C	0.7
61.A	2.7	61.B	2.4	97.C	0.7
61.A	2.7	97.B	2.4	197.C	0.7
97.A	2.7	197.B	2.4	72.C	0.7
197.A	2.7	72.B	2.5	76.C	0.7
72.A	2.7	76.B	2.5	101.C	0.7
76.A	2.7	101.B	2.5	98.C	0.7
101.A	2.7	98.B	2.5	57.C	0.8
98.A	2.8	105.B	2.6	73.C	0.8
69.A	2.8	57.B	2.6	105.C	0.8
105.A	2.8	77.B	2.6	102.C	0.8
57.A	2.8	78.B	2.6	77.C	0.8
77.A	2.8	99.B	2.7	78.C	0.9
78.A	2.9	108.B	2.7	99.C	0.9
99.A	2.9	106.B	2.7	108.C	0.9
108.A	2.9	86.B	2.7	86.C	0.9
86.A	2.9	79.B	2.7	79.C	0.9
79.A	2.9	67.B	2.7	74.C	0.9
70.A	2.9	100.B	2.7	103.C	0.9
100.A	3	80.B	2.7	54.C	0.9
80.A	3	58.B	2.8	100.C	0.9

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Electric distance with loads					
87.A	3	81.B	2.8	80.C	1
81.A	3	87.B	2.8	81.C	1
54.A	3	54.B	2.8	87.C	1
94_open.A	3	82.B	2.8	53.C	1
71.A	3	89.B	2.8	82.C	1
109.A	3	107.B	2.8	75.C	1
82.A	3.1	300.B	2.9	89.C	1
88.A	3.1	83.B	2.9	55.C	1.1
89.A	3.1	91.B	2.9	300.C	1.1
53.A	3.1	450.B	2.9	83.C	1.1
300.A	3.1	53.B	2.9	91.C	1.1
91.A	3.1	90.B	2.9	450.C	1.1
83.A	3.1	59.B	2.9	52.C	1.1
450.A	3.1	93.B	2.9	93.C	1.1
110.A	3.1	55.B	3	104.C	1.2
93.A	3.1	95.B	3	92.C	1.2
55.A	3.1	52.B	3	95.C	1.2
112.A	3.2	96.B	3	84.C	1.2
95.A	3.2	56.B	3.1	56.C	1.2
52.A	3.2	13.B	3.3	85.C	1.3
94.A	3.2	152.B	3.3	152.C	1.4
56.A	3.3	8.B	3.6	13.C	1.4
111.A	3.3	18.B	3.8	34.C	1.6
113.A	3.3	135.B	3.8	15.C	1.7
114.A	3.4	7.B	3.8	8.C	1.7
13.A	3.5	12.B	3.9	18.C	1.9
152.A	3.5	21.B	4	135.C	1.9
8.A	3.8	35.B	4	7.C	2
18.A	4	23.B	4.1	17.C	2
135.A	4	40.B	4.1	16.C	2
7.A	4	25.B	4.2	21.C	2.1
9.A	4.1	42.B	4.2	23.C	2.2
9r.A	4.1	28.B	4.2	40.C	2.2
21.A	4.1	44.B	4.2	25.C	2.3
35.A	4.2	22.B	4.3	25r.C	2.3
19.A	4.2	47.B	4.3	42.C	2.3
36.A	4.2	29.B	4.3	28.C	2.4
23.A	4.2	38.B	4.3	44.C	2.4
40.A	4.3	48.B	4.4	67.C	2.4
25.A	4.3	1.B	4.4	41.C	2.4
25r.A	4.3	49.B	4.4	26.C	2.4
42.A	4.4	43.B	4.4	47.C	2.4
20.A	4.4	30.B	4.4	29.C	2.4

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Electric distance with loads					
28.A	4.4	50.B	4.5	24.C	2.5
44.A	4.4	250.B	4.5	27.C	2.5
26.A	4.5	39.B	4.5	48.C	2.5
29.A	4.5	51.B	4.5	31.C	2.5
47.A	4.5	151.B	4.6	1.C	2.5
45.A	4.5	300_open.B	4.6	49.C	2.5
14.A	4.5	2.B	4.9	30.C	2.5
27.A	4.5	149.B	32.8	50.C	2.6
48.A	4.5			250.C	2.6
37.A	4.6			32.C	2.6
49.A	4.6			51.C	2.6
1.A	4.6			151.C	2.8
30.A	4.6			300_open.C	2.8
50.A	4.6			3.C	3.2
46.A	4.6			4.C	3.5
250.A	4.6			5.C	3.7
51.A	4.7			6.C	4
10.A	4.7			35.C	4.4
11.A	4.7			149.C	9
33.A	4.7				
151.A	4.8				
300_open.A	4.8				
149.A	32.9				

Table G.7: Impedance obtained for Scenario S4

Impedance (Ω)					
82.A	1.10e+0	149.B	2.55e+4	85.C	0.00e+0
160.A	1.20e+0	1.B	2.59e+4	84.C	2.00e-1
60.A	1.20e+0	7.B	2.62e+4	60.C	2.00e-1
81.A	1.20e+0	8.B	2.64e+4	160.C	2.00e-1
80.A	1.20e+0	13.B	2.68e+4	57.C	3.00e-1
78.A	1.20e+0	152.B	3.33e+4	54.C	3.00e-1
77.A	1.30e+0	52.B	3.39e+4	53.C	3.00e-1
57.A	1.30e+0	53.B	3.42e+4	52.C	3.00e-1
76.A	1.30e+0	54.B	3.44e+4	81.C	4.00e-1
72.A	1.30e+0	57.B	3.57e+4	13.C	4.00e-1
54.A	1.30e+0	60.B	3.73e+4	152.C	4.00e-1
53.A	1.30e+0	62.B	7.39e+4	80.C	4.00e-1
67.A	1.30e+0	63.B	8.57e+4	8.C	5.00e-1
52.A	1.40e+0	160r.B	9.68e+4	7.C	5.00e-1
160r.A	1.40e+0	160.B	9.92e+4	78.C	5.00e-1

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Impedance (Ω)					
13.A	1.40e+0	67.B	1.00e+5	1.C	6.00e-1
152.A	1.40e+0	64.B	1.26e+5	77.C	6.00e-1
8.A	1.50e+0	18.B	1.54e+5	149.C	6.00e-1
7.A	1.50e+0	97.B	2.11e+5	76.C	6.00e-1
1.A	1.60e+0	72.B	2.15e+5	72.C	7.00e-1
149.A	1.60e+0	76.B	2.26e+5	67.C	7.00e-1
62.A	7.39e+4	135.B	2.34e+5	160r.C	8.00e-1
63.A	8.57e+4	35.B	2.58e+5	62.C	7.39e+4
64.A	1.26e+5	65.B	2.90e+5	63.C	8.57e+4
18.A	1.39e+5	40.B	3.81e+5	64.C	1.26e+5
97.A	1.85e+5	197.B	3.83e+5	18.C	1.53e+5
135.A	2.75e+5	42.B	4.27e+5	97.C	1.85e+5
197.A	2.87e+5	101.B	4.28e+5	65.C	2.90e+5
65.A	2.90e+5	105.B	4.92e+5	135.C	3.17e+5
35.A	3.00e+5	21.B	5.14e+5	197.C	3.23e+5
101.A	3.09e+5	98.B	5.49e+5	21.C	3.23e+5
105.A	3.37e+5	86.B	5.58e+5	23.C	3.55e+5
21.A	3.60e+5	44.B	5.63e+5	101.C	3.57e+5
108.A	3.79e+5	47.B	6.63e+5	35.C	3.65e+5
23.A	4.02e+5	77.B	6.80e+5	40.C	4.02e+5
40.A	4.39e+5	78.B	7.30e+5	25.C	4.72e+5
25.A	4.63e+5	87.B	7.45e+5	42.C	4.98e+5
42.A	4.97e+5	23.B	7.57e+5	86.C	5.06e+5
86.A	5.13e+5	99.B	8.23e+5	98.C	5.07e+5
44.A	5.55e+5	108.B	9.05e+5	44.C	5.53e+5
98.A	6.06e+5	49.B	9.28e+5	105.C	6.32e+5
87.A	6.88e+5	89.B	9.36e+5	47.C	6.42e+5
109.A	7.58e+5	25.B	9.55e+5	87.C	6.95e+5
47.A	8.34e+5	100.B	1.13e+6	99.C	7.61e+5
110.A	9.05e+5	28.B	1.18e+6	108.C	8.37e+5
99.A	9.09e+5	50.B	1.24e+6	49.C	8.99e+5
89.A	9.76e+5	80.B	1.49e+6	89.C	9.01e+5
28.A	9.95e+5	91.B	1.50e+6	100.C	1.05e+6
25r.A	1.09e+6	29.B	1.82e+6	28.C	1.06e+6
49.A	1.17e+6	51.B	1.86e+6	25r.C	1.06e+6
100.A	1.25e+6	81.B	2.01e+6	91.C	1.19e+6
91.A	1.29e+6	93.B	2.26e+6	50.C	1.20e+6
9r.A	1.52e+6	106.B	2.44e+6	102.C	1.37e+6
9.A	1.53e+6	36.B	2.44e+6	26.C	1.60e+6
29.A	1.54e+6	55.B	3.09e+6	29.C	1.64e+6
50.A	1.56e+6	82.B	4.02e+6	34.C	1.70e+6
68.A	1.60e+6	38.B	4.31e+6	51.C	1.80e+6
112.A	1.65e+6	30.B	5.01e+6	3.C	1.81e+6

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Impedance (Ω)					
26.A	1.66e+6	58.B	5.61e+6	73.C	1.87e+6
93.A	1.90e+6	95.B	7.01e+6	15.C	1.93e+6
51.A	2.34e+6	61.B	1.72e+8	103.C	2.00e+6
69.A	2.34e+6	61.B	1.74e+8	93.C	2.79e+6
27.A	2.80e+6	151.B	1.67e+11	82.C	3.33e+6
14.A	2.80e+6	250.B	1.62e+14	74.C	3.51e+6
55.A	3.29e+6	56.B	2.44e+14	55.C	3.61e+6
30.A	4.23e+6	48.B	2.48e+14	30.C	4.50e+6
113.A	4.31e+6	450.B	2.52e+14	31.C	4.67e+6
19.A	4.31e+6	83.B	2.67e+14	5.C	5.61e+6
36.A	4.67e+6	12.B	3.23e+14	61.C	1.70e+8
45.A	4.67e+6	66.B	4.20e+14	61.C	1.71e+8
70.A	5.10e+6	96.B	4.70e+14	151.C	1.37e+11
61.A	1.73e+8	90.B	5.95e+14	79.C	1.15e+14
61.A	1.73e+8	39.B	5.97e+14	48.C	1.64e+14
151.A	3.19e+10	300.B	6.44e+14	56.C	2.30e+14
48.A	5.46e+13	79.B	6.66e+14	95.C	2.31e+14
79.A	8.99e+13	59.B	6.70e+14	27.C	2.95e+14
83.A	2.17e+14	107.B	1.06e+15	4.C	2.96e+14
250.A	2.95e+14	2.B	1.33e+15	66.C	3.12e+14
56.A	3.19e+14	22.B	1.34e+15	83.C	3.22e+14
88.A	4.64e+14	43.B	2.67e+15	250.C	3.28e+14
37.A	5.90e+14	300_open.B	Inf	450.C	5.87e+14
111.A	6.38e+14			41.C	6.56e+14
10.A	6.57e+14			300.C	6.56e+14
11.A	6.57e+14			75.C	8.73e+14
71.A	6.57e+14			16.C	8.74e+14
114.A	6.57e+14			24.C	1.17e+15
20.A	6.60e+14			17.C	1.31e+15
33.A	6.60e+14			6.C	1.32e+15
300.A	7.29e+14			92.C	2.61e+15
66.A	9.72e+14			104.C	5.25e+15
95.A	1.17e+15			300_open.C	Inf
450.A	1.18e+15			32.C	Inf
94.A	1.31e+15				
300_open.A	Inf				
46.A	Inf				
94_open.A	Inf				

Table G.8: Electric distance obtained for Scenario S4

Electric distance with loads					
68.A	0.7	81.B	2.1	85.C	0
81.A	2.2	80.B	2.1	84.C	0.1
80.A	2.2	82.B	2.1	81.C	0.3
82.A	2.2	83.B	2.2	80.C	0.3
83.A	2.3	78.B	2.2	82.C	0.4
78.A	2.3	77.B	2.2	83.C	0.4
77.A	2.4	79.B	2.3	78.C	0.4
79.A	2.4	76.B	2.3	77.C	0.5
76.A	2.5	72.B	2.4	79.C	0.5
72.A	2.6	36.B	2.4	76.C	0.6
67.A	2.7	86.B	2.5	72.C	0.6
86.A	2.7	97.B	2.6	73.C	0.7
97.A	2.7	197.B	2.6	86.C	0.7
197.A	2.7	60.B	2.6	97.C	0.8
87.A	2.8	160.B	2.6	197.C	0.8
101.A	2.8	160r.B	2.6	160r.C	0.8
98.A	2.8	87.B	2.6	160.C	0.8
60.A	2.8	101.B	2.6	60.C	0.8
160.A	2.8	98.B	2.6	87.C	0.8
160r.A	2.8	89.B	2.6	101.C	0.8
88.A	2.8	62.B	2.7	98.C	0.8
89.A	2.8	91.B	2.7	74.C	0.9
69.A	2.8	105.B	2.7	89.C	0.9
105.A	2.9	90.B	2.7	62.C	0.9
91.A	2.9	63.B	2.7	105.C	0.9
62.A	2.9	93.B	2.7	102.C	0.9
93.A	2.9	67.B	2.7	91.C	0.9
99.A	2.9	61.B	2.7	63.C	1
108.A	2.9	61.B	2.7	93.C	1
63.A	3	99.B	2.8	99.C	1
95.A	3	108.B	2.8	61.C	1
70.A	3	106.B	2.8	61.C	1
61.A	3	95.B	2.8	108.C	1
61.A	3	96.B	2.8	75.C	1
94.A	3	100.B	2.8	92.C	1
100.A	3	64.B	2.8	95.C	1
71.A	3.1	57.B	2.9	103.C	1
64.A	3.1	107.B	3	100.C	1
109.A	3.1	65.B	3	64.C	1.1
57.A	3.1	300.B	3	57.C	1.1
300.A	3.1	450.B	3	300.C	1.2
450.A	3.1	66.B	3.1	450.C	1.2

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Electric distance with loads					
110.A	3.2	58.B	3.1	65.C	1.2
112.A	3.2	54.B	3.1	104.C	1.2
65.A	3.2	53.B	3.2	54.C	1.3
66.A	3.3	59.B	3.2	66.C	1.3
111.A	3.3	55.B	3.3	53.C	1.3
54.A	3.3	52.B	3.3	55.C	1.4
94_open.A	3.3	56.B	3.4	52.C	1.4
113.A	3.3	13.B	3.6	56.C	1.5
53.A	3.4	152.B	3.6	152.C	1.7
114.A	3.4	8.B	3.9	13.C	1.7
55.A	3.5	18.B	4.1	34.C	1.9
52.A	3.5	135.B	4.1	15.C	2
56.A	3.6	7.B	4.1	8.C	2
13.A	3.8	12.B	4.2	18.C	2.3
152.A	3.8	21.B	4.3	135.C	2.3
8.A	4.1	35.B	4.3	7.C	2.3
18.A	4.3	23.B	4.4	17.C	2.3
135.A	4.3	40.B	4.4	16.C	2.3
7.A	4.3	25.B	4.5	21.C	2.4
9.A	4.4	42.B	4.5	67.C	2.5
9r.A	4.4	28.B	4.5	23.C	2.5
21.A	4.5	44.B	4.6	40.C	2.5
35.A	4.5	22.B	4.6	25.C	2.6
19.A	4.5	47.B	4.6	25r.C	2.6
36.A	4.5	29.B	4.6	42.C	2.6
23.A	4.6	38.B	4.7	28.C	2.7
40.A	4.6	48.B	4.7	44.C	2.7
25.A	4.7	1.B	4.7	41.C	2.7
25r.A	4.7	49.B	4.7	26.C	2.7
42.A	4.7	43.B	4.7	47.C	2.8
20.A	4.7	30.B	4.7	29.C	2.8
28.A	4.7	50.B	4.8	24.C	2.8
44.A	4.7	250.B	4.8	27.C	2.8
26.A	4.8	39.B	4.8	48.C	2.8
29.A	4.8	51.B	4.8	31.C	2.8
47.A	4.8	151.B	5	1.C	2.8
45.A	4.8	300_open.B	5	49.C	2.8
14.A	4.9	2.B	5.2	30.C	2.9
27.A	4.9	149.B	33.4	50.C	2.9
48.A	4.9			250.C	2.9
37.A	4.9			32.C	2.9
49.A	4.9			51.C	3
1.A	4.9			151.C	3.1

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Electric distance with loads					
30.A	4.9			300_open.C	3.1
50.A	5			3.C	3.5
46.A	5			4.C	3.9
250.A	5			5.C	4
51.A	5			6.C	4.3
10.A	5			35.C	4.7
11.A	5			149.C	9.3
33.A	5.1				
151.A	5.1				
300_open.A	5.1				
149.A	23.2				

Table G.9: Impedance obtained for Scenario S5

Impedance (Ω)					
48.A	0.00e+0	48.B	0.00e+0	48.C	0.00e+0
47.A	0.00e+0	47.B	0.00e+0	47.C	0.00e+0
44.A	1.00e-1	44.B	1.00e-1	44.C	1.00e-1
42.A	1.00e-1	42.B	1.00e-1	42.C	1.00e-1
40.A	1.00e-1	40.B	1.00e-1	40.C	1.00e-1
35.A	2.00e-1	35.B	1.00e-1	35.C	1.00e-1
18.A	2.00e-1	18.B	2.00e-1	18.C	2.00e-1
135.A	2.00e-1	135.B	2.00e-1	135.C	2.00e-1
13.A	3.00e-1	13.B	3.00e-1	13.C	3.00e-1
8.A	3.00e-1	8.B	3.00e-1	8.C	3.00e-1
7.A	4.00e-1	7.B	4.00e-1	7.C	4.00e-1
1.A	4.00e-1	1.B	4.00e-1	1.C	4.00e-1
149.A	5.00e-1	149.B	4.00e-1	149.C	5.00e-1
152.A	3.23e+4	152.B	3.35e+4	152.C	3.11e+4
52.A	3.27e+4	52.B	3.40e+4	52.C	3.15e+4
53.A	3.30e+4	53.B	3.43e+4	53.C	3.17e+4
54.A	3.31e+4	54.B	3.45e+4	54.C	3.19e+4
57.A	3.42e+4	57.B	3.57e+4	57.C	3.29e+4
60.A	3.51e+4	60.B	3.73e+4	60.C	3.39e+4
62.A	7.39e+4	62.B	7.39e+4	62.C	7.39e+4
160r.A	8.33e+4	63.B	8.57e+4	160r.C	7.60e+4
160.A	8.54e+4	160r.B	9.68e+4	160.C	7.79e+4
63.A	8.57e+4	160.B	9.92e+4	67.C	7.85e+4
67.A	8.61e+4	67.B	1.00e+5	63.C	8.57e+4
64.A	1.26e+5	64.B	1.26e+5	64.C	1.26e+5
97.A	1.85e+5	97.B	2.11e+5	72.C	1.47e+5
72.A	2.03e+5	72.B	2.14e+5	76.C	1.72e+5

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Impedance (Ω)					
76.A	2.12e+5	76.B	2.25e+5	97.C	1.87e+5
197.A	2.87e+5	65.B	2.90e+5	65.C	2.90e+5
65.A	2.90e+5	197.B	3.83e+5	197.C	3.25e+5
101.A	3.09e+5	101.B	4.28e+5	21.C	3.27e+5
105.A	3.37e+5	105.B	4.92e+5	23.C	3.59e+5
21.A	3.61e+5	21.B	5.13e+5	101.C	3.59e+5
108.A	3.79e+5	98.B	5.48e+5	77.C	3.90e+5
23.A	4.04e+5	86.B	5.57e+5	78.C	4.09e+5
25.A	4.65e+5	77.B	6.77e+5	25.C	4.78e+5
86.A	5.13e+5	78.B	7.27e+5	86.C	5.10e+5
98.A	6.06e+5	87.B	7.43e+5	98.C	5.12e+5
77.A	6.13e+5	23.B	7.54e+5	80.C	6.18e+5
78.A	6.57e+5	99.B	8.22e+5	105.C	6.37e+5
87.A	6.88e+5	108.B	9.04e+5	87.C	7.01e+5
109.A	7.58e+5	49.B	9.28e+5	81.C	7.09e+5
110.A	9.05e+5	89.B	9.34e+5	99.C	7.68e+5
99.A	9.08e+5	25.B	9.52e+5	108.C	8.45e+5
89.A	9.76e+5	100.B	1.13e+6	49.C	9.04e+5
28.A	9.94e+5	28.B	1.18e+6	89.C	9.08e+5
25r.A	1.09e+6	50.B	1.24e+6	100.C	1.06e+6
49.A	1.17e+6	80.B	1.48e+6	25r.C	1.06e+6
100.A	1.25e+6	91.B	1.50e+6	28.C	1.06e+6
91.A	1.29e+6	29.B	1.82e+6	91.C	1.20e+6
80.A	1.34e+6	51.B	1.86e+6	50.C	1.20e+6
9r.A	1.52e+6	81.B	2.00e+6	102.C	1.37e+6
29.A	1.54e+6	93.B	2.26e+6	26.C	1.61e+6
9.A	1.55e+6	106.B	2.44e+6	29.C	1.64e+6
50.A	1.56e+6	36.B	2.44e+6	34.C	1.70e+6
68.A	1.60e+6	55.B	3.07e+6	51.C	1.81e+6
112.A	1.65e+6	82.B	4.00e+6	3.C	1.81e+6
26.A	1.66e+6	38.B	4.31e+6	73.C	1.87e+6
81.A	1.81e+6	30.B	5.00e+6	15.C	1.93e+6
93.A	1.90e+6	58.B	5.61e+6	103.C	2.00e+6
69.A	2.34e+6	95.B	7.01e+6	93.C	2.82e+6
51.A	2.34e+6	61.B	1.73e+8	84.C	2.95e+6
14.A	2.80e+6	61.B	1.77e+8	82.C	3.38e+6
27.A	2.80e+6	151.B	1.66e+11	74.C	3.51e+6
55.A	3.29e+6	250.B	1.48e+14	55.C	3.63e+6
82.A	3.62e+6	79.B	2.43e+14	30.C	4.52e+6
30.A	4.22e+6	96.B	2.93e+14	31.C	4.67e+6
113.A	4.31e+6	56.B	4.42e+14	5.C	5.61e+6
19.A	4.31e+6	59.B	5.93e+14	61.C	1.71e+8
45.A	4.67e+6	450.B	8.28e+14	61.C	1.73e+8

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Impedance (Ω)					
36.A	4.67e+6	66.B	9.38e+14	151.C	1.37e+11
70.A	5.10e+6	300.B	1.17e+15	79.C	1.46e+14
61.A	1.73e+8	107.B	1.31e+15	56.C	1.61e+14
61.A	1.73e+8	43.B	1.32e+15	250.C	1.65e+14
151.A	3.19e+10	12.B	1.33e+15	17.C	6.43e+14
83.A	1.30e+14	39.B	2.65e+15	16.C	6.43e+14
79.A	1.81e+14	22.B	2.65e+15	66.C	6.43e+14
250.A	2.18e+14	2.B	Inf	300.C	6.55e+14
56.A	2.20e+14	300_open.B	Inf	83.C	6.55e+14
95.A	2.62e+14	83.B	Inf	95.C	6.55e+14
10.A	4.63e+14	90.B	Inf	27.C	6.58e+14
11.A	4.63e+14			6.C	6.64e+14
66.A	4.90e+14			4.C	6.64e+14
37.A	5.91e+14			104.C	1.75e+15
71.A	6.54e+14			75.C	2.62e+15
94.A	6.54e+14			92.C	2.62e+15
114.A	6.54e+14			85.C	2.62e+15
46.A	9.34e+14			32.C	2.63e+15
20.A	9.36e+14			41.C	2.64e+15
111.A	1.17e+15			24.C	2.65e+15
300.A	1.23e+15			300_open.C	Inf
450.A	1.31e+15			450.C	Inf
33.A	1.32e+15				
300_open.A	Inf				
88.A	Inf				
94_open.A	Inf				

Table G.10: Electric distance obtained for Scenario S5

Electric distance with loads					
48.A	2	36.B	0.4	48.C	0
47.A	2	48.B	1.9	47.C	0
44.A	2.1	47.B	1.9	49.C	0.1
49.A	2.1	49.B	2	44.C	0.1
68.A	2.1	44.B	2	50.C	0.2
42.A	2.1	50.B	2.1	42.C	0.2
50.A	2.1	42.B	2.1	51.C	0.2
45.A	2.2	51.B	2.1	40.C	0.3
40.A	2.2	40.B	2.2	151.C	0.4
51.A	2.2	151.B	2.3	300_open.C	0.4
35.A	2.3	300_open.B	2.3	41.C	0.5
46.A	2.3	35.B	2.3	135.C	0.5

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Electric distance with loads					
151.A	2.3	43.B	2.3	18.C	0.5
300_open.A	2.3	18.B	2.5	21.C	0.7
18.A	2.4	135.B	2.5	23.C	0.8
135.A	2.4	38.B	2.6	25.C	0.9
36.A	2.5	21.B	2.7	25r.C	0.9
21.A	2.6	23.B	2.8	28.C	1
19.A	2.6	39.B	2.8	26.C	1
23.A	2.7	25.B	2.9	29.C	1.1
37.A	2.7	28.B	2.9	24.C	1.1
25.A	2.8	22.B	3	13.C	1.1
25r.A	2.8	13.B	3	152.C	1.1
20.A	2.8	152.B	3	27.C	1.1
28.A	2.8	29.B	3	31.C	1.1
26.A	2.9	30.B	3.1	30.C	1.2
29.A	2.9	250.B	3.2	250.C	1.2
27.A	3	52.B	3.3	32.C	1.2
30.A	3	8.B	3.3	34.C	1.3
250.A	3.1	53.B	3.4	15.C	1.4
13.A	3.2	54.B	3.4	8.C	1.4
152.A	3.2	7.B	3.5	52.C	1.4
33.A	3.2	55.B	3.6	53.C	1.5
52.A	3.4	12.B	3.6	54.C	1.6
8.A	3.4	57.B	3.6	7.C	1.6
53.A	3.6	56.B	3.7	17.C	1.7
54.A	3.6	58.B	3.8	16.C	1.7
94_open.A	3.6	60.B	3.9	55.C	1.7
7.A	3.7	160.B	3.9	57.C	1.7
55.A	3.8	160r.B	3.9	56.C	1.8
9.A	3.8	59.B	3.9	60.C	2
9r.A	3.8	62.B	4	160.C	2
57.A	3.8	63.B	4	160r.C	2
56.A	3.9	1.B	4.1	62.C	2.1
60.A	4.1	61.B	4.1	63.C	2.2
160.A	4.1	61.B	4.1	61.C	2.2
160r.A	4.1	97.B	4.1	61.C	2.2
62.A	4.2	197.B	4.1	1.C	2.2
67.A	4.2	72.B	4.1	97.C	2.2
14.A	4.2	76.B	4.1	197.C	2.2
63.A	4.2	101.B	4.2	72.C	2.2
61.A	4.2	98.B	4.2	76.C	2.2
61.A	4.2	64.B	4.2	101.C	2.2
1.A	4.3	105.B	4.2	98.C	2.3
97.A	4.3	77.B	4.2	64.C	2.3

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Electric distance with loads					
197.A	4.3	78.B	4.3	73.C	2.3
72.A	4.3	67.B	4.3	105.C	2.3
76.A	4.3	99.B	4.3	102.C	2.3
101.A	4.3	65.B	4.3	77.C	2.3
98.A	4.3	108.B	4.3	78.C	2.4
64.A	4.3	106.B	4.3	99.C	2.4
69.A	4.4	86.B	4.3	108.C	2.4
10.A	4.4	79.B	4.3	65.C	2.4
11.A	4.4	100.B	4.4	86.C	2.4
105.A	4.4	80.B	4.4	79.C	2.4
77.A	4.4	66.B	4.4	74.C	2.4
78.A	4.4	81.B	4.4	103.C	2.4
99.A	4.5	87.B	4.4	100.C	2.5
108.A	4.5	82.B	4.5	80.C	2.5
65.A	4.5	89.B	4.5	66.C	2.5
86.A	4.5	107.B	4.5	81.C	2.5
79.A	4.5	300.B	4.5	87.C	2.5
70.A	4.5	83.B	4.5	35.C	2.5
100.A	4.5	91.B	4.5	82.C	2.6
80.A	4.6	450.B	4.5	75.C	2.6
66.A	4.6	90.B	4.5	89.C	2.6
87.A	4.6	93.B	4.5	300.C	2.6
81.A	4.6	2.B	4.6	83.C	2.6
71.A	4.6	95.B	4.6	91.C	2.6
109.A	4.6	96.B	4.6	450.C	2.6
82.A	4.6	149.B	20.6	93.C	2.6
88.A	4.6			104.C	2.7
89.A	4.6			92.C	2.7
300.A	4.7			95.C	2.7
91.A	4.7			84.C	2.7
83.A	4.7			85.C	2.8
450.A	4.7			3.C	2.9
110.A	4.7			4.C	3.2
93.A	4.7			5.C	3.4
112.A	4.7			6.C	3.6
95.A	4.8			67.C	4
94.A	4.8			149.C	8.6
111.A	4.9				
113.A	4.9				
114.A	4.9				
149.A	20.6				

Table G.11: Impedance obtained for Scenario S6

Impedance (Ω)					
149.A	2.40e+4	149.B	2.56e+4	66.C	0.00e+0
1.A	2.43e+4	1.B	2.59e+4	65.C	1.00e-1
7.A	2.46e+4	7.B	2.62e+4	64.C	2.00e-1
8.A	2.48e+4	8.B	2.64e+4	85.C	3.00e-1
13.A	2.56e+4	13.B	2.67e+4	63.C	4.00e-1
152.A	3.22e+4	152.B	3.33e+4	62.C	4.00e-1
52.A	3.28e+4	52.B	3.38e+4	84.C	4.00e-1
53.A	3.31e+4	53.B	3.40e+4	81.C	7.00e-1
54.A	3.32e+4	54.B	3.42e+4	80.C	7.00e-1
57.A	3.44e+4	57.B	3.54e+4	78.C	8.00e-1
60.A	3.55e+4	60.B	3.69e+4	77.C	8.00e-1
62.A	7.38e+4	62.B	7.38e+4	76.C	9.00e-1
160r.A	8.40e+4	63.B	8.55e+4	72.C	9.00e-1
63.A	8.56e+4	160r.B	9.57e+4	160.C	9.00e-1
67.A	8.69e+4	160.B	9.70e+4	67.C	1.00e+0
160.A	8.83e+4	67.B	9.91e+4	160r.C	1.10e+0
64.A	1.26e+5	64.B	1.26e+5	149.C	7.90e+0
18.A	1.40e+5	18.B	1.54e+5	1.C	8.00e+0
97.A	1.86e+5	97.B	2.08e+5	7.C	8.10e+0
72.A	2.06e+5	72.B	2.12e+5	8.C	8.10e+0
76.A	2.15e+5	76.B	2.23e+5	13.C	8.10e+0
135.A	2.75e+5	135.B	2.33e+5	152.C	8.10e+0
197.A	2.88e+5	35.B	2.57e+5	52.C	8.20e+0
65.A	2.90e+5	65.B	2.90e+5	53.C	8.20e+0
35.A	3.01e+5	197.B	3.79e+5	54.C	8.30e+0
101.A	3.11e+5	40.B	3.80e+5	57.C	8.30e+0
105.A	3.39e+5	101.B	4.24e+5	60.C	8.40e+0
21.A	3.67e+5	42.B	4.26e+5	18.C	1.52e+5
108.A	3.81e+5	105.B	4.87e+5	97.C	1.85e+5
23.A	4.11e+5	21.B	5.13e+5	135.C	3.16e+5
40.A	4.40e+5	98.B	5.41e+5	21.C	3.21e+5
25.A	4.73e+5	86.B	5.52e+5	197.C	3.22e+5
42.A	4.98e+5	44.B	5.61e+5	23.C	3.52e+5
86.A	5.20e+5	47.B	6.61e+5	101.C	3.56e+5
44.A	5.56e+5	77.B	6.71e+5	35.C	3.64e+5
98.A	6.13e+5	78.B	7.20e+5	40.C	4.00e+5
77.A	6.24e+5	87.B	7.38e+5	25.C	4.67e+5
78.A	6.70e+5	23.B	7.54e+5	42.C	4.96e+5
87.A	6.98e+5	99.B	8.11e+5	98.C	5.06e+5
109.A	7.58e+5	108.B	8.92e+5	86.C	5.07e+5
47.A	8.37e+5	49.B	9.26e+5	44.C	5.51e+5
110.A	9.05e+5	89.B	9.28e+5	105.C	6.30e+5

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Impedance (Ω)					
99.A	9.20e+5	25.B	9.51e+5	47.C	6.39e+5
89.A	9.90e+5	100.B	1.11e+6	87.C	6.97e+5
28.A	1.00e+6	28.B	1.17e+6	99.C	7.59e+5
25r.A	1.09e+6	50.B	1.23e+6	108.C	8.35e+5
49.A	1.17e+6	80.B	1.47e+6	49.C	8.95e+5
100.A	1.26e+6	91.B	1.49e+6	89.C	9.04e+5
91.A	1.31e+6	29.B	1.82e+6	100.C	1.04e+6
80.A	1.37e+6	51.B	1.85e+6	28.C	1.06e+6
9r.A	1.52e+6	81.B	1.98e+6	25r.C	1.06e+6
29.A	1.55e+6	93.B	2.24e+6	91.C	1.19e+6
9.A	1.55e+6	106.B	2.44e+6	50.C	1.19e+6
50.A	1.56e+6	36.B	2.44e+6	102.C	1.37e+6
68.A	1.60e+6	55.B	3.07e+6	26.C	1.61e+6
112.A	1.65e+6	82.B	3.96e+6	29.C	1.63e+6
26.A	1.66e+6	38.B	4.31e+6	34.C	1.70e+6
81.A	1.85e+6	30.B	4.99e+6	51.C	1.79e+6
93.A	1.92e+6	58.B	5.61e+6	3.C	1.81e+6
69.A	2.34e+6	95.B	7.01e+6	73.C	1.87e+6
51.A	2.34e+6	61.B	1.73e+8	15.C	1.93e+6
27.A	2.80e+6	61.B	1.73e+8	103.C	2.00e+6
14.A	2.80e+6	151.B	1.67e+11	93.C	2.80e+6
55.A	3.33e+6	56.B	9.25e+13	82.C	3.35e+6
82.A	3.70e+6	48.B	1.23e+14	74.C	3.51e+6
30.A	4.27e+6	79.B	1.31e+14	55.C	3.59e+6
113.A	4.31e+6	83.B	1.95e+14	30.C	4.49e+6
19.A	4.31e+6	250.B	2.46e+14	31.C	4.67e+6
45.A	4.67e+6	59.B	3.31e+14	5.C	5.61e+6
36.A	4.67e+6	66.B	3.96e+14	61.C	1.69e+8
70.A	5.10e+6	96.B	4.64e+14	61.C	1.70e+8
61.A	1.77e+8	90.B	6.56e+14	151.C	1.37e+11
61.A	1.77e+8	12.B	6.63e+14	48.C	1.45e+14
151.A	3.19e+10	107.B	1.27e+15	250.C	1.45e+14
48.A	9.87e+13	300.B	1.31e+15	79.C	1.46e+14
66.A	1.95e+14	39.B	2.65e+15	56.C	1.60e+14
79.A	1.99e+14	43.B	2.65e+15	27.C	2.34e+14
83.A	2.49e+14	450.B	5.25e+15	95.C	3.27e+14
250.A	2.68e+14	22.B	Inf	4.C	3.66e+14
71.A	2.98e+14	2.B	Inf	17.C	4.58e+14
56.A	2.98e+14	300_open.B	Inf	41.C	5.80e+14
95.A	3.24e+14			32.C	6.41e+14
88.A	4.72e+14			24.C	6.43e+14
20.A	6.00e+14			16.C	6.48e+14
37.A	6.00e+14			75.C	6.56e+14

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Impedance (Ω)					
94.A	6.67e+14			450.C	6.57e+14
450.A	7.53e+14			6.C	6.59e+14
111.A	1.19e+15			92.C	8.73e+14
33.A	1.32e+15			104.C	5.26e+15
46.A	1.34e+15			300.C	Inf
300.A	1.68e+15			300_open.C	Inf
10.A	Inf			83.C	Inf
114.A	Inf				
11.A	Inf				
300_open.A	Inf				
94_open.A	Inf				

Table G.12: Electric distance obtained for Scenario S6

Electric distance with loads					
68.A	0.6	66.B	1.9	66.C	0
66.A	2.1	65.B	2	65.C	0.1
65.A	2.2	64.B	2.1	64.C	0.2
64.A	2.3	36.B	2.1	63.C	0.3
63.A	2.4	63.B	2.2	62.C	0.4
62.A	2.4	62.B	2.2	60.C	0.5
60.A	2.5	60.B	2.3	160.C	0.5
160.A	2.5	160.B	2.3	160r.C	0.5
160r.A	2.5	160r.B	2.3	61.C	0.7
67.A	2.6	61.B	2.4	61.C	0.7
61.A	2.7	61.B	2.4	97.C	0.7
61.A	2.7	97.B	2.4	197.C	0.7
97.A	2.7	197.B	2.4	72.C	0.7
197.A	2.7	72.B	2.5	76.C	0.7
72.A	2.7	76.B	2.5	101.C	0.7
76.A	2.7	101.B	2.5	98.C	0.7
101.A	2.7	98.B	2.5	57.C	0.8
98.A	2.8	105.B	2.6	73.C	0.8
69.A	2.8	57.B	2.6	105.C	0.8
105.A	2.8	77.B	2.6	102.C	0.8
57.A	2.8	78.B	2.6	77.C	0.8
77.A	2.8	99.B	2.7	78.C	0.9
78.A	2.9	108.B	2.7	99.C	0.9
99.A	2.9	106.B	2.7	108.C	0.9
108.A	2.9	86.B	2.7	86.C	0.9
86.A	2.9	79.B	2.7	79.C	0.9
79.A	2.9	67.B	2.7	74.C	0.9

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Electric distance with loads					
70.A	2.9	100.B	2.7	103.C	0.9
100.A	3	80.B	2.7	54.C	0.9
80.A	3	58.B	2.8	100.C	0.9
87.A	3	81.B	2.8	80.C	1
81.A	3	87.B	2.8	87.C	1
54.A	3	54.B	2.8	81.C	1
94_open.A	3	82.B	2.8	53.C	1
71.A	3	89.B	2.8	82.C	1
109.A	3	107.B	2.8	75.C	1
82.A	3.1	300.B	2.9	89.C	1
88.A	3.1	83.B	2.9	55.C	1.1
89.A	3.1	91.B	2.9	300.C	1.1
53.A	3.1	450.B	2.9	91.C	1.1
300.A	3.1	53.B	2.9	83.C	1.1
91.A	3.1	90.B	2.9	450.C	1.1
83.A	3.1	59.B	2.9	52.C	1.1
450.A	3.1	93.B	2.9	93.C	1.1
110.A	3.1	55.B	3	104.C	1.2
93.A	3.1	95.B	3	92.C	1.2
55.A	3.1	52.B	3	95.C	1.2
112.A	3.2	96.B	3	84.C	1.2
95.A	3.2	56.B	3.1	56.C	1.2
52.A	3.2	13.B	3.3	85.C	1.3
94.A	3.2	152.B	3.3	152.C	1.4
56.A	3.3	8.B	3.6	13.C	1.4
111.A	3.3	18.B	3.8	34.C	1.6
113.A	3.3	135.B	3.8	15.C	1.7
114.A	3.4	7.B	3.8	8.C	1.7
13.A	3.5	12.B	3.9	18.C	1.9
152.A	3.5	21.B	4	135.C	1.9
8.A	3.8	35.B	4	7.C	2
18.A	4	23.B	4.1	17.C	2
135.A	4	40.B	4.1	16.C	2
7.A	4	25.B	4.2	21.C	2.1
9.A	4.1	42.B	4.2	23.C	2.2
9r.A	4.1	28.B	4.2	40.C	2.2
21.A	4.1	44.B	4.2	25.C	2.3
35.A	4.2	22.B	4.3	25r.C	2.3
19.A	4.2	47.B	4.3	42.C	2.3
36.A	4.2	29.B	4.3	28.C	2.4
23.A	4.2	38.B	4.3	44.C	2.4
40.A	4.3	48.B	4.4	67.C	2.4
25.A	4.3	1.B	4.4	41.C	2.4

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Electric distance with loads					
25r.A	4.3	49.B	4.4	26.C	2.4
42.A	4.4	43.B	4.4	47.C	2.4
20.A	4.4	30.B	4.4	29.C	2.4
28.A	4.4	50.B	4.5	24.C	2.5
44.A	4.4	250.B	4.5	27.C	2.5
26.A	4.5	39.B	4.5	48.C	2.5
29.A	4.5	51.B	4.5	31.C	2.5
47.A	4.5	151.B	4.6	1.C	2.5
45.A	4.5	300_open.B	4.6	49.C	2.5
14.A	4.5	2.B	4.9	30.C	2.5
27.A	4.5	149.B	32.8	50.C	2.6
48.A	4.6			250.C	2.6
37.A	4.6			32.C	2.6
49.A	4.6			51.C	2.6
1.A	4.6			151.C	2.8
30.A	4.6			300_open.C	2.8
50.A	4.6			3.C	3.2
46.A	4.7			4.C	3.5
250.A	4.7			5.C	3.7
51.A	4.7			6.C	4
10.A	4.7			35.C	4.4
11.A	4.7			149.C	9
33.A	4.7				
151.A	4.8				
300_open.A	4.8				
149.A	32.9				

G.0.2 Considering OLTCs connected with capacitors compensation in radial configuration

Table G.13: Impedance obtained for Scenario S1

Impedance (Ω)					
160r.A	3.37e+1	160r.B	3.40e+1	85.C	0.00e+0
67.A	3.38e+1	67.B	3.40e+1	84.C	2.00e-1
72.A	3.38e+1	72.B	3.40e+1	77.C	1.12e+1
76.A	3.39e+1	76.B	3.40e+1	78.C	1.12e+1
149.A	3.39e+1	149.B	3.46e+1	80.C	1.13e+1
1.A	3.40e+1	1.B	3.46e+1	81.C	1.13e+1
7.A	3.41e+1	7.B	3.47e+1	149.C	1.28e+1
8.A	3.42e+1	8.B	3.47e+1	1.C	1.28e+1

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Impedance (Ω)					
13.A	3.42e+1	13.B	3.47e+1	7.C	1.29e+1
152.A	3.42e+1	152.B	3.47e+1	8.C	1.29e+1
52.A	3.43e+1	52.B	3.47e+1	152.C	1.29e+1
53.A	3.44e+1	53.B	3.47e+1	13.C	1.29e+1
54.A	3.44e+1	54.B	3.47e+1	52.C	1.30e+1
57.A	3.45e+1	57.B	3.47e+1	53.C	1.30e+1
60.A	3.47e+1	60.B	3.48e+1	54.C	1.30e+1
160.A	3.47e+1	160.B	3.48e+1	57.C	1.31e+1
77.A	3.91e+1	77.B	3.93e+1	160.C	1.31e+1
78.A	3.91e+1	78.B	3.93e+1	60.C	1.31e+1
80.A	3.93e+1	80.B	3.93e+1	160r.C	1.34e+1
81.A	3.93e+1	81.B	3.93e+1	67.C	1.34e+1
82.A	3.94e+1	82.B	3.94e+1	72.C	1.34e+1
83.A	3.94e+1	83.B	3.94e+1	76.C	1.35e+1
86.A	1.24e+2	86.B	1.24e+2	82.C	3.94e+1
87.A	1.24e+2	87.B	1.24e+2	83.C	3.94e+1
88.A	1.24e+2	89.B	1.24e+2	86.C	1.24e+2
62.A	7.39e+4	90.B	1.24e+2	87.C	1.24e+2
63.A	8.57e+4	62.B	7.39e+4	89.C	1.24e+2
64.A	1.26e+5	63.B	8.57e+4	91.C	1.24e+2
18.A	1.40e+5	64.B	1.26e+5	92.C	1.24e+2
97.A	1.86e+5	18.B	1.54e+5	62.C	7.39e+4
135.A	2.75e+5	97.B	2.09e+5	63.C	8.57e+4
197.A	2.88e+5	135.B	2.34e+5	64.C	1.26e+5
65.A	2.90e+5	35.B	2.57e+5	18.C	1.53e+5
35.A	3.00e+5	65.B	2.90e+5	97.C	1.86e+5
101.A	3.10e+5	40.B	3.80e+5	65.C	2.90e+5
105.A	3.38e+5	197.B	3.80e+5	135.C	3.17e+5
21.A	3.62e+5	101.B	4.25e+5	21.C	3.22e+5
108.A	3.80e+5	42.B	4.26e+5	197.C	3.23e+5
23.A	4.06e+5	105.B	4.89e+5	23.C	3.54e+5
40.A	4.40e+5	21.B	5.13e+5	101.C	3.57e+5
25.A	4.67e+5	98.B	5.44e+5	35.C	3.65e+5
42.A	4.98e+5	44.B	5.62e+5	40.C	4.02e+5
44.A	5.56e+5	47.B	6.62e+5	25.C	4.70e+5
98.A	6.10e+5	23.B	7.54e+5	42.C	4.98e+5
109.A	7.58e+5	99.B	8.16e+5	98.C	5.08e+5
47.A	8.36e+5	108.B	8.97e+5	44.C	5.53e+5
110.A	9.05e+5	49.B	9.26e+5	105.C	6.33e+5
99.A	9.15e+5	25.B	9.51e+5	47.C	6.42e+5
89.A	9.85e+5	100.B	1.12e+6	99.C	7.63e+5
28.A	9.99e+5	28.B	1.18e+6	108.C	8.39e+5
25r.A	1.09e+6	50.B	1.24e+6	49.C	8.99e+5

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Impedance (Ω)					
49.A	1.17e+6	91.B	1.49e+6	100.C	1.05e+6
100.A	1.26e+6	29.B	1.82e+6	28.C	1.06e+6
91.A	1.30e+6	51.B	1.85e+6	25r.C	1.06e+6
9r.A	1.52e+6	93.B	2.25e+6	50.C	1.20e+6
9.A	1.53e+6	36.B	2.44e+6	102.C	1.37e+6
29.A	1.54e+6	106.B	2.44e+6	26.C	1.61e+6
50.A	1.56e+6	55.B	3.07e+6	29.C	1.64e+6
68.A	1.60e+6	38.B	4.31e+6	34.C	1.70e+6
112.A	1.65e+6	30.B	4.99e+6	51.C	1.80e+6
26.A	1.66e+6	58.B	5.61e+6	3.C	1.81e+6
93.A	1.91e+6	95.B	7.01e+6	73.C	1.87e+6
69.A	2.34e+6	61.B	1.69e+8	15.C	1.93e+6
51.A	2.34e+6	61.B	1.73e+8	103.C	2.00e+6
27.A	2.80e+6	151.B	1.67e+11	93.C	2.80e+6
14.A	2.80e+6	250.B	1.13e+14	74.C	3.51e+6
55.A	3.31e+6	2.B	1.64e+14	55.C	3.61e+6
30.A	4.25e+6	48.B	2.06e+14	30.C	4.50e+6
19.A	4.31e+6	79.B	2.07e+14	31.C	4.67e+6
113.A	4.31e+6	12.B	2.94e+14	5.C	5.61e+6
45.A	4.67e+6	39.B	3.27e+14	61.C	1.71e+8
36.A	4.67e+6	66.B	3.68e+14	61.C	1.71e+8
70.A	5.10e+6	300.B	3.97e+14	151.C	1.37e+11
61.A	1.75e+8	59.B	5.92e+14	79.C	1.15e+14
61.A	1.75e+8	56.B	6.41e+14	27.C	1.83e+14
151.A	3.19e+10	450.B	8.25e+14	56.C	2.30e+14
250.A	1.65e+14	22.B	1.18e+15	4.C	2.31e+14
56.A	1.75e+14	96.B	1.31e+15	450.C	2.61e+14
79.A	2.48e+14	43.B	1.32e+15	32.C	4.67e+14
95.A	2.66e+14	107.B	5.22e+15	41.C	8.70e+14
48.A	3.22e+14	300_open.B	Inf	17.C	1.30e+15
450.A	3.53e+14			24.C	1.30e+15
114.A	4.18e+14			300.C	1.31e+15
66.A	4.78e+14			16.C	2.61e+15
10.A	6.58e+14			104.C	2.61e+15
11.A	6.58e+14			250.C	Inf
71.A	6.61e+14			300_open.C	Inf
37.A	6.64e+14			48.C	Inf
94.A	6.65e+14			66.C	Inf
33.A	9.33e+14			6.C	Inf
20.A	1.33e+15			75.C	Inf
46.A	1.33e+15			95.C	Inf
300.A	1.76e+15				
111.A	Inf				

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Impedance (Ω)					
300_open.A	Inf				
94_open.A	Inf				

Table G.14: Electric distance obtained for Scenario S1

Electric distance with loads					
68.A	0.7	81.B	2	85.C	0
81.A	2.1	80.B	2	84.C	0.1
80.A	2.1	82.B	2	81.C	0.3
82.A	2.1	83.B	2.1	80.C	0.3
83.A	2.1	78.B	2.1	82.C	0.3
78.A	2.2	77.B	2.1	83.C	0.4
77.A	2.3	79.B	2.2	78.C	0.4
79.A	2.3	76.B	2.2	77.C	0.5
76.A	2.4	72.B	2.3	79.C	0.5
72.A	2.4	36.B	2.4	76.C	0.5
67.A	2.5	86.B	2.4	72.C	0.6
86.A	2.6	97.B	2.4	73.C	0.7
97.A	2.6	197.B	2.4	86.C	0.7
197.A	2.6	60.B	2.5	97.C	0.7
87.A	2.6	160.B	2.5	197.C	0.7
101.A	2.7	160r.B	2.5	160r.C	0.8
98.A	2.7	87.B	2.5	160.C	0.8
60.A	2.7	101.B	2.5	60.C	0.8
160.A	2.7	98.B	2.5	87.C	0.8
160r.A	2.7	89.B	2.5	101.C	0.8
88.A	2.7	62.B	2.5	98.C	0.8
89.A	2.7	91.B	2.6	74.C	0.8
69.A	2.7	105.B	2.6	89.C	0.9
105.A	2.7	90.B	2.6	62.C	0.9
91.A	2.7	93.B	2.6	105.C	0.9
62.A	2.8	63.B	2.6	91.C	0.9
93.A	2.8	67.B	2.6	102.C	0.9
99.A	2.8	61.B	2.6	93.C	0.9
108.A	2.8	61.B	2.6	63.C	0.9
63.A	2.8	99.B	2.6	99.C	0.9
95.A	2.8	108.B	2.6	61.C	0.9
61.A	2.8	95.B	2.7	61.C	0.9
61.A	2.8	106.B	2.7	108.C	0.9
70.A	2.8	96.B	2.7	75.C	1
94.A	2.8	100.B	2.7	92.C	1
100.A	2.9	64.B	2.7	95.C	1

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Electric distance with loads					
71.A	2.9	57.B	2.8	103.C	1
64.A	2.9	107.B	2.8	100.C	1
109.A	2.9	65.B	2.8	64.C	1
57.A	3	300.B	2.8	57.C	1.1
300.A	3	450.B	2.9	300.C	1.1
450.A	3	66.B	2.9	450.C	1.2
110.A	3	58.B	2.9	65.C	1.2
65.A	3.1	54.B	3	104.C	1.2
112.A	3.1	53.B	3.1	54.C	1.2
66.A	3.2	59.B	3.1	66.C	1.3
54.A	3.2	55.B	3.1	53.C	1.3
94_open.A	3.2	52.B	3.2	55.C	1.3
111.A	3.2	56.B	3.2	52.C	1.4
113.A	3.2	13.B	3.5	56.C	1.5
53.A	3.2	152.B	3.5	152.C	1.7
114.A	3.3	8.B	3.7	13.C	1.7
55.A	3.3	18.B	4	34.C	1.9
52.A	3.4	135.B	4	15.C	2
56.A	3.4	7.B	4	8.C	2
13.A	3.6	12.B	4.1	18.C	2.2
152.A	3.6	21.B	4.1	135.C	2.2
8.A	3.9	35.B	4.1	7.C	2.2
18.A	4.1	23.B	4.2	17.C	2.3
135.A	4.1	40.B	4.2	16.C	2.3
7.A	4.2	25.B	4.3	21.C	2.3
9.A	4.2	42.B	4.3	67.C	2.4
9r.A	4.2	28.B	4.4	23.C	2.4
21.A	4.3	44.B	4.4	40.C	2.5
35.A	4.3	22.B	4.4	25.C	2.5
19.A	4.3	47.B	4.5	25r.C	2.5
23.A	4.4	29.B	4.5	42.C	2.6
36.A	4.4	38.B	4.5	28.C	2.6
40.A	4.4	48.B	4.5	44.C	2.6
25.A	4.5	1.B	4.5	41.C	2.6
25r.A	4.5	49.B	4.5	26.C	2.7
42.A	4.5	43.B	4.6	47.C	2.7
20.A	4.5	30.B	4.6	29.C	2.7
28.A	4.6	50.B	4.6	24.C	2.7
44.A	4.6	250.B	4.6	27.C	2.7
26.A	4.6	39.B	4.6	48.C	2.7
29.A	4.6	51.B	4.7	31.C	2.8
47.A	4.7	151.B	4.8	1.C	2.8
45.A	4.7	300_open.B	4.8	49.C	2.8

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Electric distance with loads					
14.A	4.7	2.B	5.1	30.C	2.8
27.A	4.7	149.B	17.2	50.C	2.8
48.A	4.7			250.C	2.9
37.A	4.7			32.C	2.9
49.A	4.7			51.C	2.9
1.A	4.7			151.C	3
30.A	4.7			300_open.C	3
50.A	4.8			3.C	3.5
46.A	4.8			4.C	3.8
250.A	4.8			5.C	4
51.A	4.9			6.C	4.2
10.A	4.9			35.C	4.6
11.A	4.9			149.C	9.3
33.A	4.9				
151.A	5				
300_open.A	5				
149.A	17.3				

Table G.15: Impedance obtained for Scenario S2

Impedance (Ω)					
76.A	2.05e+1	76.B	2.04e+1	85.C	0.00e+0
72.A	2.05e+1	72.B	2.04e+1	84.C	2.00e-1
67.A	2.05e+1	67.B	2.05e+1	81.C	5.50e+0
60.A	2.05e+1	160r.B	2.05e+1	80.C	5.50e+0
160.A	2.05e+1	60.B	2.11e+1	78.C	5.50e+0
160r.A	2.05e+1	13.B	2.11e+1	77.C	5.50e+0
57.A	2.05e+1	57.B	2.11e+1	160.C	5.90e+0
54.A	2.05e+1	8.B	2.11e+1	60.C	5.90e+0
53.A	2.05e+1	7.B	2.11e+1	57.C	5.90e+0
52.A	2.05e+1	1.B	2.11e+1	54.C	5.90e+0
13.A	2.05e+1	160.B	2.11e+1	53.C	5.90e+0
152.A	2.05e+1	52.B	2.11e+1	52.C	5.90e+0
8.A	2.05e+1	53.B	2.11e+1	152.C	5.90e+0
7.A	2.05e+1	54.B	2.11e+1	13.C	5.90e+0
1.A	2.05e+1	149.B	2.11e+1	8.C	5.90e+0
149.A	2.06e+1	152.B	2.11e+1	7.C	5.90e+0
81.A	2.52e+1	77.B	2.52e+1	1.C	5.90e+0
80.A	2.52e+1	78.B	2.52e+1	149.C	6.00e+0
82.A	2.52e+1	80.B	2.52e+1	76.C	6.40e+0
83.A	2.52e+1	81.B	2.52e+1	72.C	6.40e+0
78.A	2.52e+1	82.B	2.52e+1	67.C	6.40e+0

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Impedance (Ω)					
77.A	2.53e+1	83.B	2.52e+1	160r.C	6.40e+0
86.A	1.09e+2	86.B	1.09e+2	82.C	2.52e+1
87.A	1.09e+2	87.B	1.09e+2	83.C	2.52e+1
88.A	1.09e+2	89.B	1.09e+2	86.C	1.09e+2
62.A	7.39e+4	90.B	1.09e+2	87.C	1.09e+2
63.A	8.57e+4	62.B	7.39e+4	89.C	1.09e+2
64.A	1.26e+5	63.B	8.57e+4	91.C	1.09e+2
18.A	1.38e+5	64.B	1.26e+5	92.C	1.09e+2
97.A	1.84e+5	18.B	1.54e+5	62.C	7.39e+4
135.A	2.74e+5	97.B	2.13e+5	63.C	8.57e+4
197.A	2.85e+5	135.B	2.34e+5	64.C	1.26e+5
65.A	2.90e+5	35.B	2.57e+5	18.C	1.55e+5
35.A	2.99e+5	65.B	2.90e+5	97.C	1.88e+5
101.A	3.07e+5	40.B	3.81e+5	65.C	2.90e+5
105.A	3.36e+5	197.B	3.85e+5	135.C	3.20e+5
21.A	3.56e+5	42.B	4.27e+5	197.C	3.27e+5
108.A	3.78e+5	101.B	4.31e+5	21.C	3.28e+5
23.A	3.98e+5	105.B	4.95e+5	23.C	3.61e+5
40.A	4.38e+5	21.B	5.13e+5	101.C	3.61e+5
25.A	4.58e+5	98.B	5.53e+5	35.C	3.68e+5
42.A	4.96e+5	44.B	5.63e+5	40.C	4.05e+5
44.A	5.55e+5	47.B	6.64e+5	25.C	4.82e+5
98.A	6.01e+5	23.B	7.55e+5	42.C	5.03e+5
109.A	7.58e+5	99.B	8.29e+5	98.C	5.16e+5
47.A	8.36e+5	108.B	9.12e+5	44.C	5.59e+5
99.A	9.01e+5	49.B	9.30e+5	105.C	6.43e+5
110.A	9.05e+5	25.B	9.52e+5	47.C	6.49e+5
89.A	9.66e+5	100.B	1.14e+6	99.C	7.74e+5
28.A	9.87e+5	28.B	1.18e+6	108.C	8.52e+5
25r.A	1.09e+6	50.B	1.24e+6	49.C	9.09e+5
49.A	1.17e+6	91.B	1.51e+6	25r.C	1.06e+6
100.A	1.24e+6	29.B	1.82e+6	100.C	1.06e+6
91.A	1.28e+6	51.B	1.86e+6	28.C	1.07e+6
9r.A	1.52e+6	93.B	2.27e+6	50.C	1.21e+6
9.A	1.52e+6	36.B	2.44e+6	102.C	1.37e+6
29.A	1.53e+6	106.B	2.44e+6	26.C	1.60e+6
50.A	1.56e+6	55.B	3.08e+6	29.C	1.65e+6
68.A	1.60e+6	38.B	4.31e+6	34.C	1.70e+6
112.A	1.65e+6	30.B	5.00e+6	3.C	1.81e+6
26.A	1.66e+6	58.B	5.61e+6	51.C	1.82e+6
93.A	1.88e+6	95.B	7.01e+6	73.C	1.87e+6
69.A	2.34e+6	61.B	1.73e+8	15.C	1.93e+6
51.A	2.34e+6	61.B	1.74e+8	103.C	2.00e+6

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Impedance (Ω)					
27.A	2.80e+6	151.B	1.67e+11	93.C	2.83e+6
14.A	2.80e+6	48.B	1.56e+14	74.C	3.51e+6
55.A	3.26e+6	66.B	2.25e+14	55.C	3.66e+6
30.A	4.19e+6	79.B	2.46e+14	30.C	4.53e+6
19.A	4.31e+6	56.B	3.68e+14	31.C	4.67e+6
113.A	4.31e+6	450.B	5.58e+14	5.C	5.61e+6
36.A	4.67e+6	59.B	5.95e+14	61.C	1.75e+8
45.A	4.67e+6	2.B	6.58e+14	61.C	1.75e+8
70.A	5.10e+6	12.B	6.60e+14	151.C	1.37e+11
61.A	1.71e+8	250.B	9.35e+14	48.C	1.18e+14
61.A	1.71e+8	300.B	1.18e+15	66.C	2.60e+14
151.A	3.19e+10	107.B	1.32e+15	27.C	3.31e+14
250.A	2.07e+14	22.B	1.32e+15	17.C	3.32e+14
79.A	2.31e+14	39.B	2.64e+15	250.C	3.35e+14
95.A	2.43e+14	300_open.B	Inf	79.C	3.35e+14
48.A	2.62e+14	43.B	Inf	56.C	3.39e+14
66.A	2.91e+14	96.B	Inf	41.C	4.74e+14
71.A	2.93e+14			300.C	5.28e+14
94.A	4.63e+14			6.C	5.91e+14
37.A	5.87e+14			32.C	5.92e+14
10.A	6.56e+14			95.C	6.67e+14
11.A	6.56e+14			450.C	1.32e+15
300.A	1.27e+15			75.C	1.33e+15
450.A	1.31e+15			16.C	1.34e+15
114.A	1.31e+15			104.C	1.76e+15
56.A	1.31e+15			24.C	2.68e+15
33.A	1.32e+15			300_open.C	Inf
111.A	2.62e+15			4.C	Inf
20.A	Inf				
300_open.A	Inf				
46.A	Inf				
94_open.A	Inf				

Table G.16: Electric distance obtained for Scenario S2

Electric distance with loads					
68.A	0.7	81.B	2	85.C	0
81.A	2.1	80.B	2	84.C	0.1
82.A	2.1	82.B	2	81.C	0.3
80.A	2.1	83.B	2.1	80.C	0.3
83.A	2.1	78.B	2.1	82.C	0.3
78.A	2.2	77.B	2.1	83.C	0.4

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Electric distance with loads					
77.A	2.3	79.B	2.2	78.C	0.4
79.A	2.3	76.B	2.2	77.C	0.5
76.A	2.4	72.B	2.3	79.C	0.5
72.A	2.5	86.B	2.4	76.C	0.6
67.A	2.5	36.B	2.4	72.C	0.6
86.A	2.6	97.B	2.4	73.C	0.7
97.A	2.6	197.B	2.4	86.C	0.7
197.A	2.6	60.B	2.5	97.C	0.8
87.A	2.6	160.B	2.5	197.C	0.8
101.A	2.7	160r.B	2.5	160r.C	0.8
98.A	2.7	87.B	2.5	160.C	0.8
60.A	2.7	101.B	2.5	60.C	0.8
160.A	2.7	98.B	2.5	87.C	0.8
160r.A	2.7	89.B	2.5	101.C	0.8
88.A	2.7	62.B	2.6	98.C	0.8
89.A	2.7	91.B	2.6	74.C	0.8
69.A	2.7	105.B	2.6	89.C	0.9
105.A	2.7	90.B	2.6	62.C	0.9
91.A	2.7	93.B	2.6	105.C	0.9
62.A	2.8	63.B	2.6	91.C	0.9
93.A	2.8	67.B	2.6	102.C	0.9
99.A	2.8	61.B	2.6	63.C	0.9
108.A	2.8	61.B	2.6	93.C	0.9
95.A	2.8	99.B	2.6	61.C	1
63.A	2.8	108.B	2.7	61.C	1
70.A	2.8	95.B	2.7	99.C	1
61.A	2.8	106.B	2.7	108.C	1
61.A	2.8	96.B	2.7	75.C	1
94.A	2.8	100.B	2.7	92.C	1
100.A	2.9	64.B	2.7	95.C	1
71.A	2.9	57.B	2.8	103.C	1
64.A	2.9	107.B	2.8	100.C	1
109.A	3	65.B	2.9	64.C	1.1
57.A	3	300.B	2.9	57.C	1.1
300.A	3	450.B	2.9	300.C	1.2
450.A	3	66.B	2.9	450.C	1.2
110.A	3	58.B	3	65.C	1.2
112.A	3.1	54.B	3	54.C	1.2
65.A	3.1	53.B	3.1	104.C	1.2
66.A	3.2	59.B	3.1	66.C	1.3
111.A	3.2	55.B	3.1	53.C	1.3
54.A	3.2	52.B	3.2	55.C	1.4
94_open.A	3.2	56.B	3.3	52.C	1.4

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Electric distance with loads					
113.A	3.2	13.B	3.5	56.C	1.5
53.A	3.3	152.B	3.5	152.C	1.7
114.A	3.3	8.B	3.8	13.C	1.7
55.A	3.3	18.B	4	34.C	1.9
52.A	3.4	135.B	4	15.C	2
56.A	3.4	7.B	4	8.C	2
13.A	3.6	12.B	4.1	18.C	2.2
152.A	3.6	21.B	4.1	135.C	2.2
8.A	3.9	35.B	4.2	7.C	2.2
18.A	4.2	23.B	4.2	17.C	2.3
135.A	4.2	40.B	4.3	16.C	2.3
7.A	4.2	25.B	4.3	21.C	2.4
9.A	4.3	42.B	4.3	67.C	2.4
9r.A	4.3	28.B	4.4	23.C	2.5
21.A	4.3	44.B	4.4	40.C	2.5
35.A	4.3	22.B	4.4	25.C	2.6
19.A	4.3	47.B	4.5	25r.C	2.6
23.A	4.4	29.B	4.5	42.C	2.6
36.A	4.4	38.B	4.5	28.C	2.6
40.A	4.4	48.B	4.5	44.C	2.6
25.A	4.5	1.B	4.6	41.C	2.7
25r.A	4.5	49.B	4.6	26.C	2.7
42.A	4.5	43.B	4.6	47.C	2.7
20.A	4.5	30.B	4.6	29.C	2.7
28.A	4.6	50.B	4.6	24.C	2.7
44.A	4.6	250.B	4.6	27.C	2.8
26.A	4.6	39.B	4.7	48.C	2.8
29.A	4.7	51.B	4.7	31.C	2.8
47.A	4.7	151.B	4.8	1.C	2.8
45.A	4.7	300_open.B	4.8	49.C	2.8
14.A	4.7	2.B	5.1	30.C	2.8
27.A	4.7	149.B	17.2	50.C	2.9
48.A	4.7			250.C	2.9
37.A	4.7			32.C	2.9
49.A	4.7			51.C	2.9
1.A	4.7			151.C	3
30.A	4.8			300_open.C	3
50.A	4.8			3.C	3.5
46.A	4.8			4.C	3.8
250.A	4.8			5.C	4
51.A	4.9			6.C	4.2
10.A	4.9			35.C	4.6
11.A	4.9			149.C	9.3

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Electric distance with loads					
33.A	4.9				
151.A	5				
300_open.A	5				
149.A	17.2				

Table G.17: Impedance obtained for Scenario S3

Impedance (Ω)					
160r.A	3.37e+1	160r.B	3.37e+1	66.C	0.00e+0
67.A	3.38e+1	67.B	3.38e+1	65.C	1.00e-1
72.A	3.38e+1	72.B	3.38e+1	64.C	2.00e-1
76.A	3.39e+1	76.B	3.39e+1	63.C	4.00e-1
149.A	3.40e+1	149.B	3.44e+1	62.C	4.00e-1
1.A	3.41e+1	1.B	3.44e+1	149.C	1.33e+1
7.A	3.42e+1	7.B	3.44e+1	1.C	1.34e+1
8.A	3.43e+1	8.B	3.44e+1	7.C	1.34e+1
13.A	3.43e+1	13.B	3.44e+1	8.C	1.35e+1
152.A	3.43e+1	152.B	3.44e+1	152.C	1.35e+1
52.A	3.44e+1	52.B	3.44e+1	13.C	1.35e+1
53.A	3.45e+1	53.B	3.45e+1	52.C	1.36e+1
54.A	3.45e+1	54.B	3.45e+1	53.C	1.36e+1
57.A	3.46e+1	57.B	3.45e+1	54.C	1.36e+1
60.A	3.48e+1	60.B	3.45e+1	57.C	1.36e+1
160.A	3.48e+1	160.B	3.45e+1	60.C	1.37e+1
77.A	3.91e+1	77.B	3.91e+1	160.C	3.32e+1
78.A	3.91e+1	78.B	3.91e+1	160r.C	3.37e+1
80.A	3.92e+1	80.B	3.92e+1	67.C	3.38e+1
81.A	3.92e+1	81.B	3.92e+1	72.C	3.38e+1
82.A	3.92e+1	82.B	3.92e+1	76.C	3.39e+1
83.A	3.93e+1	83.B	3.93e+1	77.C	3.91e+1
86.A	1.24e+2	86.B	1.24e+2	78.C	3.91e+1
87.A	1.24e+2	87.B	1.24e+2	80.C	3.92e+1
88.A	1.24e+2	89.B	1.24e+2	81.C	3.92e+1
62.A	7.38e+4	90.B	1.24e+2	82.C	3.92e+1
63.A	8.56e+4	62.B	7.38e+4	83.C	3.93e+1
64.A	1.26e+5	63.B	8.55e+4	86.C	1.24e+2
18.A	1.40e+5	64.B	1.26e+5	87.C	1.24e+2
97.A	1.85e+5	18.B	1.54e+5	89.C	1.24e+2
135.A	2.75e+5	97.B	2.09e+5	91.C	1.24e+2
197.A	2.87e+5	135.B	2.34e+5	92.C	1.24e+2
65.A	2.90e+5	35.B	2.57e+5	18.C	1.53e+5
35.A	3.00e+5	65.B	2.90e+5	97.C	1.86e+5

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Impedance (Ω)					
101.A	3.10e+5	40.B	3.80e+5	135.C	3.17e+5
105.A	3.38e+5	197.B	3.80e+5	21.C	3.23e+5
21.A	3.62e+5	101.B	4.25e+5	197.C	3.24e+5
108.A	3.80e+5	42.B	4.26e+5	23.C	3.54e+5
23.A	4.06e+5	105.B	4.89e+5	101.C	3.58e+5
40.A	4.40e+5	21.B	5.13e+5	35.C	3.65e+5
25.A	4.67e+5	98.B	5.44e+5	40.C	4.02e+5
42.A	4.98e+5	44.B	5.62e+5	25.C	4.70e+5
44.A	5.56e+5	47.B	6.62e+5	42.C	4.98e+5
98.A	6.09e+5	23.B	7.54e+5	98.C	5.10e+5
109.A	7.58e+5	99.B	8.15e+5	44.C	5.53e+5
47.A	8.36e+5	108.B	8.97e+5	105.C	6.35e+5
110.A	9.05e+5	49.B	9.26e+5	47.C	6.42e+5
99.A	9.14e+5	25.B	9.51e+5	99.C	7.64e+5
89.A	9.82e+5	100.B	1.12e+6	108.C	8.41e+5
28.A	9.99e+5	28.B	1.18e+6	49.C	8.99e+5
25r.A	1.09e+6	50.B	1.24e+6	100.C	1.05e+6
49.A	1.17e+6	91.B	1.49e+6	28.C	1.06e+6
100.A	1.26e+6	29.B	1.82e+6	25r.C	1.06e+6
91.A	1.30e+6	51.B	1.85e+6	50.C	1.20e+6
9r.A	1.52e+6	93.B	2.25e+6	102.C	1.37e+6
9.A	1.53e+6	106.B	2.44e+6	26.C	1.61e+6
29.A	1.54e+6	36.B	2.44e+6	29.C	1.64e+6
50.A	1.56e+6	55.B	3.07e+6	34.C	1.70e+6
68.A	1.60e+6	38.B	4.31e+6	51.C	1.80e+6
112.A	1.65e+6	30.B	4.99e+6	3.C	1.81e+6
26.A	1.66e+6	58.B	5.61e+6	73.C	1.87e+6
93.A	1.91e+6	95.B	7.01e+6	15.C	1.93e+6
69.A	2.34e+6	61.B	1.73e+8	103.C	2.00e+6
51.A	2.34e+6	61.B	1.74e+8	93.C	2.81e+6
27.A	2.80e+6	151.B	1.67e+11	84.C	2.95e+6
14.A	2.80e+6	250.B	1.29e+14	74.C	3.51e+6
55.A	3.31e+6	66.B	2.59e+14	55.C	3.61e+6
30.A	4.25e+6	59.B	2.65e+14	30.C	4.50e+6
113.A	4.31e+6	96.B	3.27e+14	31.C	4.67e+6
19.A	4.31e+6	450.B	3.58e+14	5.C	5.61e+6
36.A	4.67e+6	79.B	3.63e+14	61.C	1.68e+8
45.A	4.67e+6	48.B	3.66e+14	61.C	1.71e+8
70.A	5.10e+6	56.B	5.91e+14	151.C	1.37e+11
61.A	1.75e+8	12.B	6.58e+14	250.C	1.46e+14
61.A	1.75e+8	107.B	7.23e+14	48.C	1.63e+14
151.A	3.19e+10	43.B	9.32e+14	79.C	2.33e+14
79.A	2.18e+14	22.B	1.18e+15	95.C	2.95e+14

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Impedance (Ω)					
66.A	2.32e+14	300.B	1.30e+15	56.C	3.25e+14
48.A	2.35e+14	39.B	1.32e+15	27.C	3.30e+14
56.A	2.67e+14	2.B	Inf	4.C	5.86e+14
10.A	3.29e+14	300_open.B	Inf	16.C	6.53e+14
11.A	3.29e+14			24.C	1.17e+15
37.A	4.69e+14			75.C	1.18e+15
450.A	5.72e+14			41.C	1.31e+15
95.A	5.92e+14			6.C	1.31e+15
250.A	5.93e+14			300.C	1.31e+15
114.A	6.60e+14			85.C	1.32e+15
94.A	6.62e+14			17.C	2.61e+15
300.A	8.80e+14			104.C	2.63e+15
33.A	9.32e+14			32.C	2.64e+15
111.A	9.33e+14			300_open.C	Inf
20.A	1.33e+15			450.C	Inf
46.A	1.33e+15				
300_open.A	Inf				
71.A	Inf				
94_open.A	Inf				

Table G.18: Electric distance obtained for Scenario S3

Electric distance with loads					
68.A	0.6	66.B	1.9	66.C	0
66.A	2.1	65.B	1.9	65.C	0.1
65.A	2.2	64.B	2	64.C	0.2
64.A	2.3	36.B	2.1	63.C	0.3
63.A	2.3	63.B	2.1	62.C	0.4
62.A	2.4	62.B	2.1	60.C	0.5
60.A	2.4	60.B	2.2	160.C	0.5
160.A	2.4	160.B	2.2	160r.C	0.5
160r.A	2.4	160r.B	2.2	61.C	0.6
67.A	2.5	61.B	2.4	61.C	0.6
61.A	2.6	61.B	2.4	97.C	0.7
61.A	2.6	97.B	2.4	197.C	0.7
97.A	2.6	197.B	2.4	72.C	0.7
197.A	2.6	72.B	2.4	76.C	0.7
72.A	2.6	76.B	2.4	101.C	0.7
76.A	2.6	101.B	2.4	98.C	0.7
101.A	2.7	98.B	2.4	57.C	0.8
98.A	2.7	105.B	2.5	73.C	0.8
69.A	2.7	77.B	2.5	105.C	0.8

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Electric distance with loads					
105.A	2.7	57.B	2.5	102.C	0.8
77.A	2.7	78.B	2.5	77.C	0.8
57.A	2.7	99.B	2.6	78.C	0.8
78.A	2.7	108.B	2.6	99.C	0.9
99.A	2.8	79.B	2.6	108.C	0.9
108.A	2.8	86.B	2.6	86.C	0.9
79.A	2.8	106.B	2.6	79.C	0.9
86.A	2.8	67.B	2.6	74.C	0.9
70.A	2.8	80.B	2.6	103.C	0.9
80.A	2.8	100.B	2.6	54.C	0.9
100.A	2.9	81.B	2.7	100.C	0.9
81.A	2.9	87.B	2.7	80.C	0.9
87.A	2.9	58.B	2.7	81.C	1
82.A	2.9	82.B	2.7	87.C	1
71.A	2.9	89.B	2.7	53.C	1
54.A	2.9	54.B	2.7	82.C	1
94_open.A	2.9	83.B	2.7	89.C	1
109.A	2.9	107.B	2.8	75.C	1
88.A	2.9	91.B	2.8	55.C	1
89.A	2.9	300.B	2.8	83.C	1.1
83.A	3	90.B	2.8	91.C	1.1
91.A	3	450.B	2.8	300.C	1.1
53.A	3	53.B	2.8	450.C	1.1
300.A	3	93.B	2.8	93.C	1.1
450.A	3	59.B	2.8	52.C	1.1
93.A	3	95.B	2.9	104.C	1.1
110.A	3	55.B	2.9	92.C	1.1
55.A	3.1	96.B	2.9	95.C	1.1
112.A	3.1	52.B	2.9	84.C	1.1
95.A	3.1	56.B	3	56.C	1.2
94.A	3.1	13.B	3.2	85.C	1.3
52.A	3.1	152.B	3.2	152.C	1.4
56.A	3.2	8.B	3.5	13.C	1.4
111.A	3.2	18.B	3.7	34.C	1.6
113.A	3.2	135.B	3.7	15.C	1.7
114.A	3.3	7.B	3.7	8.C	1.7
13.A	3.4	12.B	3.8	18.C	1.9
152.A	3.4	21.B	3.9	135.C	1.9
8.A	3.7	35.B	3.9	7.C	1.9
18.A	3.9	23.B	4	17.C	2
135.A	3.9	40.B	4	16.C	2
7.A	3.9	25.B	4.1	21.C	2
9.A	4	42.B	4.1	23.C	2.1

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Electric distance with loads					
9r.A	4	28.B	4.1	40.C	2.2
21.A	4	44.B	4.1	25.C	2.2
35.A	4.1	22.B	4.2	25r.C	2.2
19.A	4.1	47.B	4.2	42.C	2.3
36.A	4.1	29.B	4.2	67.C	2.3
23.A	4.1	38.B	4.2	28.C	2.3
40.A	4.2	48.B	4.3	44.C	2.3
25.A	4.2	1.B	4.3	41.C	2.3
25r.A	4.2	49.B	4.3	26.C	2.4
42.A	4.3	43.B	4.3	47.C	2.4
20.A	4.3	30.B	4.3	29.C	2.4
28.A	4.3	50.B	4.4	24.C	2.4
44.A	4.3	250.B	4.4	27.C	2.4
26.A	4.3	39.B	4.4	48.C	2.4
29.A	4.4	51.B	4.4	31.C	2.5
47.A	4.4	151.B	4.5	1.C	2.5
45.A	4.4	300_open.B	4.5	49.C	2.5
14.A	4.4	2.B	4.8	30.C	2.5
27.A	4.4	149.B	17.8	50.C	2.5
48.A	4.4			250.C	2.6
37.A	4.4			32.C	2.6
49.A	4.5			51.C	2.6
1.A	4.5			151.C	2.7
30.A	4.5			300_open.C	2.7
50.A	4.5			3.C	3.2
46.A	4.5			4.C	3.5
250.A	4.5			5.C	3.7
51.A	4.6			6.C	3.9
10.A	4.6			35.C	4.3
11.A	4.6			149.C	9
33.A	4.6				
151.A	4.7				
300_open.A	4.7				
149.A	18				

Table G.19: Impedance obtained for Scenario S4

Impedance (Ω)					
82.A	0.00e+0	160r.B	2.70e+1	77.C	1.00e+0
81.A	1.00e-1	67.B	2.70e+1	78.C	1.00e+0
80.A	1.00e-1	72.B	2.71e+1	80.C	1.00e+0
78.A	2.00e-1	76.B	2.71e+1	81.C	1.00e+0

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Impedance (Ω)					
77.A	2.00e-1	149.B	2.74e+1	149.C	2.40e+0
149.A	2.20e+0	1.B	2.75e+1	1.C	2.50e+0
1.A	2.30e+0	7.B	2.75e+1	160r.C	2.50e+0
7.A	2.40e+0	8.B	2.76e+1	7.C	2.50e+0
8.A	2.40e+0	13.B	2.76e+1	67.C	2.50e+0
152.A	2.50e+0	152.B	2.76e+1	8.C	2.50e+0
13.A	2.50e+0	52.B	2.76e+1	72.C	2.60e+0
52.A	2.60e+0	53.B	2.77e+1	152.C	2.60e+0
53.A	2.60e+0	54.B	2.77e+1	13.C	2.60e+0
54.A	2.60e+0	57.B	2.77e+1	76.C	2.60e+0
57.A	2.70e+0	60.B	2.78e+1	52.C	2.60e+0
160.A	2.90e+0	160.B	2.78e+1	53.C	2.70e+0
160r.A	2.90e+0	77.B	3.14e+1	54.C	2.70e+0
60.A	2.90e+0	78.B	3.14e+1	57.C	2.70e+0
67.A	2.90e+0	80.B	3.14e+1	160.C	2.90e+0
72.A	3.00e+0	81.B	3.15e+1	60.C	2.90e+0
76.A	3.00e+0	82.B	3.15e+1	85.C	1.24e+1
83.A	3.16e+1	83.B	3.16e+1	84.C	1.25e+1
86.A	1.13e+2	86.B	1.13e+2	82.C	3.15e+1
87.A	1.13e+2	87.B	1.13e+2	83.C	3.16e+1
88.A	1.13e+2	89.B	1.13e+2	86.C	1.13e+2
62.A	7.39e+4	90.B	1.13e+2	87.C	1.13e+2
63.A	8.57e+4	62.B	7.39e+4	89.C	1.13e+2
64.A	1.26e+5	63.B	8.57e+4	91.C	1.13e+2
18.A	1.39e+5	64.B	1.26e+5	92.C	1.13e+2
97.A	1.85e+5	18.B	1.54e+5	62.C	7.39e+4
135.A	2.74e+5	97.B	2.11e+5	63.C	8.57e+4
197.A	2.87e+5	135.B	2.34e+5	64.C	1.26e+5
65.A	2.90e+5	35.B	2.57e+5	18.C	1.53e+5
35.A	3.00e+5	65.B	2.90e+5	97.C	1.85e+5
101.A	3.09e+5	40.B	3.81e+5	65.C	2.90e+5
105.A	3.37e+5	197.B	3.83e+5	135.C	3.17e+5
21.A	3.58e+5	42.B	4.27e+5	21.C	3.22e+5
108.A	3.79e+5	101.B	4.28e+5	197.C	3.23e+5
23.A	4.00e+5	105.B	4.92e+5	23.C	3.54e+5
40.A	4.39e+5	21.B	5.14e+5	101.C	3.57e+5
25.A	4.60e+5	98.B	5.48e+5	35.C	3.65e+5
42.A	4.97e+5	44.B	5.62e+5	40.C	4.02e+5
44.A	5.55e+5	47.B	6.62e+5	25.C	4.69e+5
98.A	6.06e+5	23.B	7.57e+5	42.C	4.98e+5
109.A	7.58e+5	99.B	8.22e+5	98.C	5.08e+5
47.A	8.34e+5	108.B	9.04e+5	44.C	5.53e+5
110.A	9.05e+5	49.B	9.27e+5	105.C	6.32e+5

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Impedance (Ω)					
99.A	9.09e+5	25.B	9.55e+5	47.C	6.42e+5
89.A	9.76e+5	100.B	1.13e+6	99.C	7.62e+5
28.A	9.95e+5	28.B	1.18e+6	108.C	8.38e+5
25r.A	1.09e+6	50.B	1.24e+6	49.C	8.99e+5
49.A	1.17e+6	91.B	1.50e+6	100.C	1.05e+6
100.A	1.25e+6	29.B	1.82e+6	28.C	1.06e+6
91.A	1.29e+6	51.B	1.85e+6	25r.C	1.06e+6
9r.A	1.52e+6	93.B	2.26e+6	50.C	1.20e+6
9.A	1.52e+6	36.B	2.44e+6	102.C	1.37e+6
29.A	1.54e+6	106.B	2.44e+6	26.C	1.60e+6
50.A	1.56e+6	55.B	3.10e+6	29.C	1.64e+6
68.A	1.60e+6	38.B	4.31e+6	34.C	1.70e+6
112.A	1.65e+6	30.B	5.01e+6	51.C	1.80e+6
26.A	1.66e+6	58.B	5.61e+6	3.C	1.81e+6
93.A	1.90e+6	95.B	7.01e+6	73.C	1.87e+6
51.A	2.33e+6	61.B	1.73e+8	15.C	1.93e+6
69.A	2.34e+6	61.B	1.74e+8	103.C	2.00e+6
27.A	2.80e+6	151.B	1.67e+11	93.C	2.79e+6
14.A	2.80e+6	79.B	1.05e+14	74.C	3.51e+6
55.A	3.29e+6	56.B	1.66e+14	55.C	3.61e+6
30.A	4.23e+6	250.B	2.28e+14	30.C	4.50e+6
113.A	4.31e+6	96.B	4.41e+14	31.C	4.67e+6
19.A	4.31e+6	59.B	4.73e+14	5.C	5.61e+6
45.A	4.67e+6	22.B	6.43e+14	61.C	1.71e+8
36.A	4.67e+6	43.B	6.43e+14	61.C	1.73e+8
70.A	5.10e+6	2.B	6.58e+14	151.C	1.37e+11
61.A	1.73e+8	300.B	6.59e+14	56.C	1.01e+14
61.A	1.73e+8	48.B	6.63e+14	79.C	1.15e+14
151.A	3.19e+10	39.B	8.84e+14	48.C	1.15e+14
79.A	7.25e+13	107.B	1.18e+15	250.C	1.46e+14
48.A	1.02e+14	66.B	1.49e+15	95.C	2.93e+14
250.A	1.59e+14	450.B	2.63e+15	17.C	3.05e+14
56.A	2.62e+14	12.B	Inf	27.C	3.30e+14
95.A	2.63e+14	300_open.B	Inf	66.C	5.16e+14
10.A	2.93e+14			300.C	5.86e+14
11.A	2.93e+14			450.C	5.86e+14
114.A	4.38e+14			32.C	6.40e+14
450.A	5.23e+14			6.C	6.55e+14
300.A	5.80e+14			41.C	1.30e+15
94.A	5.88e+14			24.C	1.30e+15
66.A	6.37e+14			16.C	2.61e+15
20.A	6.56e+14			104.C	5.24e+15
71.A	6.57e+14			300_open.C	Inf

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Impedance (Ω)					
46.A	9.28e+14			4.C	Inf
111.A	1.17e+15			75.C	Inf
37.A	1.31e+15				
33.A	1.32e+15				
300_open.A	Inf				
94_open.A	Inf				

Table G.20: Electric distance obtained for Scenario S4

Electric distance with loads					
82.A	0	67.B	0.5	82.C	1.8
83.A	0	82.B	1.8	83.C	1.8
81.A	0	81.B	1.8	81.C	1.8
80.A	0.1	83.B	1.8	80.C	1.9
78.A	0.2	80.B	1.9	78.C	2
77.A	0.2	78.B	1.9	84.C	2
79.A	0.2	77.B	2	77.C	2
76.A	0.3	79.B	2	79.C	2
72.A	0.3	76.B	2	85.C	2.1
67.A	0.4	72.B	2.1	67.C	2.1
86.A	0.5	86.B	2.2	76.C	2.1
97.A	0.5	97.B	2.2	72.C	2.2
197.A	0.5	197.B	2.2	86.C	2.3
160r.A	0.5	60.B	2.2	73.C	2.3
160.A	0.5	160.B	2.2	97.C	2.3
60.A	0.5	160r.B	2.2	197.C	2.3
87.A	0.6	101.B	2.3	35.C	2.4
101.A	0.6	98.B	2.3	87.C	2.4
98.A	0.6	87.B	2.3	101.C	2.4
88.A	0.6	62.B	2.3	98.C	2.4
89.A	0.6	105.B	2.3	74.C	2.4
69.A	0.6	89.B	2.3	60.C	2.4
62.A	0.6	63.B	2.3	160.C	2.4
105.A	0.6	61.B	2.4	160r.C	2.4
91.A	0.6	61.B	2.4	89.C	2.4
63.A	0.7	91.B	2.4	105.C	2.5
93.A	0.7	57.B	2.4	91.C	2.5
61.A	0.7	99.B	2.4	102.C	2.5
61.A	0.7	90.B	2.4	62.C	2.5
99.A	0.7	108.B	2.4	93.C	2.5
108.A	0.7	106.B	2.4	99.C	2.5
70.A	0.7	93.B	2.4	108.C	2.6

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Electric distance with loads					
95.A	0.7	64.B	2.5	75.C	2.6
94.A	0.8	95.B	2.5	92.C	2.6
100.A	0.8	100.B	2.5	95.C	2.6
64.A	0.8	54.B	2.5	63.C	2.6
57.A	0.8	96.B	2.5	61.C	2.6
71.A	0.8	58.B	2.5	61.C	2.6
109.A	0.8	53.B	2.5	103.C	2.6
300.A	0.9	65.B	2.6	100.C	2.6
450.A	0.9	107.B	2.6	64.C	2.7
65.A	0.9	300.B	2.6	57.C	2.7
110.A	0.9	55.B	2.6	300.C	2.7
112.A	1	450.B	2.6	450.C	2.8
54.A	1	52.B	2.7	104.C	2.8
94_open.A	1	59.B	2.7	65.C	2.8
66.A	1	66.B	2.7	66.C	2.9
53.A	1	56.B	2.7	54.C	2.9
111.A	1.1	13.B	2.9	53.C	3
113.A	1.1	152.B	2.9	55.C	3.1
55.A	1.1	8.B	3.2	52.C	3.1
52.A	1.1	18.B	3.5	56.C	3.2
114.A	1.2	135.B	3.5	13.C	3.4
56.A	1.2	7.B	3.5	152.C	3.4
152.A	1.4	12.B	3.6	34.C	3.6
13.A	1.4	21.B	3.6	15.C	3.7
8.A	1.7	35.B	3.6	8.C	3.7
18.A	1.9	23.B	3.7	18.C	3.9
135.A	1.9	40.B	3.7	135.C	3.9
7.A	2	25.B	3.8	7.C	3.9
9.A	2	42.B	3.8	17.C	4
9r.A	2	28.B	3.9	16.C	4
21.A	2.1	44.B	3.9	21.C	4.1
35.A	2.1	22.B	3.9	23.C	4.2
19.A	2.1	47.B	4	40.C	4.2
23.A	2.2	29.B	4	25.C	4.3
40.A	2.2	38.B	4	25r.C	4.3
68.A	2.3	48.B	4	42.C	4.3
25.A	2.3	1.B	4	28.C	4.3
25r.A	2.3	49.B	4	44.C	4.3
42.A	2.3	43.B	4.1	41.C	4.4
20.A	2.3	30.B	4.1	26.C	4.4
28.A	2.3	36.B	4.1	47.C	4.4
44.A	2.4	50.B	4.1	29.C	4.4
26.A	2.4	250.B	4.1	24.C	4.4

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Electric distance with loads					
29.A	2.4	39.B	4.1	27.C	4.5
47.A	2.4	51.B	4.2	48.C	4.5
45.A	2.5	151.B	4.3	31.C	4.5
14.A	2.5	300_open.B	4.3	1.C	4.5
27.A	2.5	2.B	4.6	49.C	4.5
48.A	2.5	149.B	16.9	30.C	4.5
37.A	2.5			50.C	4.6
49.A	2.5			250.C	4.6
1.A	2.5			32.C	4.6
30.A	2.5			51.C	4.6
50.A	2.6			151.C	4.7
46.A	2.6			300_open.C	4.7
250.A	2.6			3.C	5.2
51.A	2.6			4.C	5.5
10.A	2.7			5.C	5.7
11.A	2.7			6.C	5.9
33.A	2.7			149.C	16.9
151.A	2.8				
300_open.A	2.8				
36.A	3.9				
149.A	9				

Table G.21: Impedance obtained for Scenario S5

Impedance (Ω)					
48.A	0.00e+0	48.B	0.00e+0	48.C	0.00e+0
47.A	0.00e+0	47.B	0.00e+0	47.C	0.00e+0
44.A	1.00e-1	44.B	1.00e-1	44.C	1.00e-1
42.A	1.00e-1	42.B	1.00e-1	42.C	1.00e-1
40.A	1.00e-1	40.B	1.00e-1	40.C	1.00e-1
35.A	2.00e-1	35.B	1.00e-1	35.C	1.00e-1
18.A	2.00e-1	18.B	2.00e-1	18.C	2.00e-1
135.A	2.00e-1	135.B	2.00e-1	135.C	2.00e-1
149.A	6.14e+1	149.B	6.14e+1	149.C	6.14e+1
1.A	6.15e+1	1.B	6.14e+1	1.C	6.15e+1
7.A	6.15e+1	7.B	6.15e+1	7.C	6.15e+1
8.A	6.16e+1	8.B	6.15e+1	8.C	6.15e+1
13.A	6.16e+1	13.B	6.15e+1	13.C	6.16e+1
160r.A	6.85e+1	160r.B	6.85e+1	160r.C	6.85e+1
67.A	6.86e+1	67.B	6.85e+1	67.C	6.86e+1
72.A	6.86e+1	72.B	6.86e+1	72.C	6.86e+1
76.A	6.86e+1	76.B	6.86e+1	76.C	6.86e+1

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Impedance (Ω)					
152.A	6.89e+1	152.B	6.89e+1	152.C	6.89e+1
52.A	6.90e+1	52.B	6.89e+1	52.C	6.90e+1
53.A	6.90e+1	53.B	6.89e+1	53.C	6.90e+1
54.A	6.90e+1	54.B	6.90e+1	54.C	6.90e+1
57.A	6.91e+1	57.B	6.90e+1	57.C	6.90e+1
60.A	6.91e+1	60.B	6.91e+1	60.C	6.91e+1
160.A	6.92e+1	160.B	6.91e+1	160.C	6.91e+1
77.A	7.28e+1	77.B	7.27e+1	77.C	7.27e+1
78.A	7.28e+1	78.B	7.27e+1	78.C	7.27e+1
80.A	7.28e+1	80.B	7.28e+1	80.C	7.28e+1
81.A	7.28e+1	81.B	7.28e+1	81.C	7.28e+1
82.A	7.29e+1	82.B	7.29e+1	82.C	7.29e+1
83.A	7.29e+1	83.B	7.29e+1	83.C	7.29e+1
86.A	1.48e+2	86.B	1.48e+2	86.C	1.48e+2
87.A	1.49e+2	87.B	1.48e+2	87.C	1.48e+2
88.A	1.49e+2	89.B	1.49e+2	89.C	1.48e+2
62.A	7.39e+4	90.B	1.49e+2	91.C	1.49e+2
63.A	8.57e+4	62.B	7.39e+4	92.C	1.49e+2
64.A	1.26e+5	63.B	8.57e+4	62.C	7.39e+4
97.A	1.85e+5	64.B	1.26e+5	63.C	8.57e+4
197.A	2.87e+5	97.B	2.11e+5	64.C	1.26e+5
65.A	2.90e+5	65.B	2.90e+5	97.C	1.87e+5
101.A	3.09e+5	197.B	3.83e+5	65.C	2.90e+5
105.A	3.37e+5	101.B	4.28e+5	197.C	3.25e+5
21.A	3.59e+5	105.B	4.92e+5	21.C	3.25e+5
108.A	3.79e+5	21.B	5.13e+5	23.C	3.58e+5
23.A	4.02e+5	98.B	5.48e+5	101.C	3.59e+5
25.A	4.63e+5	23.B	7.54e+5	25.C	4.76e+5
98.A	6.06e+5	99.B	8.22e+5	98.C	5.12e+5
109.A	7.58e+5	108.B	9.04e+5	105.C	6.37e+5
110.A	9.05e+5	49.B	9.28e+5	99.C	7.68e+5
99.A	9.08e+5	25.B	9.52e+5	108.C	8.45e+5
89.A	9.76e+5	100.B	1.13e+6	49.C	9.04e+5
28.A	9.94e+5	28.B	1.18e+6	100.C	1.06e+6
25r.A	1.09e+6	50.B	1.24e+6	25r.C	1.06e+6
49.A	1.17e+6	91.B	1.50e+6	28.C	1.06e+6
100.A	1.25e+6	29.B	1.82e+6	50.C	1.20e+6
91.A	1.29e+6	51.B	1.86e+6	102.C	1.37e+6
9r.A	1.52e+6	93.B	2.26e+6	26.C	1.61e+6
9.A	1.52e+6	36.B	2.44e+6	29.C	1.64e+6
29.A	1.54e+6	106.B	2.44e+6	34.C	1.70e+6
50.A	1.56e+6	55.B	3.07e+6	51.C	1.81e+6
68.A	1.60e+6	38.B	4.31e+6	3.C	1.81e+6

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Impedance (Ω)					
112.A	1.65e+6	30.B	5.00e+6	73.C	1.87e+6
26.A	1.66e+6	58.B	5.61e+6	15.C	1.93e+6
93.A	1.90e+6	95.B	7.01e+6	103.C	2.00e+6
69.A	2.34e+6	61.B	1.73e+8	93.C	2.82e+6
51.A	2.34e+6	61.B	1.80e+8	84.C	2.95e+6
27.A	2.80e+6	151.B	1.68e+11	74.C	3.51e+6
14.A	2.80e+6	250.B	2.08e+14	55.C	3.63e+6
55.A	3.29e+6	66.B	2.63e+14	30.C	4.52e+6
30.A	4.22e+6	79.B	2.93e+14	31.C	4.67e+6
19.A	4.31e+6	96.B	3.18e+14	5.C	5.61e+6
113.A	4.31e+6	2.B	3.19e+14	61.C	1.73e+8
45.A	4.67e+6	12.B	5.88e+14	61.C	1.74e+8
36.A	4.67e+6	56.B	5.91e+14	151.C	1.37e+11
70.A	5.10e+6	39.B	6.57e+14	56.C	1.48e+14
61.A	1.73e+8	450.B	8.71e+14	79.C	1.64e+14
61.A	1.73e+8	22.B	1.18e+15	250.C	1.64e+14
151.A	3.19e+10	107.B	1.31e+15	17.C	3.08e+14
250.A	1.04e+14	300.B	1.31e+15	4.C	3.19e+14
10.A	2.94e+14	59.B	1.32e+15	27.C	3.29e+14
11.A	2.94e+14	43.B	2.63e+15	450.C	4.13e+14
71.A	3.27e+14	300_open.B	Inf	32.C	5.26e+14
46.A	4.15e+14			95.C	6.56e+14
95.A	4.37e+14			41.C	6.57e+14
450.A	4.85e+14			6.C	6.57e+14
56.A	4.91e+14			16.C	8.78e+14
66.A	4.92e+14			300.C	1.31e+15
79.A	5.87e+14			104.C	1.31e+15
94.A	6.56e+14			75.C	2.62e+15
114.A	9.24e+14			24.C	2.63e+15
37.A	1.31e+15			85.C	2.63e+15
20.A	1.31e+15			300_open.C	Inf
33.A	1.31e+15			66.C	Inf
300.A	2.34e+15				
111.A	2.61e+15				
300_open.A	Inf				
94_open.A	Inf				

Table G.22: Electric distance obtained for Scenario S5

Electric distance with loads					
48.A	2	36.B	0.4	48.C	0
47.A	2	48.B	1.9	47.C	0

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Electric distance with loads					
44.A	2.1	47.B	1.9	49.C	0.1
49.A	2.1	49.B	2	44.C	0.1
68.A	2.1	44.B	2	50.C	0.2
42.A	2.1	50.B	2.1	42.C	0.2
50.A	2.1	42.B	2.1	51.C	0.2
45.A	2.2	51.B	2.1	40.C	0.3
40.A	2.2	40.B	2.2	151.C	0.4
51.A	2.2	151.B	2.3	300_open.C	0.4
35.A	2.3	300_open.B	2.3	41.C	0.5
46.A	2.3	35.B	2.3	135.C	0.5
151.A	2.3	43.B	2.3	18.C	0.5
300_open.A	2.3	18.B	2.5	21.C	0.7
18.A	2.4	135.B	2.5	23.C	0.8
135.A	2.4	38.B	2.6	25.C	0.9
36.A	2.5	21.B	2.7	25r.C	0.9
21.A	2.6	23.B	2.8	28.C	1
19.A	2.6	39.B	2.8	26.C	1
23.A	2.7	25.B	2.9	29.C	1.1
37.A	2.7	28.B	2.9	24.C	1.1
25.A	2.8	22.B	3	13.C	1.1
25r.A	2.8	13.B	3	152.C	1.1
20.A	2.8	152.B	3	27.C	1.1
28.A	2.8	29.B	3	31.C	1.1
26.A	2.9	30.B	3.1	30.C	1.2
29.A	2.9	250.B	3.2	250.C	1.2
27.A	3	52.B	3.3	32.C	1.2
30.A	3	8.B	3.3	34.C	1.3
250.A	3.1	53.B	3.4	15.C	1.4
13.A	3.2	54.B	3.4	8.C	1.4
152.A	3.2	7.B	3.5	52.C	1.4
33.A	3.2	55.B	3.6	53.C	1.5
52.A	3.4	12.B	3.6	54.C	1.6
8.A	3.4	57.B	3.6	7.C	1.6
53.A	3.6	56.B	3.7	17.C	1.7
54.A	3.6	58.B	3.8	16.C	1.7
94_open.A	3.6	60.B	3.9	55.C	1.7
7.A	3.7	160.B	3.9	57.C	1.7
55.A	3.8	160r.B	3.9	56.C	1.8
9.A	3.8	59.B	3.9	60.C	2
9r.A	3.8	62.B	4	160.C	2
57.A	3.8	63.B	4	160r.C	2
56.A	3.9	1.B	4.1	62.C	2.1
60.A	4.1	61.B	4.1	63.C	2.2

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Electric distance with loads					
160.A	4.1	61.B	4.1	61.C	2.2
160r.A	4.1	97.B	4.1	61.C	2.2
62.A	4.2	197.B	4.1	1.C	2.2
67.A	4.2	72.B	4.1	97.C	2.2
14.A	4.2	76.B	4.1	197.C	2.2
63.A	4.2	101.B	4.2	72.C	2.2
61.A	4.2	98.B	4.2	76.C	2.2
61.A	4.2	64.B	4.2	101.C	2.2
1.A	4.3	105.B	4.2	98.C	2.3
97.A	4.3	77.B	4.2	64.C	2.3
197.A	4.3	78.B	4.3	73.C	2.3
72.A	4.3	67.B	4.3	105.C	2.3
76.A	4.3	99.B	4.3	102.C	2.3
101.A	4.3	65.B	4.3	77.C	2.3
98.A	4.3	108.B	4.3	78.C	2.4
64.A	4.3	106.B	4.3	99.C	2.4
69.A	4.4	86.B	4.3	108.C	2.4
10.A	4.4	79.B	4.3	65.C	2.4
11.A	4.4	100.B	4.4	86.C	2.4
105.A	4.4	80.B	4.4	79.C	2.4
77.A	4.4	66.B	4.4	74.C	2.4
78.A	4.4	81.B	4.4	103.C	2.4
99.A	4.5	87.B	4.4	100.C	2.5
108.A	4.5	82.B	4.5	80.C	2.5
65.A	4.5	89.B	4.5	66.C	2.5
86.A	4.5	107.B	4.5	81.C	2.5
79.A	4.5	300.B	4.5	87.C	2.5
70.A	4.5	83.B	4.5	35.C	2.5
100.A	4.5	91.B	4.5	82.C	2.6
80.A	4.6	450.B	4.5	75.C	2.6
66.A	4.6	90.B	4.5	89.C	2.6
87.A	4.6	93.B	4.5	300.C	2.6
81.A	4.6	2.B	4.6	83.C	2.6
71.A	4.6	95.B	4.6	91.C	2.6
109.A	4.6	96.B	4.6	450.C	2.6
82.A	4.6	149.B	20.6	93.C	2.6
88.A	4.6			104.C	2.7
89.A	4.6			92.C	2.7
300.A	4.7			95.C	2.7
91.A	4.7			84.C	2.7
83.A	4.7			85.C	2.8
450.A	4.7			3.C	2.9
110.A	4.7			4.C	3.2

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Electric distance with loads					
93.A	4.7			5.C	3.4
112.A	4.7			6.C	3.6
95.A	4.8			67.C	4
94.A	4.8			149.C	8.6
111.A	4.9				
113.A	4.9				
114.A	4.9				
149.A	20.6				

Table G.23: Impedance obtained for Scenario S6

Impedance (Ω)					
160r.A	3.35e+1	160r.B	3.38e+1	66.C	0.00e+0
67.A	3.36e+1	67.B	3.38e+1	65.C	1.00e-1
72.A	3.36e+1	72.B	3.39e+1	85.C	2.00e-1
76.A	3.37e+1	76.B	3.39e+1	64.C	2.00e-1
149.A	3.40e+1	60.B	3.46e+1	63.C	4.00e-1
1.A	3.41e+1	160.B	3.46e+1	84.C	4.00e-1
7.A	3.42e+1	57.B	3.46e+1	62.C	4.00e-1
8.A	3.43e+1	54.B	3.46e+1	149.C	8.10e+0
13.A	3.44e+1	53.B	3.46e+1	1.C	8.20e+0
152.A	3.44e+1	52.B	3.46e+1	7.C	8.30e+0
52.A	3.46e+1	13.B	3.46e+1	8.C	8.30e+0
53.A	3.46e+1	152.B	3.46e+1	152.C	8.40e+0
54.A	3.47e+1	8.B	3.46e+1	13.C	8.40e+0
57.A	3.48e+1	7.B	3.46e+1	52.C	8.50e+0
60.A	3.51e+1	1.B	3.46e+1	53.C	8.50e+0
160.A	3.51e+1	149.B	3.46e+1	54.C	8.60e+0
77.A	3.89e+1	77.B	3.91e+1	57.C	8.60e+0
78.A	3.90e+1	78.B	3.91e+1	60.C	8.80e+0
80.A	3.91e+1	80.B	3.92e+1	77.C	1.12e+1
81.A	3.92e+1	81.B	3.92e+1	78.C	1.12e+1
82.A	3.92e+1	82.B	3.92e+1	80.C	1.12e+1
83.A	3.92e+1	83.B	3.92e+1	81.C	1.12e+1
86.A	1.24e+2	86.B	1.24e+2	160.C	1.26e+1
87.A	1.24e+2	87.B	1.24e+2	160r.C	1.33e+1
88.A	1.24e+2	89.B	1.24e+2	67.C	1.33e+1
62.A	7.38e+4	90.B	1.24e+2	72.C	1.34e+1
63.A	8.56e+4	62.B	7.38e+4	76.C	1.34e+1
64.A	1.26e+5	63.B	8.55e+4	82.C	3.92e+1
18.A	1.40e+5	64.B	1.26e+5	83.C	3.92e+1
97.A	1.86e+5	18.B	1.54e+5	86.C	1.24e+2

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Impedance (Ω)					
135.A	2.75e+5	97.B	2.08e+5	87.C	1.24e+2
197.A	2.88e+5	135.B	2.33e+5	89.C	1.24e+2
65.A	2.90e+5	35.B	2.57e+5	91.C	1.24e+2
35.A	3.01e+5	65.B	2.90e+5	92.C	1.24e+2
101.A	3.11e+5	197.B	3.78e+5	18.C	1.52e+5
105.A	3.39e+5	40.B	3.80e+5	97.C	1.85e+5
21.A	3.65e+5	101.B	4.23e+5	135.C	3.15e+5
108.A	3.81e+5	42.B	4.26e+5	21.C	3.20e+5
23.A	4.09e+5	105.B	4.87e+5	197.C	3.22e+5
40.A	4.40e+5	21.B	5.13e+5	23.C	3.51e+5
25.A	4.71e+5	98.B	5.40e+5	101.C	3.56e+5
42.A	4.98e+5	44.B	5.61e+5	35.C	3.63e+5
44.A	5.56e+5	47.B	6.61e+5	40.C	4.00e+5
98.A	6.13e+5	23.B	7.54e+5	25.C	4.64e+5
109.A	7.58e+5	99.B	8.10e+5	42.C	4.96e+5
47.A	8.37e+5	108.B	8.91e+5	98.C	5.06e+5
110.A	9.05e+5	49.B	9.25e+5	44.C	5.51e+5
99.A	9.20e+5	25.B	9.51e+5	105.C	6.30e+5
89.A	9.90e+5	100.B	1.11e+6	47.C	6.39e+5
28.A	1.00e+6	28.B	1.17e+6	99.C	7.59e+5
25r.A	1.09e+6	50.B	1.23e+6	108.C	8.35e+5
49.A	1.17e+6	91.B	1.49e+6	49.C	8.95e+5
100.A	1.27e+6	29.B	1.82e+6	100.C	1.04e+6
91.A	1.31e+6	51.B	1.85e+6	28.C	1.06e+6
9r.A	1.52e+6	93.B	2.24e+6	25r.C	1.06e+6
9.A	1.53e+6	36.B	2.44e+6	50.C	1.19e+6
29.A	1.55e+6	106.B	2.44e+6	102.C	1.37e+6
50.A	1.56e+6	55.B	3.07e+6	26.C	1.61e+6
68.A	1.60e+6	38.B	4.31e+6	29.C	1.63e+6
112.A	1.65e+6	30.B	4.99e+6	34.C	1.70e+6
26.A	1.66e+6	58.B	5.61e+6	51.C	1.79e+6
93.A	1.92e+6	95.B	7.01e+6	3.C	1.81e+6
69.A	2.34e+6	61.B	1.71e+8	73.C	1.87e+6
51.A	2.34e+6	61.B	1.73e+8	15.C	1.93e+6
27.A	2.80e+6	151.B	1.67e+11	103.C	2.00e+6
14.A	2.80e+6	48.B	6.46e+13	93.C	2.80e+6
55.A	3.33e+6	250.B	1.65e+14	74.C	3.51e+6
30.A	4.27e+6	56.B	1.73e+14	55.C	3.59e+6
19.A	4.31e+6	2.B	2.94e+14	30.C	4.49e+6
113.A	4.31e+6	79.B	3.17e+14	31.C	4.67e+6
45.A	4.67e+6	96.B	4.62e+14	5.C	5.61e+6
36.A	4.67e+6	66.B	5.95e+14	61.C	1.70e+8
70.A	5.10e+6	43.B	1.18e+15	61.C	1.70e+8

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Impedance (Ω)					
61.A	1.77e+8	450.B	1.30e+15	151.C	1.37e+11
61.A	1.77e+8	12.B	1.32e+15	48.C	8.05e+13
151.A	3.19e+10	39.B	1.32e+15	250.C	1.02e+14
48.A	7.86e+13	59.B	1.32e+15	56.C	1.55e+14
79.A	1.08e+14	300.B	1.84e+15	79.C	2.29e+14
250.A	1.48e+14	22.B	2.63e+15	27.C	2.33e+14
95.A	1.98e+14	107.B	5.21e+15	6.C	2.92e+14
56.A	2.15e+14	300_open.B	Inf	95.C	2.92e+14
450.A	4.35e+14			4.C	3.16e+14
94.A	4.70e+14			41.C	5.76e+14
114.A	5.91e+14			450.C	9.23e+14
20.A	6.67e+14			104.C	1.04e+15
66.A	9.71e+14			75.C	1.17e+15
300.A	1.04e+15			300.C	1.31e+15
33.A	1.32e+15			17.C	2.58e+15
111.A	1.32e+15			16.C	2.58e+15
37.A	1.33e+15			32.C	2.64e+15
10.A	Inf			24.C	Inf
11.A	Inf			300_open.C	Inf
300_open.A	Inf				
46.A	Inf				
71.A	Inf				
94_open.A	Inf				

Table G.24: Electric distance obtained for Scenario S6

Electric distance with loads					
68.A	0.6	66.B	1.9	66.C	0
66.A	2.1	65.B	1.9	65.C	0.1
65.A	2.2	64.B	2	64.C	0.2
64.A	2.3	36.B	2.1	63.C	0.3
63.A	2.3	63.B	2.1	62.C	0.4
62.A	2.4	62.B	2.1	60.C	0.5
60.A	2.4	60.B	2.2	160.C	0.5
160.A	2.4	160.B	2.2	160r.C	0.5
160r.A	2.4	160r.B	2.2	61.C	0.6
67.A	2.5	61.B	2.4	61.C	0.6
61.A	2.6	61.B	2.4	97.C	0.7
61.A	2.6	97.B	2.4	197.C	0.7
97.A	2.6	197.B	2.4	72.C	0.7
197.A	2.6	72.B	2.4	76.C	0.7
72.A	2.6	76.B	2.4	101.C	0.7

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Electric distance with loads					
76.A	2.6	101.B	2.4	98.C	0.7
101.A	2.7	98.B	2.4	57.C	0.8
98.A	2.7	105.B	2.5	73.C	0.8
69.A	2.7	77.B	2.5	105.C	0.8
105.A	2.7	57.B	2.5	102.C	0.8
77.A	2.7	78.B	2.5	77.C	0.8
57.A	2.7	99.B	2.6	78.C	0.8
78.A	2.8	108.B	2.6	99.C	0.9
99.A	2.8	79.B	2.6	108.C	0.9
108.A	2.8	86.B	2.6	86.C	0.9
79.A	2.8	106.B	2.6	79.C	0.9
86.A	2.8	67.B	2.6	74.C	0.9
70.A	2.8	80.B	2.6	54.C	0.9
80.A	2.8	100.B	2.6	103.C	0.9
100.A	2.9	81.B	2.7	100.C	0.9
81.A	2.9	87.B	2.7	80.C	0.9
87.A	2.9	58.B	2.7	81.C	1
82.A	2.9	82.B	2.7	87.C	1
71.A	2.9	89.B	2.7	53.C	1
54.A	2.9	54.B	2.7	82.C	1
94_open.A	2.9	83.B	2.7	89.C	1
109.A	2.9	107.B	2.8	75.C	1
88.A	2.9	91.B	2.8	55.C	1
89.A	2.9	300.B	2.8	83.C	1.1
83.A	3	90.B	2.8	91.C	1.1
91.A	3	450.B	2.8	300.C	1.1
53.A	3	53.B	2.8	450.C	1.1
300.A	3	93.B	2.8	93.C	1.1
450.A	3	59.B	2.8	52.C	1.1
93.A	3	95.B	2.9	104.C	1.1
110.A	3	55.B	2.9	92.C	1.1
55.A	3.1	96.B	2.9	95.C	1.1
112.A	3.1	52.B	2.9	84.C	1.2
95.A	3.1	56.B	3	56.C	1.2
94.A	3.1	13.B	3.2	85.C	1.3
52.A	3.1	152.B	3.2	152.C	1.4
56.A	3.2	8.B	3.5	13.C	1.4
111.A	3.2	18.B	3.7	34.C	1.6
113.A	3.2	135.B	3.7	15.C	1.7
114.A	3.3	7.B	3.7	8.C	1.7
13.A	3.4	12.B	3.8	18.C	1.9
152.A	3.4	21.B	3.9	135.C	1.9
8.A	3.7	35.B	3.9	7.C	1.9

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Electric distance with loads					
18.A	3.9	23.B	4	17.C	2
135.A	3.9	40.B	4	16.C	2
7.A	3.9	25.B	4.1	21.C	2
9.A	4	42.B	4.1	23.C	2.1
9r.A	4	28.B	4.1	40.C	2.2
21.A	4	44.B	4.1	25.C	2.2
35.A	4.1	22.B	4.2	25r.C	2.2
19.A	4.1	47.B	4.2	42.C	2.3
36.A	4.1	29.B	4.2	67.C	2.3
23.A	4.1	38.B	4.2	28.C	2.3
40.A	4.2	48.B	4.3	44.C	2.3
25.A	4.2	1.B	4.3	41.C	2.3
25r.A	4.2	49.B	4.3	26.C	2.4
42.A	4.3	43.B	4.3	47.C	2.4
20.A	4.3	30.B	4.3	29.C	2.4
28.A	4.3	50.B	4.4	24.C	2.4
44.A	4.3	250.B	4.4	27.C	2.4
26.A	4.3	39.B	4.4	48.C	2.4
29.A	4.4	51.B	4.4	31.C	2.5
47.A	4.4	151.B	4.5	1.C	2.5
45.A	4.4	300_open.B	4.5	49.C	2.5
14.A	4.4	2.B	4.8	30.C	2.5
27.A	4.4	149.B	17.7	50.C	2.5
48.A	4.4			250.C	2.6
37.A	4.4			32.C	2.6
49.A	4.5			51.C	2.6
1.A	4.5			151.C	2.7
30.A	4.5			300_open.C	2.7
50.A	4.5			3.C	3.2
46.A	4.5			4.C	3.5
250.A	4.5			5.C	3.7
51.A	4.6			6.C	3.9
10.A	4.6			35.C	4.3
11.A	4.6			149.C	9
33.A	4.6				
151.A	4.7				
300_open.A	4.7				
149.A	18				

G.0.3 Considering OLTCs connected without capacitors compensation and meshing the network from the switch between nodes S54A and S94A

Table G.25: Impedance obtained for Scenario S1

Impedance (Ω)					
94.A	7.44e+1	149.B	2.57e+4	85.C	0.00e+0
160r.A	1.05e+2	1.B	2.60e+4	84.C	2.00e-1
67.A	1.05e+2	7.B	2.63e+4	81.C	4.00e-1
72.A	1.06e+2	8.B	2.64e+4	60.C	4.00e-1
76.A	1.06e+2	13.B	2.68e+4	160.C	4.00e-1
86.A	1.06e+2	152.B	3.33e+4	80.C	4.00e-1
87.A	1.06e+2	52.B	3.39e+4	57.C	5.00e-1
89.A	1.06e+2	53.B	3.41e+4	78.C	5.00e-1
91.A	1.06e+2	54.B	3.43e+4	54.C	6.00e-1
93.A	1.06e+2	57.B	3.55e+4	77.C	6.00e-1
57.A	1.08e+2	60.B	3.70e+4	53.C	6.00e-1
60.A	1.08e+2	62.B	7.39e+4	52.C	6.00e-1
160.A	1.08e+2	63.B	8.57e+4	76.C	7.00e-1
54.A	5.30e+3	160r.B	9.62e+4	13.C	7.00e-1
53.A	5.30e+3	160.B	9.74e+4	152.C	7.00e-1
52.A	5.30e+3	67.B	9.95e+4	72.C	7.00e-1
152.A	5.31e+3	64.B	1.26e+5	8.C	7.00e-1
13.A	5.44e+3	18.B	1.54e+5	67.C	8.00e-1
8.A	5.46e+3	97.B	2.09e+5	7.C	8.00e-1
7.A	5.46e+3	72.B	2.13e+5	160r.C	8.00e-1
1.A	5.46e+3	76.B	2.24e+5	1.C	8.00e-1
149.A	5.46e+3	135.B	2.34e+5	149.C	9.00e-1
62.A	7.39e+4	35.B	2.57e+5	62.C	7.39e+4
63.A	8.57e+4	65.B	2.90e+5	63.C	8.57e+4
64.A	1.26e+5	40.B	3.80e+5	64.C	1.26e+5
18.A	1.40e+5	197.B	3.80e+5	18.C	1.53e+5
97.A	1.86e+5	101.B	4.25e+5	97.C	1.86e+5
135.A	2.75e+5	42.B	4.26e+5	65.C	2.90e+5
197.A	2.88e+5	105.B	4.89e+5	135.C	3.17e+5
65.A	2.90e+5	21.B	5.13e+5	197.C	3.23e+5
35.A	3.00e+5	98.B	5.44e+5	21.C	3.24e+5
101.A	3.10e+5	86.B	5.54e+5	23.C	3.56e+5
105.A	3.38e+5	44.B	5.62e+5	101.C	3.58e+5
21.A	3.64e+5	47.B	6.62e+5	35.C	3.65e+5
108.A	3.80e+5	77.B	6.73e+5	40.C	4.02e+5
23.A	4.07e+5	78.B	7.22e+5	25.C	4.72e+5
40.A	4.40e+5	87.B	7.39e+5	42.C	4.98e+5

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Impedance (Ω)					
25.A	4.69e+5	23.B	7.54e+5	86.C	5.08e+5
42.A	4.98e+5	99.B	8.15e+5	98.C	5.09e+5
44.A	5.56e+5	108.B	8.97e+5	44.C	5.53e+5
98.A	6.10e+5	49.B	9.27e+5	105.C	6.34e+5
77.A	6.20e+5	89.B	9.29e+5	47.C	6.42e+5
78.A	6.66e+5	25.B	9.51e+5	87.C	6.98e+5
109.A	7.58e+5	100.B	1.12e+6	99.C	7.63e+5
47.A	8.37e+5	28.B	1.18e+6	108.C	8.39e+5
110.A	9.05e+5	50.B	1.24e+6	49.C	8.99e+5
99.A	9.15e+5	80.B	1.47e+6	89.C	9.05e+5
28.A	9.99e+5	91.B	1.49e+6	100.C	1.05e+6
25r.A	1.09e+6	29.B	1.82e+6	28.C	1.06e+6
49.A	1.17e+6	51.B	1.85e+6	25r.C	1.06e+6
100.A	1.26e+6	81.B	1.99e+6	91.C	1.19e+6
80.A	1.36e+6	93.B	2.25e+6	50.C	1.20e+6
9r.A	1.52e+6	106.B	2.44e+6	102.C	1.37e+6
29.A	1.54e+6	36.B	2.44e+6	26.C	1.61e+6
9.A	1.55e+6	55.B	3.07e+6	29.C	1.64e+6
50.A	1.56e+6	82.B	3.97e+6	34.C	1.70e+6
68.A	1.60e+6	38.B	4.31e+6	51.C	1.80e+6
112.A	1.65e+6	30.B	4.99e+6	3.C	1.81e+6
26.A	1.66e+6	58.B	5.61e+6	73.C	1.87e+6
81.A	1.84e+6	95.B	7.01e+6	15.C	1.93e+6
69.A	2.34e+6	61.B	1.71e+8	103.C	2.00e+6
51.A	2.34e+6	61.B	1.73e+8	93.C	2.80e+6
14.A	2.80e+6	151.B	1.67e+11	82.C	3.35e+6
27.A	2.80e+6	48.B	2.07e+14	74.C	3.51e+6
55.A	3.31e+6	96.B	2.16e+14	55.C	3.61e+6
82.A	3.67e+6	83.B	2.44e+14	30.C	4.51e+6
30.A	4.25e+6	66.B	2.57e+14	31.C	4.67e+6
19.A	4.31e+6	79.B	2.63e+14	5.C	5.61e+6
113.A	4.31e+6	90.B	2.93e+14	61.C	1.71e+8
45.A	4.67e+6	59.B	3.22e+14	61.C	1.73e+8
36.A	4.67e+6	2.B	3.22e+14	151.C	1.37e+11
70.A	5.10e+6	56.B	3.64e+14	83.C	1.45e+14
61.A	1.75e+8	39.B	6.44e+14	48.C	1.47e+14
61.A	1.75e+8	250.B	6.64e+14	250.C	1.47e+14
151.A	3.19e+10	450.B	7.22e+14	95.C	1.64e+14
250.A	1.34e+14	300.B	7.22e+14	27.C	1.65e+14
79.A	1.85e+14	22.B	1.19e+15	79.C	3.26e+14
56.A	1.86e+14	107.B	2.63e+15	6.C	3.31e+14
83.A	2.37e+14	43.B	2.65e+15	32.C	6.41e+14
48.A	2.67e+14	12.B	Inf	56.C	6.51e+14

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Impedance (Ω)					
88.A	2.99e+14	300_open.B	Inf	41.C	6.56e+14
66.A	3.18e+14			300.C	6.58e+14
10.A	4.66e+14			450.C	6.58e+14
11.A	4.66e+14			104.C	1.18e+15
71.A	6.64e+14			92.C	2.62e+15
300.A	7.59e+14			75.C	2.63e+15
114.A	9.39e+14			17.C	2.63e+15
46.A	9.44e+14			16.C	2.63e+15
33.A	1.32e+15			24.C	Inf
111.A	1.33e+15			300_open.C	Inf
37.A	1.34e+15			4.C	Inf
450.A	1.68e+15			66.C	Inf
20.A	Inf				
300_open.A	Inf				
95.A	Inf				
94_open.A	Inf				

Table G.26: Electric distance obtained for Scenario S1

Electric distance with loads					
68.A	0.7	81.B	2.2	85.C	0
81.A	2.3	80.B	2.2	84.C	0.1
80.A	2.4	82.B	2.2	81.C	0.3
82.A	2.4	83.B	2.3	80.C	0.4
83.A	2.4	78.B	2.3	82.C	0.4
78.A	2.6	77.B	2.3	83.C	0.4
77.A	2.6	79.B	2.4	78.C	0.5
79.A	2.6	36.B	2.4	77.C	0.5
76.A	2.8	76.B	2.4	79.C	0.5
72.A	2.8	72.B	2.5	76.C	0.6
67.A	2.9	86.B	2.6	72.C	0.6
86.A	3	97.B	2.6	73.C	0.8
97.A	3	197.B	2.6	86.C	0.8
197.A	3	60.B	2.7	97.C	0.8
60.A	3.1	160.B	2.7	197.C	0.8
160.A	3.1	160r.B	2.7	160r.C	0.8
160r.A	3.1	101.B	2.7	160.C	0.8
101.A	3.1	98.B	2.7	60.C	0.8
98.A	3.1	62.B	2.7	87.C	0.9
87.A	3.1	87.B	2.8	101.C	0.9
69.A	3.2	105.B	2.8	98.C	0.9
62.A	3.2	63.B	2.8	74.C	0.9

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Electric distance with loads					
105.A	3.2	61.B	2.8	89.C	0.9
89.A	3.2	61.B	2.8	62.C	0.9
88.A	3.2	89.B	2.8	105.C	0.9
91.A	3.2	99.B	2.9	102.C	0.9
63.A	3.2	108.B	2.9	91.C	0.9
57.A	3.2	106.B	2.9	63.C	1
61.A	3.2	91.B	2.9	93.C	1
61.A	3.2	90.B	2.9	61.C	1
99.A	3.2	64.B	2.9	61.C	1
108.A	3.2	100.B	2.9	99.C	1
93.A	3.3	57.B	2.9	108.C	1
70.A	3.3	93.B	3	75.C	1
94.A	3.3	95.B	3	92.C	1
54.A	3.3	67.B	3	95.C	1
100.A	3.3	65.B	3.1	103.C	1.1
64.A	3.4	107.B	3.1	100.C	1.1
53.A	3.4	96.B	3.1	57.C	1.1
95.A	3.4	300.B	3.1	64.C	1.1
71.A	3.4	450.B	3.1	300.C	1.2
109.A	3.4	58.B	3.1	450.C	1.2
55.A	3.4	54.B	3.1	65.C	1.2
52.A	3.5	66.B	3.1	54.C	1.2
300.A	3.5	53.B	3.2	104.C	1.3
450.A	3.5	59.B	3.2	53.C	1.3
65.A	3.5	55.B	3.2	66.C	1.3
110.A	3.5	52.B	3.3	55.C	1.4
56.A	3.5	56.B	3.4	52.C	1.4
112.A	3.5	13.B	3.6	56.C	1.5
66.A	3.6	152.B	3.6	152.C	1.7
111.A	3.7	8.B	3.9	13.C	1.7
113.A	3.7	18.B	4.1	34.C	1.9
13.A	3.8	135.B	4.1	15.C	2
152.A	3.8	7.B	4.1	8.C	2
114.A	3.8	12.B	4.2	18.C	2.2
8.A	4	21.B	4.2	135.C	2.2
18.A	4.3	35.B	4.3	7.C	2.2
135.A	4.3	23.B	4.3	17.C	2.3
7.A	4.3	40.B	4.4	16.C	2.3
9.A	4.4	25.B	4.4	21.C	2.4
9r.A	4.4	42.B	4.5	23.C	2.5
21.A	4.4	28.B	4.5	40.C	2.5
35.A	4.4	44.B	4.5	67.C	2.6
19.A	4.4	22.B	4.5	25.C	2.6

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Electric distance with loads					
23.A	4.5	47.B	4.6	25r.C	2.6
36.A	4.5	29.B	4.6	42.C	2.6
40.A	4.5	38.B	4.6	28.C	2.6
25.A	4.6	48.B	4.7	44.C	2.7
25r.A	4.6	1.B	4.7	41.C	2.7
42.A	4.6	49.B	4.7	26.C	2.7
20.A	4.6	43.B	4.7	47.C	2.7
28.A	4.7	30.B	4.7	29.C	2.7
44.A	4.7	50.B	4.7	24.C	2.8
26.A	4.7	250.B	4.8	27.C	2.8
29.A	4.8	39.B	4.8	48.C	2.8
47.A	4.8	51.B	4.8	31.C	2.8
45.A	4.8	151.B	4.9	1.C	2.8
14.A	4.8	300_open.B	4.9	49.C	2.8
27.A	4.8	2.B	5.2	30.C	2.8
48.A	4.8	149.B	33.5	50.C	2.9
37.A	4.8			250.C	2.9
49.A	4.9			32.C	2.9
1.A	4.9			51.C	2.9
30.A	4.9			151.C	3.1
50.A	4.9			300_open.C	3.1
46.A	4.9			3.C	3.5
250.A	4.9			4.C	3.8
51.A	5			5.C	4
10.A	5			6.C	4.3
11.A	5			35.C	4.7
33.A	5			149.C	9.3
151.A	5.1				
300_open.A	5.1				
149.A	20.7				
94_open.A	Inf				

Table G.27: Impedance obtained for Scenario S2

Impedance (Ω)					
76.A	6.79e+1	149.B	2.56e+4	85.C	0.00e+0
72.A	6.80e+1	1.B	2.60e+4	84.C	2.00e-1
67.A	6.80e+1	7.B	2.63e+4	81.C	4.00e-1
60.A	6.80e+1	8.B	2.65e+4	80.C	4.00e-1
86.A	6.81e+1	13.B	2.69e+4	60.C	5.00e-1
160.A	6.81e+1	152.B	3.34e+4	160.C	5.00e-1
160r.A	6.81e+1	52.B	3.40e+4	57.C	5.00e-1

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Impedance (Ω)					
57.A	6.82e+1	53.B	3.43e+4	78.C	5.00e-1
87.A	6.82e+1	54.B	3.44e+4	54.C	5.00e-1
89.A	6.83e+1	57.B	3.57e+4	53.C	6.00e-1
91.A	6.83e+1	60.B	3.74e+4	77.C	6.00e-1
93.A	6.83e+1	62.B	7.39e+4	52.C	6.00e-1
94.A	8.63e+1	63.B	8.57e+4	13.C	6.00e-1
149.A	2.42e+4	160r.B	9.73e+4	152.C	6.00e-1
1.A	2.44e+4	160.B	9.98e+4	76.C	7.00e-1
7.A	2.46e+4	67.B	1.01e+5	8.C	7.00e-1
8.A	2.47e+4	64.B	1.26e+5	7.C	7.00e-1
13.A	2.54e+4	18.B	1.54e+5	72.C	7.00e-1
152.A	3.21e+4	97.B	2.12e+5	1.C	7.00e-1
52.A	3.24e+4	72.B	2.15e+5	67.C	7.00e-1
53.A	3.26e+4	76.B	2.26e+5	149.C	8.00e-1
54.A	3.28e+4	135.B	2.34e+5	160r.C	8.00e-1
62.A	7.39e+4	35.B	2.57e+5	62.C	7.39e+4
63.A	8.57e+4	65.B	2.90e+5	63.C	8.57e+4
64.A	1.26e+5	40.B	3.81e+5	64.C	1.26e+5
18.A	1.39e+5	197.B	3.85e+5	18.C	1.55e+5
97.A	1.84e+5	42.B	4.27e+5	97.C	1.88e+5
135.A	2.74e+5	101.B	4.31e+5	65.C	2.90e+5
197.A	2.85e+5	105.B	4.95e+5	135.C	3.20e+5
65.A	2.90e+5	21.B	5.13e+5	197.C	3.27e+5
35.A	2.99e+5	98.B	5.52e+5	21.C	3.30e+5
101.A	3.07e+5	86.B	5.59e+5	101.C	3.61e+5
105.A	3.36e+5	44.B	5.63e+5	23.C	3.63e+5
21.A	3.58e+5	47.B	6.64e+5	35.C	3.68e+5
108.A	3.78e+5	77.B	6.81e+5	40.C	4.05e+5
23.A	4.00e+5	78.B	7.31e+5	25.C	4.84e+5
40.A	4.38e+5	87.B	7.46e+5	42.C	5.03e+5
25.A	4.61e+5	23.B	7.55e+5	86.C	5.13e+5
42.A	4.97e+5	99.B	8.28e+5	98.C	5.16e+5
44.A	5.55e+5	108.B	9.11e+5	44.C	5.59e+5
98.A	6.01e+5	49.B	9.30e+5	105.C	6.43e+5
77.A	6.04e+5	89.B	9.37e+5	47.C	6.49e+5
78.A	6.47e+5	25.B	9.52e+5	87.C	7.04e+5
109.A	7.58e+5	100.B	1.14e+6	99.C	7.75e+5
47.A	8.36e+5	28.B	1.18e+6	108.C	8.52e+5
99.A	9.01e+5	50.B	1.24e+6	49.C	9.09e+5
110.A	9.05e+5	80.B	1.49e+6	89.C	9.11e+5
28.A	9.87e+5	91.B	1.50e+6	25r.C	1.06e+6
25r.A	1.09e+6	29.B	1.82e+6	100.C	1.06e+6
49.A	1.17e+6	51.B	1.86e+6	28.C	1.07e+6

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Impedance (Ω)					
100.A	1.24e+6	81.B	2.01e+6	91.C	1.20e+6
80.A	1.31e+6	93.B	2.27e+6	50.C	1.21e+6
9r.A	1.52e+6	106.B	2.44e+6	102.C	1.37e+6
29.A	1.53e+6	36.B	2.44e+6	26.C	1.60e+6
9.A	1.53e+6	55.B	3.08e+6	29.C	1.65e+6
50.A	1.56e+6	82.B	4.02e+6	34.C	1.70e+6
68.A	1.60e+6	38.B	4.31e+6	3.C	1.81e+6
112.A	1.65e+6	30.B	5.00e+6	51.C	1.82e+6
26.A	1.66e+6	58.B	5.61e+6	73.C	1.87e+6
81.A	1.77e+6	95.B	7.01e+6	15.C	1.93e+6
69.A	2.34e+6	61.B	1.73e+8	103.C	2.00e+6
51.A	2.34e+6	61.B	1.76e+8	93.C	2.83e+6
14.A	2.80e+6	151.B	1.67e+11	82.C	3.41e+6
27.A	2.80e+6	56.B	1.28e+14	74.C	3.51e+6
55.A	3.26e+6	83.B	1.74e+14	55.C	3.66e+6
82.A	3.55e+6	79.B	2.59e+14	30.C	4.53e+6
30.A	4.20e+6	96.B	2.95e+14	31.C	4.67e+6
113.A	4.31e+6	2.B	2.97e+14	5.C	5.61e+6
19.A	4.31e+6	12.B	3.69e+14	61.C	1.75e+8
45.A	4.67e+6	450.B	4.34e+14	61.C	1.75e+8
36.A	4.67e+6	48.B	4.44e+14	151.C	1.37e+11
70.A	5.10e+6	66.B	5.34e+14	250.C	8.42e+13
61.A	1.71e+8	39.B	5.95e+14	48.C	9.34e+13
61.A	1.71e+8	90.B	6.60e+14	95.C	1.62e+14
151.A	3.19e+10	250.B	6.65e+14	56.C	1.70e+14
48.A	9.90e+13	107.B	1.32e+15	4.C	2.19e+14
95.A	1.05e+14	22.B	1.33e+15	66.C	2.26e+14
83.A	1.61e+14	59.B	1.33e+15	83.C	3.03e+14
250.A	2.09e+14	300.B	2.36e+15	92.C	3.34e+14
79.A	2.91e+14	43.B	2.66e+15	79.C	3.36e+14
71.A	2.93e+14	300_open.B	Inf	75.C	4.71e+14
88.A	3.28e+14			32.C	5.91e+14
56.A	3.65e+14			6.C	5.97e+14
450.A	5.21e+14			27.C	6.61e+14
66.A	5.22e+14			300.C	6.64e+14
114.A	6.54e+14			450.C	9.40e+14
20.A	1.32e+15			41.C	1.35e+15
300.A	2.54e+15			16.C	2.69e+15
111.A	2.62e+15			17.C	2.69e+15
10.A	Inf			24.C	2.69e+15
11.A	Inf			104.C	Inf
300_open.A	Inf			300_open.C	Inf
33.A	Inf				

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Impedance (Ω)					
37.A	Inf				
46.A	Inf				
94_open.A	Inf				

Table G.28: Electric distance obtained for Scenario S2

Electric distance with loads					
68.A	0.7	81.B	2.2	85.C	0
81.A	2.3	80.B	2.2	84.C	0.1
80.A	2.4	82.B	2.2	81.C	0.3
82.A	2.4	83.B	2.3	80.C	0.4
83.A	2.5	78.B	2.3	82.C	0.4
78.A	2.6	77.B	2.3	83.C	0.4
77.A	2.6	79.B	2.4	78.C	0.5
79.A	2.6	36.B	2.4	77.C	0.5
76.A	2.8	76.B	2.4	79.C	0.5
72.A	2.9	72.B	2.5	76.C	0.6
67.A	2.9	86.B	2.7	72.C	0.6
86.A	3	97.B	2.7	73.C	0.8
97.A	3	197.B	2.7	86.C	0.8
197.A	3	60.B	2.7	97.C	0.8
60.A	3.1	160.B	2.7	197.C	0.8
160.A	3.1	160r.B	2.7	160r.C	0.8
160r.A	3.1	101.B	2.7	160.C	0.8
101.A	3.1	98.B	2.7	60.C	0.8
98.A	3.1	62.B	2.8	87.C	0.9
87.A	3.1	87.B	2.8	101.C	0.9
69.A	3.2	105.B	2.8	98.C	0.9
105.A	3.2	63.B	2.8	74.C	0.9
62.A	3.2	61.B	2.8	89.C	0.9
89.A	3.2	61.B	2.8	62.C	0.9
88.A	3.2	89.B	2.8	105.C	0.9
91.A	3.2	99.B	2.9	102.C	1
63.A	3.3	108.B	2.9	91.C	1
99.A	3.3	106.B	2.9	63.C	1
108.A	3.3	91.B	2.9	93.C	1
57.A	3.3	90.B	2.9	61.C	1
61.A	3.3	64.B	2.9	61.C	1
61.A	3.3	100.B	2.9	99.C	1
93.A	3.3	57.B	3	108.C	1
70.A	3.3	93.B	3	75.C	1
94.A	3.3	95.B	3	92.C	1

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Electric distance with loads					
54.A	3.3	67.B	3	95.C	1.1
100.A	3.3	65.B	3.1	103.C	1.1
53.A	3.4	107.B	3.1	100.C	1.1
64.A	3.4	96.B	3.1	57.C	1.1
95.A	3.4	300.B	3.1	64.C	1.1
71.A	3.4	450.B	3.1	300.C	1.2
109.A	3.4	58.B	3.1	450.C	1.2
55.A	3.4	54.B	3.1	65.C	1.2
300.A	3.5	66.B	3.2	54.C	1.2
52.A	3.5	53.B	3.2	104.C	1.3
450.A	3.5	59.B	3.2	53.C	1.3
110.A	3.5	55.B	3.2	66.C	1.3
65.A	3.5	52.B	3.3	55.C	1.4
112.A	3.6	56.B	3.4	52.C	1.4
56.A	3.6	13.B	3.6	56.C	1.5
66.A	3.6	152.B	3.6	152.C	1.7
111.A	3.7	8.B	3.9	13.C	1.7
113.A	3.7	18.B	4.1	34.C	1.9
114.A	3.8	135.B	4.1	15.C	2
13.A	3.8	7.B	4.1	8.C	2
152.A	3.8	12.B	4.2	18.C	2.2
8.A	4.1	21.B	4.3	135.C	2.2
18.A	4.3	35.B	4.3	7.C	2.3
135.A	4.3	23.B	4.4	17.C	2.3
7.A	4.3	40.B	4.4	16.C	2.3
9.A	4.4	25.B	4.5	21.C	2.4
9r.A	4.4	42.B	4.5	23.C	2.5
21.A	4.4	28.B	4.5	40.C	2.5
35.A	4.5	44.B	4.5	67.C	2.6
19.A	4.5	22.B	4.6	25.C	2.6
36.A	4.5	47.B	4.6	25r.C	2.6
23.A	4.5	29.B	4.6	42.C	2.6
40.A	4.6	38.B	4.6	28.C	2.7
25.A	4.6	48.B	4.7	44.C	2.7
25r.A	4.6	1.B	4.7	41.C	2.7
42.A	4.7	49.B	4.7	26.C	2.7
20.A	4.7	43.B	4.7	47.C	2.7
28.A	4.7	30.B	4.7	29.C	2.7
44.A	4.7	50.B	4.8	24.C	2.8
26.A	4.8	250.B	4.8	27.C	2.8
29.A	4.8	39.B	4.8	48.C	2.8
47.A	4.8	51.B	4.8	31.C	2.8
45.A	4.8	151.B	4.9	1.C	2.8

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Electric distance with loads					
14.A	4.8	300_open.B	4.9	49.C	2.8
27.A	4.8	2.B	5.2	30.C	2.8
48.A	4.8	149.B	33.5	50.C	2.9
37.A	4.8			250.C	2.9
49.A	4.9			32.C	2.9
1.A	4.9			51.C	2.9
30.A	4.9			151.C	3.1
50.A	4.9			300_open.C	3.1
46.A	4.9			3.C	3.5
250.A	4.9			4.C	3.8
51.A	5			5.C	4
10.A	5			6.C	4.3
11.A	5			35.C	4.7
33.A	5			149.C	9.3
151.A	5.1				
300_open.A	5.1				
149.A	34				
94_open.A	Inf				

Table G.29: Impedance obtained for Scenario S3

Impedance (Ω)					
94.A	5.28e+1	149.B	2.56e+4	66.C	0.00e+0
160r.A	8.03e+1	1.B	2.59e+4	65.C	1.00e-1
67.A	8.04e+1	7.B	2.63e+4	64.C	2.00e-1
72.A	8.04e+1	8.B	2.64e+4	63.C	4.00e-1
76.A	8.05e+1	13.B	2.68e+4	62.C	4.00e-1
86.A	8.06e+1	152.B	3.33e+4	60.C	5.00e-1
87.A	8.07e+1	52.B	3.38e+4	57.C	6.00e-1
89.A	8.08e+1	53.B	3.41e+4	54.C	7.00e-1
91.A	8.09e+1	54.B	3.43e+4	53.C	7.00e-1
93.A	8.09e+1	57.B	3.55e+4	52.C	8.00e-1
57.A	8.23e+1	60.B	3.70e+4	152.C	9.00e-1
60.A	8.27e+1	62.B	7.38e+4	13.C	9.00e-1
160.A	8.28e+1	63.B	8.55e+4	8.C	9.00e-1
152.A	3.86e+3	160r.B	9.62e+4	7.C	1.00e+0
52.A	3.86e+3	160.B	9.75e+4	1.C	1.00e+0
53.A	3.86e+3	67.B	9.96e+4	149.C	1.10e+0
54.A	3.86e+3	64.B	1.26e+5	160.C	7.29e+4
13.A	3.95e+3	18.B	1.54e+5	160r.C	7.57e+4
149.A	3.96e+3	97.B	2.10e+5	67.C	7.81e+4
1.A	3.96e+3	72.B	2.13e+5	72.C	1.47e+5

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Impedance (Ω)					
7.A	3.96e+3	76.B	2.24e+5	18.C	1.53e+5
8.A	3.96e+3	135.B	2.34e+5	76.C	1.71e+5
62.A	7.38e+4	35.B	2.57e+5	97.C	1.86e+5
63.A	8.56e+4	65.B	2.90e+5	135.C	3.17e+5
64.A	1.26e+5	40.B	3.80e+5	197.C	3.23e+5
18.A	1.40e+5	197.B	3.81e+5	21.C	3.24e+5
97.A	1.86e+5	101.B	4.26e+5	23.C	3.56e+5
135.A	2.75e+5	42.B	4.26e+5	101.C	3.58e+5
197.A	2.88e+5	105.B	4.89e+5	35.C	3.65e+5
65.A	2.90e+5	21.B	5.13e+5	77.C	3.89e+5
35.A	3.00e+5	98.B	5.44e+5	40.C	4.02e+5
101.A	3.10e+5	86.B	5.54e+5	78.C	4.08e+5
105.A	3.38e+5	44.B	5.62e+5	25.C	4.73e+5
21.A	3.64e+5	47.B	6.62e+5	42.C	4.98e+5
108.A	3.80e+5	77.B	6.74e+5	98.C	5.09e+5
23.A	4.07e+5	78.B	7.23e+5	86.C	5.09e+5
40.A	4.40e+5	87.B	7.40e+5	44.C	5.53e+5
25.A	4.69e+5	23.B	7.54e+5	80.C	6.17e+5
42.A	4.98e+5	99.B	8.16e+5	105.C	6.34e+5
44.A	5.56e+5	108.B	8.98e+5	47.C	6.43e+5
98.A	6.10e+5	49.B	9.27e+5	87.C	6.99e+5
77.A	6.18e+5	89.B	9.30e+5	81.C	7.08e+5
78.A	6.63e+5	25.B	9.51e+5	99.C	7.63e+5
109.A	7.58e+5	100.B	1.12e+6	108.C	8.40e+5
47.A	8.37e+5	28.B	1.18e+6	49.C	9.00e+5
110.A	9.05e+5	50.B	1.24e+6	89.C	9.05e+5
99.A	9.15e+5	80.B	1.47e+6	100.C	1.05e+6
28.A	9.99e+5	91.B	1.49e+6	28.C	1.06e+6
25r.A	1.09e+6	29.B	1.82e+6	25r.C	1.06e+6
49.A	1.17e+6	51.B	1.85e+6	91.C	1.19e+6
100.A	1.26e+6	81.B	1.99e+6	50.C	1.20e+6
80.A	1.35e+6	93.B	2.25e+6	102.C	1.37e+6
9r.A	1.52e+6	106.B	2.44e+6	26.C	1.61e+6
29.A	1.54e+6	36.B	2.44e+6	29.C	1.64e+6
9.A	1.55e+6	55.B	3.07e+6	34.C	1.70e+6
50.A	1.56e+6	82.B	3.98e+6	51.C	1.80e+6
68.A	1.60e+6	38.B	4.31e+6	3.C	1.81e+6
112.A	1.65e+6	30.B	4.99e+6	73.C	1.87e+6
26.A	1.66e+6	58.B	5.61e+6	15.C	1.93e+6
81.A	1.82e+6	95.B	7.01e+6	103.C	2.00e+6
69.A	2.34e+6	61.B	1.71e+8	93.C	2.80e+6
51.A	2.34e+6	61.B	1.73e+8	84.C	2.95e+6
27.A	2.80e+6	151.B	1.67e+11	82.C	3.37e+6

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Impedance (Ω)					
14.A	2.80e+6	250.B	7.81e+13	74.C	3.51e+6
55.A	3.31e+6	48.B	1.44e+14	55.C	3.61e+6
82.A	3.65e+6	96.B	2.62e+14	30.C	4.51e+6
30.A	4.25e+6	12.B	2.97e+14	31.C	4.67e+6
19.A	4.31e+6	2.B	2.97e+14	5.C	5.61e+6
113.A	4.31e+6	66.B	3.76e+14	61.C	1.69e+8
36.A	4.67e+6	83.B	4.65e+14	61.C	1.71e+8
45.A	4.67e+6	300.B	4.78e+14	151.C	1.37e+11
70.A	5.10e+6	90.B	5.87e+14	48.C	1.16e+14
61.A	1.75e+8	56.B	5.93e+14	250.C	1.47e+14
61.A	1.75e+8	39.B	8.85e+14	95.C	2.32e+14
151.A	3.19e+10	79.B	9.29e+14	79.C	3.28e+14
48.A	1.17e+14	22.B	1.19e+15	83.C	3.28e+14
83.A	2.66e+14	107.B	1.31e+15	92.C	5.87e+14
250.A	2.99e+14	59.B	1.33e+15	450.C	5.87e+14
56.A	2.99e+14	43.B	1.33e+15	300.C	5.87e+14
66.A	4.12e+14	450.B	1.46e+15	4.C	5.92e+14
10.A	4.66e+14	300_open.B	Inf	56.C	6.52e+14
11.A	4.66e+14			6.C	6.62e+14
71.A	4.69e+14			75.C	9.29e+14
37.A	5.97e+14			85.C	1.31e+15
79.A	6.65e+14			16.C	1.31e+15
88.A	6.67e+14			41.C	1.31e+15
95.A	6.69e+14			17.C	2.63e+15
450.A	8.39e+14			24.C	2.63e+15
20.A	9.44e+14			104.C	5.25e+15
46.A	9.44e+14			27.C	Inf
300.A	9.86e+14			300_open.C	Inf
111.A	1.19e+15			32.C	Inf
33.A	1.32e+15				
114.A	Inf				
300_open.A	Inf				
94_open.A	Inf				

Table G.30: Electric distance obtained for Scenario S3

Electric distance with loads					
68.A	0.6	66.B	1.9	66.C	0
66.A	2.2	65.B	2	65.C	0.1
65.A	2.3	36.B	2.1	64.C	0.2
64.A	2.4	64.B	2.1	63.C	0.3
63.A	2.5	63.B	2.2	62.C	0.4

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Electric distance with loads					
62.A	2.5	62.B	2.2	60.C	0.5
60.A	2.6	60.B	2.3	160.C	0.5
160.A	2.6	160.B	2.3	160r.C	0.5
160r.A	2.6	160r.B	2.3	61.C	0.7
67.A	2.7	61.B	2.5	61.C	0.7
61.A	2.8	61.B	2.5	97.C	0.7
61.A	2.8	97.B	2.5	197.C	0.7
72.A	2.8	197.B	2.5	72.C	0.7
97.A	2.8	72.B	2.5	76.C	0.7
197.A	2.8	101.B	2.6	101.C	0.7
76.A	2.8	98.B	2.6	98.C	0.8
57.A	2.9	76.B	2.6	57.C	0.8
101.A	2.9	57.B	2.6	73.C	0.8
98.A	2.9	105.B	2.6	105.C	0.8
69.A	2.9	77.B	2.7	102.C	0.8
105.A	3	78.B	2.7	77.C	0.8
77.A	3	99.B	2.7	78.C	0.9
86.A	3	108.B	2.7	99.C	0.9
54.A	3	106.B	2.7	108.C	0.9
94.A	3	79.B	2.8	86.C	0.9
78.A	3	86.B	2.8	79.C	0.9
99.A	3	58.B	2.8	74.C	0.9
108.A	3	100.B	2.8	54.C	0.9
87.A	3	54.B	2.8	103.C	1
93.A	3.1	80.B	2.8	100.C	1
89.A	3.1	67.B	2.8	80.C	1
53.A	3.1	81.B	2.8	87.C	1
91.A	3.1	53.B	2.9	53.C	1
79.A	3.1	87.B	2.9	81.C	1
70.A	3.1	82.B	2.9	89.C	1
100.A	3.1	107.B	2.9	82.C	1.1
55.A	3.1	59.B	2.9	75.C	1.1
80.A	3.1	300.B	2.9	55.C	1.1
88.A	3.1	450.B	2.9	91.C	1.1
71.A	3.2	55.B	2.9	300.C	1.1
95.A	3.2	83.B	2.9	83.C	1.1
52.A	3.2	89.B	2.9	450.C	1.1
81.A	3.2	52.B	3	52.C	1.1
109.A	3.2	91.B	3	93.C	1.1
82.A	3.2	90.B	3	104.C	1.2
56.A	3.2	93.B	3	92.C	1.2
300.A	3.3	56.B	3.1	95.C	1.2
450.A	3.3	95.B	3.1	56.C	1.2

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Electric distance with loads					
83.A	3.3	96.B	3.2	84.C	1.2
110.A	3.3	13.B	3.3	85.C	1.3
112.A	3.3	152.B	3.3	152.C	1.4
111.A	3.5	8.B	3.6	13.C	1.4
13.A	3.5	18.B	3.8	34.C	1.6
152.A	3.5	135.B	3.8	15.C	1.7
113.A	3.5	7.B	3.8	8.C	1.7
114.A	3.6	12.B	3.9	18.C	1.9
8.A	3.8	21.B	3.9	135.C	1.9
18.A	4	35.B	4	7.C	1.9
135.A	4	23.B	4	17.C	2
7.A	4	40.B	4.1	16.C	2
9.A	4.1	25.B	4.2	21.C	2.1
9r.A	4.1	42.B	4.2	23.C	2.2
21.A	4.1	28.B	4.2	40.C	2.2
35.A	4.2	44.B	4.2	25.C	2.3
19.A	4.2	22.B	4.2	25r.C	2.3
36.A	4.2	47.B	4.3	42.C	2.3
23.A	4.2	29.B	4.3	28.C	2.3
40.A	4.3	38.B	4.3	44.C	2.4
25.A	4.3	48.B	4.4	41.C	2.4
25r.A	4.3	1.B	4.4	26.C	2.4
42.A	4.3	49.B	4.4	67.C	2.4
20.A	4.3	43.B	4.4	47.C	2.4
28.A	4.4	30.B	4.4	29.C	2.4
44.A	4.4	50.B	4.4	24.C	2.5
26.A	4.4	250.B	4.5	27.C	2.5
29.A	4.5	39.B	4.5	48.C	2.5
47.A	4.5	51.B	4.5	31.C	2.5
45.A	4.5	151.B	4.6	1.C	2.5
14.A	4.5	300_open.B	4.6	49.C	2.5
27.A	4.5	2.B	4.9	30.C	2.5
48.A	4.5	149.B	32.8	50.C	2.6
37.A	4.5			250.C	2.6
49.A	4.6			32.C	2.6
1.A	4.6			51.C	2.6
30.A	4.6			151.C	2.8
50.A	4.6			300_open.C	2.8
46.A	4.6			3.C	3.2
250.A	4.6			4.C	3.5
51.A	4.7			5.C	3.7
10.A	4.7			6.C	4
11.A	4.7			35.C	4.4

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Electric distance with loads					
33.A	4.7			149.C	9
151.A	4.8				
300_open.A	4.8				
149.A	21.6				
94_open.A	Inf				

Table G.31: Impedance obtained for Scenario S4

Impedance (Ω)					
82.A	0.00e+0	149.B	2.55e+4	160r.C	4.00e-1
81.A	1.00e-1	1.B	2.59e+4	67.C	5.00e-1
80.A	1.00e-1	7.B	2.62e+4	72.C	5.00e-1
78.A	2.00e-1	8.B	2.64e+4	76.C	5.00e-1
77.A	2.00e-1	13.B	2.68e+4	77.C	6.00e-1
54.A	4.00e-1	152.B	3.33e+4	78.C	6.00e-1
53.A	4.00e-1	52.B	3.39e+4	80.C	7.00e-1
52.A	5.00e-1	53.B	3.42e+4	81.C	7.00e-1
13.A	6.00e-1	54.B	3.44e+4	149.C	8.00e-1
152.A	6.00e-1	57.B	3.57e+4	1.C	8.00e-1
8.A	6.00e-1	60.B	3.73e+4	7.C	9.00e-1
7.A	6.00e-1	62.B	7.39e+4	8.C	9.00e-1
1.A	7.00e-1	63.B	8.57e+4	84.C	9.00e-1
149.A	8.00e-1	160r.B	9.67e+4	13.C	9.00e-1
60.A	8.10e+0	160.B	9.92e+4	152.C	9.00e-1
160.A	8.10e+0	67.B	1.00e+5	52.C	1.00e+0
76.A	8.20e+0	64.B	1.26e+5	53.C	1.00e+0
57.A	8.20e+0	18.B	1.54e+5	54.C	1.10e+0
72.A	8.20e+0	97.B	2.11e+5	85.C	1.10e+0
67.A	8.20e+0	72.B	2.15e+5	57.C	1.10e+0
160r.A	8.30e+0	76.B	2.25e+5	60.C	1.20e+0
94.A	4.12e+1	135.B	2.34e+5	160.C	1.20e+0
86.A	6.65e+1	35.B	2.58e+5	62.C	7.39e+4
87.A	6.65e+1	65.B	2.90e+5	63.C	8.57e+4
89.A	6.65e+1	40.B	3.81e+5	64.C	1.26e+5
91.A	6.66e+1	197.B	3.83e+5	18.C	1.53e+5
93.A	6.66e+1	42.B	4.27e+5	97.C	1.85e+5
62.A	7.39e+4	101.B	4.28e+5	65.C	2.90e+5
63.A	8.57e+4	105.B	4.92e+5	135.C	3.17e+5
64.A	1.26e+5	21.B	5.14e+5	197.C	3.23e+5
18.A	1.39e+5	98.B	5.48e+5	21.C	3.23e+5
97.A	1.85e+5	86.B	5.57e+5	23.C	3.55e+5
135.A	2.75e+5	44.B	5.63e+5	101.C	3.57e+5

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Impedance (Ω)					
197.A	2.87e+5	47.B	6.63e+5	35.C	3.65e+5
65.A	2.90e+5	77.B	6.79e+5	40.C	4.02e+5
35.A	3.00e+5	78.B	7.28e+5	25.C	4.72e+5
101.A	3.09e+5	87.B	7.43e+5	42.C	4.98e+5
105.A	3.37e+5	23.B	7.57e+5	86.C	5.07e+5
21.A	3.60e+5	99.B	8.22e+5	98.C	5.08e+5
108.A	3.79e+5	108.B	9.04e+5	44.C	5.53e+5
23.A	4.02e+5	49.B	9.28e+5	105.C	6.33e+5
40.A	4.39e+5	89.B	9.34e+5	47.C	6.42e+5
25.A	4.63e+5	25.B	9.55e+5	87.C	6.97e+5
42.A	4.97e+5	100.B	1.13e+6	99.C	7.62e+5
44.A	5.55e+5	28.B	1.18e+6	108.C	8.38e+5
98.A	6.06e+5	50.B	1.24e+6	49.C	8.99e+5
109.A	7.58e+5	80.B	1.49e+6	89.C	9.04e+5
47.A	8.34e+5	91.B	1.50e+6	100.C	1.05e+6
110.A	9.05e+5	29.B	1.82e+6	28.C	1.06e+6
99.A	9.10e+5	51.B	1.86e+6	25r.C	1.06e+6
28.A	9.95e+5	81.B	2.01e+6	91.C	1.19e+6
25r.A	1.09e+6	93.B	2.26e+6	50.C	1.20e+6
49.A	1.17e+6	36.B	2.44e+6	102.C	1.37e+6
100.A	1.25e+6	106.B	2.44e+6	26.C	1.60e+6
9r.A	1.52e+6	55.B	3.09e+6	29.C	1.64e+6
9.A	1.53e+6	82.B	4.02e+6	34.C	1.70e+6
29.A	1.54e+6	38.B	4.31e+6	51.C	1.80e+6
50.A	1.56e+6	30.B	5.01e+6	3.C	1.81e+6
68.A	1.60e+6	58.B	5.61e+6	73.C	1.87e+6
112.A	1.65e+6	95.B	7.01e+6	15.C	1.93e+6
26.A	1.66e+6	61.B	1.71e+8	103.C	2.00e+6
51.A	2.34e+6	61.B	1.74e+8	93.C	2.80e+6
69.A	2.34e+6	151.B	1.67e+11	82.C	3.34e+6
27.A	2.80e+6	48.B	8.10e+13	74.C	3.51e+6
14.A	2.80e+6	56.B	1.25e+14	55.C	3.61e+6
55.A	3.29e+6	250.B	1.66e+14	30.C	4.50e+6
30.A	4.23e+6	2.B	2.35e+14	31.C	4.67e+6
113.A	4.31e+6	79.B	2.47e+14	5.C	5.61e+6
19.A	4.31e+6	66.B	3.03e+14	61.C	1.71e+8
45.A	4.67e+6	96.B	3.21e+14	61.C	1.73e+8
36.A	4.67e+6	83.B	4.44e+14	151.C	1.37e+11
70.A	5.10e+6	12.B	4.72e+14	79.C	1.46e+14
61.A	1.73e+8	300.B	5.20e+14	48.C	1.47e+14
61.A	1.73e+8	43.B	5.97e+14	4.C	2.17e+14
151.A	3.19e+10	39.B	5.97e+14	83.C	2.29e+14
250.A	1.09e+14	107.B	6.58e+14	250.C	2.32e+14

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Impedance (Ω)					
48.A	1.34e+14	450.B	9.37e+14	56.C	3.25e+14
95.A	1.96e+14	22.B	1.34e+15	450.C	4.16e+14
79.A	2.15e+14	300_open.B	Inf	17.C	6.36e+14
83.A	2.31e+14	59.B	Inf	41.C	6.56e+14
300.A	4.51e+14	90.B	Inf	75.C	6.56e+14
71.A	4.65e+14			27.C	6.60e+14
37.A	4.67e+14			16.C	8.74e+14
56.A	5.88e+14			300.C	9.30e+14
450.A	6.53e+14			92.C	2.63e+15
88.A	6.57e+14			104.C	Inf
20.A	9.34e+14			24.C	Inf
46.A	9.34e+14			300_open.C	Inf
33.A	9.34e+14			32.C	Inf
111.A	1.32e+15			66.C	Inf
114.A	1.32e+15			6.C	Inf
66.A	1.45e+15			95.C	Inf
10.A	Inf				
11.A	Inf				
300_open.A	Inf				
94_open.A	Inf				

Table G.32: Electric distance obtained for Scenario S4

Electric distance with loads					
82.A	0	67.B	0.6	82.C	2
83.A	0.1	82.B	2	83.C	2
81.A	0.1	83.B	2.1	81.C	2.1
80.A	0.1	81.B	2.1	80.C	2.1
78.A	0.2	80.B	2.1	35.C	2.2
77.A	0.3	78.B	2.2	84.C	2.3
79.A	0.3	77.B	2.3	78.C	2.3
76.A	0.4	79.B	2.3	77.C	2.4
72.A	0.5	76.B	2.4	79.C	2.4
67.A	0.5	72.B	2.4	67.C	2.4
86.A	0.6	54.B	2.4	85.C	2.4
97.A	0.6	60.B	2.4	76.C	2.6
197.A	0.6	160.B	2.4	72.C	2.6
160r.A	0.6	160r.B	2.4	73.C	2.7
160.A	0.6	57.B	2.4	97.C	2.7
60.A	0.6	53.B	2.5	197.C	2.7
101.A	0.7	97.B	2.5	60.C	2.7
87.A	0.7	197.B	2.5	160.C	2.7

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Electric distance with loads					
98.A	0.7	62.B	2.5	160r.C	2.7
62.A	0.7	55.B	2.5	101.C	2.8
89.A	0.8	101.B	2.5	98.C	2.8
69.A	0.8	98.B	2.5	62.C	2.8
105.A	0.8	63.B	2.6	57.C	2.9
57.A	0.8	58.B	2.6	74.C	2.9
91.A	0.8	61.B	2.6	105.C	2.9
88.A	0.8	61.B	2.6	102.C	2.9
63.A	0.8	52.B	2.6	54.C	2.9
93.A	0.8	105.B	2.6	63.C	2.9
61.A	0.8	56.B	2.7	61.C	2.9
61.A	0.8	64.B	2.7	61.C	2.9
54.A	0.8	99.B	2.7	99.C	2.9
94.A	0.8	108.B	2.7	108.C	2.9
99.A	0.9	106.B	2.7	53.C	3
108.A	0.9	86.B	2.7	86.C	3
53.A	0.9	59.B	2.7	75.C	3
70.A	0.9	100.B	2.8	103.C	3
100.A	0.9	65.B	2.8	100.C	3
64.A	0.9	13.B	2.9	64.C	3
95.A	0.9	152.B	2.9	55.C	3
55.A	1	107.B	2.9	52.C	3.1
71.A	1	300.B	2.9	56.C	3.1
52.A	1	66.B	2.9	65.C	3.1
109.A	1	450.B	2.9	300.C	3.2
65.A	1.1	87.B	2.9	450.C	3.2
56.A	1.1	89.B	3.1	104.C	3.2
300.A	1.1	90.B	3.1	66.C	3.2
450.A	1.1	8.B	3.2	87.C	3.2
110.A	1.1	91.B	3.2	13.C	3.4
112.A	1.1	93.B	3.3	152.C	3.4
66.A	1.2	95.B	3.3	89.C	3.4
111.A	1.3	96.B	3.4	34.C	3.5
152.A	1.3	18.B	3.4	91.C	3.6
13.A	1.3	135.B	3.4	15.C	3.6
113.A	1.3	7.B	3.4	92.C	3.7
114.A	1.4	12.B	3.5	8.C	3.7
8.A	1.6	21.B	3.5	93.C	3.7
18.A	1.8	35.B	3.6	95.C	3.8
135.A	1.8	23.B	3.6	18.C	3.9
7.A	1.8	40.B	3.7	135.C	3.9
9.A	1.9	25.B	3.7	7.C	3.9
9r.A	1.9	42.B	3.8	17.C	3.9

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Electric distance with loads					
21.A	1.9	28.B	3.8	16.C	4
35.A	2	44.B	3.8	21.C	4
19.A	2	22.B	3.8	23.C	4.1
23.A	2	47.B	3.9	40.C	4.2
40.A	2.1	29.B	3.9	25.C	4.2
25.A	2.1	38.B	3.9	25r.C	4.2
25r.A	2.1	48.B	4	42.C	4.3
42.A	2.2	1.B	4	28.C	4.3
20.A	2.2	49.B	4	44.C	4.3
28.A	2.2	43.B	4	41.C	4.3
44.A	2.2	30.B	4	26.C	4.4
26.A	2.3	50.B	4	47.C	4.4
29.A	2.3	36.B	4.1	29.C	4.4
47.A	2.3	250.B	4.1	24.C	4.4
45.A	2.3	39.B	4.1	27.C	4.4
14.A	2.3	51.B	4.1	48.C	4.4
27.A	2.3	151.B	4.2	31.C	4.5
48.A	2.4	300_open.B	4.2	1.C	4.5
37.A	2.4	2.B	4.5	49.C	4.5
49.A	2.4	149.B	33	30.C	4.5
1.A	2.4			50.C	4.5
30.A	2.4			250.C	4.6
50.A	2.5			32.C	4.6
46.A	2.5			51.C	4.6
250.A	2.5			151.C	4.7
51.A	2.5			300_open.C	4.7
10.A	2.5			3.C	5.2
11.A	2.5			4.C	5.5
33.A	2.6			5.C	5.7
151.A	2.6			6.C	5.9
300_open.A	2.6			149.C	23.1
68.A	2.7				
36.A	3.8				
149.A	8.9				
94_open.A	Inf				

Table G.33: Impedance obtained for Scenario S5

Impedance (Ω)					
48.A	0.00e+0	48.B	0.00e+0	48.C	0.00e+0
47.A	0.00e+0	47.B	0.00e+0	47.C	0.00e+0
44.A	1.00e-1	44.B	1.00e-1	44.C	1.00e-1

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Impedance (Ω)					
42.A	1.00e-1	42.B	1.00e-1	42.C	1.00e-1
40.A	1.00e-1	40.B	1.00e-1	40.C	1.00e-1
35.A	2.00e-1	35.B	1.00e-1	35.C	1.00e-1
18.A	2.00e-1	18.B	2.00e-1	18.C	2.00e-1
135.A	2.00e-1	135.B	2.00e-1	135.C	2.00e-1
149.A	1.00e+0	13.B	3.00e-1	13.C	3.00e-1
1.A	1.00e+0	8.B	3.00e-1	8.C	3.00e-1
7.A	1.00e+0	7.B	4.00e-1	7.C	4.00e-1
8.A	1.00e+0	1.B	4.00e-1	1.C	4.00e-1
13.A	1.00e+0	149.B	4.00e-1	149.C	5.00e-1
94.A	3.45e+1	152.B	3.34e+4	152.C	3.10e+4
160r.A	9.81e+1	52.B	3.39e+4	52.C	3.14e+4
67.A	9.82e+1	53.B	3.42e+4	53.C	3.16e+4
72.A	9.83e+1	54.B	3.43e+4	54.C	3.17e+4
76.A	9.83e+1	57.B	3.56e+4	57.C	3.27e+4
86.A	9.85e+1	60.B	3.71e+4	60.C	3.37e+4
87.A	9.86e+1	62.B	7.39e+4	62.C	7.39e+4
89.A	9.86e+1	63.B	8.57e+4	160r.C	7.60e+4
91.A	9.87e+1	160r.B	9.68e+4	160.C	7.70e+4
93.A	9.87e+1	160.B	9.80e+4	67.C	7.85e+4
57.A	9.97e+1	67.B	1.00e+5	63.C	8.57e+4
60.A	9.99e+1	64.B	1.26e+5	64.C	1.26e+5
160.A	9.99e+1	97.B	2.11e+5	72.C	1.47e+5
54.A	2.78e+3	72.B	2.14e+5	76.C	1.72e+5
53.A	2.78e+3	76.B	2.25e+5	97.C	1.87e+5
52.A	2.78e+3	65.B	2.90e+5	65.C	2.90e+5
152.A	2.78e+3	197.B	3.83e+5	197.C	3.25e+5
62.A	7.39e+4	101.B	4.28e+5	21.C	3.27e+5
63.A	8.57e+4	105.B	4.92e+5	101.C	3.59e+5
64.A	1.26e+5	21.B	5.13e+5	23.C	3.59e+5
97.A	1.85e+5	98.B	5.47e+5	77.C	3.90e+5
197.A	2.86e+5	86.B	5.56e+5	78.C	4.09e+5
65.A	2.90e+5	77.B	6.77e+5	25.C	4.78e+5
101.A	3.09e+5	78.B	7.26e+5	86.C	5.10e+5
105.A	3.37e+5	87.B	7.42e+5	98.C	5.12e+5
21.A	3.61e+5	23.B	7.54e+5	80.C	6.18e+5
108.A	3.79e+5	99.B	8.21e+5	105.C	6.37e+5
23.A	4.04e+5	108.B	9.03e+5	87.C	7.01e+5
25.A	4.65e+5	49.B	9.28e+5	81.C	7.09e+5
98.A	6.05e+5	89.B	9.33e+5	99.C	7.68e+5
77.A	6.13e+5	25.B	9.52e+5	108.C	8.45e+5
78.A	6.58e+5	100.B	1.13e+6	49.C	9.04e+5
109.A	7.58e+5	28.B	1.18e+6	89.C	9.08e+5

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Impedance (Ω)					
110.A	9.05e+5	50.B	1.24e+6	100.C	1.06e+6
99.A	9.08e+5	80.B	1.48e+6	25r.C	1.06e+6
28.A	9.94e+5	91.B	1.50e+6	28.C	1.06e+6
25r.A	1.09e+6	29.B	1.82e+6	91.C	1.20e+6
49.A	1.17e+6	51.B	1.86e+6	50.C	1.20e+6
100.A	1.25e+6	81.B	2.00e+6	102.C	1.37e+6
80.A	1.34e+6	93.B	2.26e+6	26.C	1.61e+6
9r.A	1.52e+6	106.B	2.44e+6	29.C	1.64e+6
29.A	1.54e+6	36.B	2.44e+6	34.C	1.70e+6
9.A	1.55e+6	55.B	3.07e+6	51.C	1.81e+6
50.A	1.56e+6	82.B	3.99e+6	3.C	1.81e+6
68.A	1.60e+6	38.B	4.31e+6	73.C	1.87e+6
112.A	1.65e+6	30.B	5.00e+6	15.C	1.93e+6
26.A	1.66e+6	58.B	5.61e+6	103.C	2.00e+6
81.A	1.81e+6	95.B	7.01e+6	93.C	2.81e+6
69.A	2.34e+6	61.B	1.73e+8	84.C	2.95e+6
51.A	2.34e+6	61.B	1.78e+8	82.C	3.38e+6
14.A	2.80e+6	151.B	1.67e+11	74.C	3.51e+6
27.A	2.80e+6	83.B	2.16e+14	55.C	3.63e+6
55.A	3.29e+6	79.B	2.58e+14	30.C	4.52e+6
82.A	3.62e+6	250.B	2.65e+14	31.C	4.67e+6
30.A	4.22e+6	90.B	3.19e+14	5.C	5.61e+6
19.A	4.31e+6	2.B	3.22e+14	61.C	1.73e+8
113.A	4.31e+6	96.B	4.38e+14	61.C	1.76e+8
45.A	4.67e+6	56.B	5.93e+14	151.C	1.37e+11
36.A	4.67e+6	12.B	5.93e+14	79.C	1.16e+14
70.A	5.10e+6	22.B	6.62e+14	56.C	1.66e+14
61.A	1.73e+8	43.B	1.18e+15	83.C	2.33e+14
61.A	1.73e+8	107.B	1.32e+15	250.C	2.34e+14
151.A	3.19e+10	66.B	2.37e+15	95.C	3.28e+14
83.A	7.24e+13	450.B	2.63e+15	16.C	3.29e+14
250.A	1.03e+14	39.B	2.65e+15	4.C	4.43e+14
79.A	2.16e+14	300.B	5.26e+15	17.C	4.69e+14
88.A	2.33e+14	300_open.B	Inf	24.C	6.42e+14
95.A	3.94e+14	59.B	Inf	27.C	6.58e+14
10.A	4.63e+14			66.C	6.62e+14
11.A	4.63e+14			6.C	6.64e+14
450.A	5.68e+14			92.C	8.76e+14
56.A	5.93e+14			41.C	8.81e+14
20.A	9.36e+14			104.C	1.18e+15
66.A	9.41e+14			85.C	1.32e+15
300.A	1.17e+15			300.C	1.32e+15
46.A	1.32e+15			450.C	1.32e+15

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Impedance (Ω)					
37.A	1.32e+15			32.C	2.63e+15
111.A	2.62e+15			300_open.C	Inf
114.A	Inf			75.C	Inf
300_open.A	Inf				
33.A	Inf				
71.A	Inf				
94_open.A	Inf				

Table G.34: Electric distance obtained for Scenario S5

Electric distance with loads					
48.A	2	36.B	0.4	48.C	0
47.A	2	48.B	1.9	47.C	0
44.A	2.1	47.B	1.9	49.C	0.1
49.A	2.1	49.B	2	44.C	0.1
68.A	2.1	44.B	2	50.C	0.2
42.A	2.1	50.B	2.1	42.C	0.2
50.A	2.1	42.B	2.1	51.C	0.2
45.A	2.2	51.B	2.1	40.C	0.3
40.A	2.2	40.B	2.2	151.C	0.4
51.A	2.2	151.B	2.3	300_open.C	0.4
35.A	2.3	300_open.B	2.3	41.C	0.5
46.A	2.3	35.B	2.3	135.C	0.5
151.A	2.3	43.B	2.3	18.C	0.5
300_open.A	2.3	18.B	2.5	21.C	0.7
18.A	2.4	135.B	2.5	23.C	0.8
135.A	2.4	38.B	2.6	25.C	0.9
36.A	2.5	21.B	2.7	25r.C	0.9
21.A	2.6	23.B	2.8	28.C	1
19.A	2.6	39.B	2.8	26.C	1
23.A	2.7	25.B	2.9	29.C	1.1
37.A	2.7	28.B	2.9	24.C	1.1
25.A	2.8	22.B	3	13.C	1.1
25r.A	2.8	13.B	3	152.C	1.1
20.A	2.8	152.B	3	27.C	1.1
28.A	2.8	29.B	3	31.C	1.1
26.A	2.9	30.B	3.1	30.C	1.2
29.A	2.9	250.B	3.2	250.C	1.2
27.A	3	52.B	3.3	32.C	1.2
30.A	3	8.B	3.3	34.C	1.3
250.A	3.1	53.B	3.4	15.C	1.4
13.A	3.2	54.B	3.4	8.C	1.4

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Electric distance with loads					
152.A	3.2	7.B	3.5	52.C	1.4
33.A	3.2	55.B	3.6	53.C	1.5
52.A	3.4	12.B	3.6	54.C	1.6
8.A	3.4	57.B	3.6	7.C	1.6
53.A	3.6	56.B	3.7	17.C	1.7
54.A	3.6	58.B	3.8	16.C	1.7
94.A	3.6	60.B	3.9	55.C	1.7
7.A	3.7	160.B	3.9	57.C	1.7
55.A	3.8	160r.B	3.9	56.C	1.8
9.A	3.8	59.B	3.9	60.C	2
9r.A	3.8	62.B	4	160.C	2
57.A	3.8	63.B	4	160r.C	2
93.A	3.8	61.B	4.1	62.C	2.1
91.A	3.9	61.B	4.1	63.C	2.1
56.A	3.9	72.B	4.1	61.C	2.2
95.A	3.9	97.B	4.1	61.C	2.2
89.A	3.9	197.B	4.1	72.C	2.2
60.A	4	1.B	4.1	97.C	2.2
160.A	4	76.B	4.1	197.C	2.2
160r.A	4	101.B	4.1	1.C	2.2
87.A	4	67.B	4.1	76.C	2.2
67.A	4	98.B	4.1	101.C	2.2
86.A	4.1	64.B	4.2	98.C	2.2
72.A	4.1	105.B	4.2	64.C	2.3
76.A	4.1	77.B	4.2	73.C	2.3
62.A	4.1	78.B	4.2	105.C	2.3
88.A	4.1	86.B	4.3	77.C	2.3
97.A	4.1	99.B	4.3	102.C	2.3
197.A	4.1	108.B	4.3	78.C	2.3
63.A	4.1	106.B	4.3	86.C	2.4
61.A	4.2	65.B	4.3	99.C	2.4
61.A	4.2	79.B	4.3	108.C	2.4
77.A	4.2	100.B	4.3	79.C	2.4
101.A	4.2	80.B	4.3	65.C	2.4
98.A	4.2	87.B	4.3	74.C	2.4
14.A	4.2	66.B	4.4	87.C	2.4
78.A	4.2	81.B	4.4	103.C	2.4
1.A	4.3	89.B	4.4	100.C	2.4
69.A	4.3	91.B	4.4	80.C	2.4
64.A	4.3	82.B	4.4	89.C	2.5
105.A	4.3	93.B	4.5	81.C	2.5
79.A	4.3	90.B	4.5	66.C	2.5
99.A	4.4	107.B	4.5	91.C	2.5

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Electric distance with loads					
80.A	4.4	83.B	4.5	35.C	2.5
108.A	4.4	300.B	4.5	82.C	2.5
70.A	4.4	450.B	4.5	93.C	2.5
81.A	4.4	95.B	4.5	75.C	2.5
10.A	4.4	96.B	4.6	83.C	2.6
11.A	4.4	2.B	4.6	300.C	2.6
65.A	4.4	149.B	20.6	95.C	2.6
100.A	4.4			92.C	2.6
82.A	4.5			450.C	2.6
71.A	4.5			104.C	2.6
66.A	4.5			84.C	2.7
83.A	4.5			85.C	2.8
109.A	4.5			3.C	2.9
300.A	4.6			4.C	3.2
450.A	4.6			5.C	3.4
110.A	4.6			6.C	3.6
112.A	4.7			67.C	4
111.A	4.8			149.C	8.6
113.A	4.8				
114.A	4.9				
149.A	20.6				
94_open.A	Inf				

Table G.35: Impedance obtained for Scenario S6

Impedance (Ω)					
94.A	3.51e+1	149.B	2.56e+4	66.C	0.00e+0
160r.A	6.48e+1	1.B	2.59e+4	65.C	1.00e-1
67.A	6.50e+1	7.B	2.63e+4	85.C	2.00e-1
72.A	6.51e+1	8.B	2.64e+4	64.C	2.00e-1
76.A	6.52e+1	13.B	2.68e+4	63.C	4.00e-1
86.A	6.53e+1	152.B	3.33e+4	84.C	4.00e-1
87.A	6.54e+1	52.B	3.38e+4	62.C	4.00e-1
89.A	6.55e+1	53.B	3.41e+4	81.C	6.00e-1
91.A	6.55e+1	54.B	3.42e+4	80.C	7.00e-1
93.A	6.56e+1	57.B	3.54e+4	78.C	8.00e-1
57.A	6.75e+1	60.B	3.69e+4	77.C	8.00e-1
60.A	6.80e+1	62.B	7.38e+4	76.C	9.00e-1
160.A	6.80e+1	63.B	8.55e+4	72.C	9.00e-1
152.A	1.63e+3	160r.B	9.57e+4	160.C	1.00e+0
149.A	1.64e+3	160.B	9.69e+4	67.C	1.00e+0
52.A	1.64e+3	67.B	9.90e+4	160r.C	1.00e+0

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Impedance (Ω)					
53.A	1.64e+3	64.B	1.26e+5	149.C	7.90e+0
1.A	1.64e+3	18.B	1.54e+5	1.C	8.00e+0
54.A	1.64e+3	97.B	2.08e+5	7.C	8.10e+0
7.A	1.64e+3	72.B	2.12e+5	8.C	8.10e+0
8.A	1.65e+3	76.B	2.23e+5	13.C	8.10e+0
13.A	1.65e+3	135.B	2.34e+5	152.C	8.10e+0
62.A	7.38e+4	35.B	2.57e+5	52.C	8.20e+0
63.A	8.56e+4	65.B	2.90e+5	53.C	8.20e+0
64.A	1.26e+5	197.B	3.78e+5	54.C	8.30e+0
18.A	1.40e+5	40.B	3.80e+5	57.C	8.30e+0
97.A	1.86e+5	101.B	4.23e+5	60.C	8.40e+0
135.A	2.75e+5	42.B	4.26e+5	18.C	1.52e+5
197.A	2.89e+5	105.B	4.87e+5	97.C	1.85e+5
65.A	2.90e+5	21.B	5.13e+5	135.C	3.16e+5
35.A	3.01e+5	98.B	5.40e+5	21.C	3.21e+5
101.A	3.11e+5	86.B	5.52e+5	197.C	3.22e+5
105.A	3.39e+5	44.B	5.61e+5	23.C	3.52e+5
21.A	3.67e+5	47.B	6.61e+5	101.C	3.56e+5
108.A	3.81e+5	77.B	6.70e+5	35.C	3.64e+5
23.A	4.11e+5	78.B	7.19e+5	40.C	4.00e+5
40.A	4.40e+5	87.B	7.37e+5	25.C	4.67e+5
25.A	4.73e+5	23.B	7.54e+5	42.C	4.96e+5
42.A	4.98e+5	99.B	8.10e+5	98.C	5.06e+5
44.A	5.56e+5	108.B	8.91e+5	86.C	5.08e+5
98.A	6.14e+5	49.B	9.26e+5	44.C	5.51e+5
77.A	6.25e+5	89.B	9.26e+5	105.C	6.30e+5
78.A	6.71e+5	25.B	9.51e+5	47.C	6.39e+5
109.A	7.58e+5	100.B	1.11e+6	87.C	6.97e+5
47.A	8.37e+5	28.B	1.17e+6	99.C	7.59e+5
110.A	9.05e+5	50.B	1.23e+6	108.C	8.35e+5
99.A	9.20e+5	80.B	1.46e+6	49.C	8.95e+5
28.A	1.00e+6	91.B	1.48e+6	89.C	9.04e+5
25r.A	1.09e+6	29.B	1.82e+6	100.C	1.04e+6
49.A	1.17e+6	51.B	1.85e+6	28.C	1.06e+6
100.A	1.27e+6	81.B	1.98e+6	25r.C	1.06e+6
80.A	1.37e+6	93.B	2.24e+6	91.C	1.19e+6
9r.A	1.52e+6	106.B	2.44e+6	50.C	1.19e+6
29.A	1.55e+6	36.B	2.44e+6	102.C	1.37e+6
9.A	1.55e+6	55.B	3.07e+6	26.C	1.61e+6
50.A	1.56e+6	82.B	3.95e+6	29.C	1.63e+6
68.A	1.60e+6	38.B	4.31e+6	34.C	1.70e+6
112.A	1.65e+6	30.B	4.99e+6	51.C	1.79e+6
26.A	1.66e+6	58.B	5.61e+6	3.C	1.81e+6

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Impedance (Ω)					
81.A	1.85e+6	95.B	7.01e+6	73.C	1.87e+6
69.A	2.34e+6	61.B	1.67e+8	15.C	1.93e+6
51.A	2.34e+6	61.B	1.72e+8	103.C	2.00e+6
27.A	2.80e+6	151.B	1.66e+11	93.C	2.80e+6
14.A	2.80e+6	56.B	8.91e+13	82.C	3.35e+6
55.A	3.33e+6	48.B	1.25e+14	74.C	3.51e+6
82.A	3.70e+6	79.B	2.07e+14	55.C	3.59e+6
30.A	4.27e+6	250.B	2.34e+14	30.C	4.49e+6
113.A	4.31e+6	83.B	2.62e+14	31.C	4.67e+6
19.A	4.31e+6	450.B	3.91e+14	5.C	5.61e+6
45.A	4.67e+6	66.B	4.20e+14	61.C	1.69e+8
36.A	4.67e+6	59.B	4.68e+14	61.C	1.70e+8
70.A	5.10e+6	96.B	5.84e+14	151.C	1.37e+11
61.A	1.77e+8	39.B	5.93e+14	250.C	1.03e+14
61.A	1.77e+8	12.B	5.93e+14	48.C	1.15e+14
151.A	3.19e+10	107.B	6.50e+14	95.C	1.21e+14
83.A	9.32e+13	43.B	8.84e+14	56.C	1.43e+14
48.A	1.50e+14	300.B	1.31e+15	79.C	3.25e+14
250.A	1.86e+14	2.B	1.33e+15	4.C	4.39e+14
300.A	4.30e+14	22.B	2.65e+15	17.C	5.19e+14
66.A	4.71e+14	300_open.B	Inf	24.C	5.80e+14
88.A	4.75e+14	90.B	Inf	300.C	5.88e+14
111.A	5.95e+14			6.C	5.89e+14
56.A	6.55e+14			16.C	1.30e+15
10.A	6.61e+14			450.C	1.31e+15
11.A	6.61e+14			41.C	2.59e+15
33.A	9.31e+14			92.C	2.62e+15
114.A	1.33e+15			75.C	2.62e+15
46.A	1.34e+15			32.C	2.64e+15
95.A	1.35e+15			104.C	5.26e+15
450.A	1.68e+15			27.C	Inf
20.A	Inf			300_open.C	Inf
300_open.A	Inf			83.C	Inf
37.A	Inf				
71.A	Inf				
79.A	Inf				
94_open.A	Inf				

Table G.36: Electric distance obtained for Scenario S6

Electric distance with loads					
68.A	0.6	66.B	1.9	66.C	0

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Electric distance with loads					
66.A	2.2	65.B	2	65.C	0.1
65.A	2.3	36.B	2.1	64.C	0.2
64.A	2.4	64.B	2.1	63.C	0.3
63.A	2.5	63.B	2.2	62.C	0.4
62.A	2.5	62.B	2.2	60.C	0.5
60.A	2.6	60.B	2.3	160.C	0.5
160.A	2.6	160.B	2.3	160r.C	0.5
160r.A	2.6	160r.B	2.3	61.C	0.7
67.A	2.7	61.B	2.5	61.C	0.7
61.A	2.8	61.B	2.5	97.C	0.7
61.A	2.8	97.B	2.5	197.C	0.7
72.A	2.8	197.B	2.5	72.C	0.7
97.A	2.8	72.B	2.5	76.C	0.7
197.A	2.8	101.B	2.6	101.C	0.8
76.A	2.8	98.B	2.6	98.C	0.8
57.A	2.9	76.B	2.6	57.C	0.8
101.A	2.9	57.B	2.6	73.C	0.8
98.A	2.9	105.B	2.6	105.C	0.8
69.A	2.9	77.B	2.7	102.C	0.8
105.A	3	78.B	2.7	77.C	0.8
77.A	3	99.B	2.7	78.C	0.9
86.A	3	108.B	2.7	99.C	0.9
54.A	3	106.B	2.7	108.C	0.9
94.A	3	79.B	2.8	86.C	0.9
78.A	3	86.B	2.8	79.C	0.9
99.A	3	58.B	2.8	74.C	0.9
108.A	3	100.B	2.8	54.C	0.9
87.A	3	54.B	2.8	103.C	1
93.A	3.1	80.B	2.8	100.C	1
89.A	3.1	67.B	2.8	80.C	1
53.A	3.1	81.B	2.9	87.C	1
91.A	3.1	53.B	2.9	53.C	1
79.A	3.1	87.B	2.9	81.C	1
70.A	3.1	82.B	2.9	89.C	1
100.A	3.1	107.B	2.9	82.C	1.1
55.A	3.1	59.B	2.9	75.C	1.1
80.A	3.1	300.B	2.9	55.C	1.1
88.A	3.1	450.B	2.9	91.C	1.1
71.A	3.2	55.B	2.9	300.C	1.1
95.A	3.2	89.B	2.9	83.C	1.1
52.A	3.2	83.B	2.9	450.C	1.1
81.A	3.2	52.B	3	52.C	1.1
109.A	3.2	91.B	3	93.C	1.1

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Electric distance with loads					
82.A	3.2	90.B	3	104.C	1.2
56.A	3.2	93.B	3	92.C	1.2
300.A	3.3	56.B	3.1	95.C	1.2
450.A	3.3	95.B	3.1	56.C	1.2
83.A	3.3	96.B	3.2	84.C	1.2
110.A	3.3	13.B	3.3	85.C	1.3
112.A	3.3	152.B	3.3	152.C	1.4
111.A	3.5	8.B	3.6	13.C	1.4
13.A	3.5	18.B	3.8	34.C	1.6
152.A	3.5	135.B	3.8	15.C	1.7
113.A	3.5	7.B	3.8	8.C	1.7
114.A	3.6	12.B	3.9	18.C	1.9
8.A	3.8	21.B	3.9	135.C	1.9
18.A	4	35.B	4	7.C	1.9
135.A	4	23.B	4.1	17.C	2
7.A	4	40.B	4.1	16.C	2
9.A	4.1	25.B	4.2	21.C	2.1
9r.A	4.1	42.B	4.2	23.C	2.2
21.A	4.1	28.B	4.2	40.C	2.2
35.A	4.2	44.B	4.2	25.C	2.3
19.A	4.2	22.B	4.2	25r.C	2.3
36.A	4.2	47.B	4.3	42.C	2.3
23.A	4.2	29.B	4.3	28.C	2.3
40.A	4.3	38.B	4.3	44.C	2.4
25.A	4.3	48.B	4.4	41.C	2.4
25r.A	4.3	1.B	4.4	26.C	2.4
42.A	4.3	49.B	4.4	67.C	2.4
20.A	4.3	43.B	4.4	47.C	2.4
28.A	4.4	30.B	4.4	29.C	2.4
44.A	4.4	50.B	4.4	24.C	2.5
26.A	4.4	250.B	4.5	27.C	2.5
29.A	4.5	39.B	4.5	48.C	2.5
47.A	4.5	51.B	4.5	31.C	2.5
45.A	4.5	151.B	4.6	1.C	2.5
14.A	4.5	300_open.B	4.6	49.C	2.5
27.A	4.5	2.B	4.9	30.C	2.5
48.A	4.5	149.B	32.8	50.C	2.6
37.A	4.5			250.C	2.6
49.A	4.6			32.C	2.6
1.A	4.6			51.C	2.6
30.A	4.6			151.C	2.8
50.A	4.6			300_open.C	2.8
46.A	4.6			3.C	3.2

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Electric distance with loads					
250.A	4.6			4.C	3.5
51.A	4.7			5.C	3.7
10.A	4.7			6.C	4
11.A	4.7			35.C	4.4
33.A	4.7			149.C	9
151.A	4.8				
300_open.A	4.8				
149.A	21.6				
94_open.A	Inf				

Appendix H

Results of simulations scenarios presented on Chapter 3 - Covariance calculated between nodes

H.0.1 Considering OLTCs connected without capacitors compensation in radial configuration

Table H.1: The highest covariance values obtained for Scenario S1

Nodes		Cov.	Nodes		Cov.	Nodes		Cov.	Nodes		Cov.
85.C	100.A	-525	66.C	60.C	762	64.C	63.C	762	84.C	77.A	-563
85.C	101.A	-525	80.C	60.C	552	65.C	63.C	762	85.C	77.A	-688
85.C	105.A	-525	81.A	60.C	-522	66.C	63.C	762	84.C	77.C	603
85.C	108.A	-525	81.C	60.C	594	80.C	63.C	552	85.C	77.C	727
85.C	109.A	-525	82.A	60.C	-522	81.A	63.C	-522	84.C	78.A	-579
85.C	110.A	-525	82.C	60.C	594	81.C	63.C	594	85.C	78.A	-709
85.C	111.A	-525	83.A	60.C	-522	82.A	63.C	-522	84.C	78.C	632
85.C	112.A	-525	83.C	60.C	594	82.C	63.C	594	85.C	78.C	764
85.C	113.A	-525	84.C	60.C	920	83.A	63.C	-522	84.C	79.A	-579
85.C	114.A	-525	85.C	60.C	1148	83.C	63.C	594	85.C	79.A	-709
85.C	160.A	-503	85.C	61.A	-503	84.C	63.C	920	84.C	79.C	632
160.C	160.C	762	61.C	61.C	762	85.C	63.C	1148	85.C	79.C	764
57.C	160.C	575	61.C	61.C	762	85.C	64.A	-503	84.C	80.A	-657
60.C	160.C	762	62.C	61.C	762	64.C	64.C	762	85.C	80.A	-806
61.C	160.C	762	63.C	61.C	762	65.C	64.C	762	80.C	80.C	503
61.C	160.C	762	64.C	61.C	762	66.C	64.C	762	81.C	80.C	534

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Nodes		Cov.	Nodes		Cov.	Nodes		Cov.	Nodes		Cov.
62.C	160.C	762	65.C	61.C	762	80.C	64.C	552	82.C	80.C	534
63.C	160.C	762	66.C	61.C	762	81.A	64.C	-522	83.C	80.C	534
64.C	160.C	762	80.C	61.C	552	81.C	64.C	594	84.C	80.C	770
65.C	160.C	762	81.A	61.C	-522	82.A	64.C	-522	85.C	80.C	936
66.C	160.C	762	81.C	61.C	594	82.C	64.C	594	84.C	81.A	-686
80.C	160.C	552	82.A	61.C	-522	83.A	64.C	-522	85.C	81.A	-842
81.A	160.C	-522	82.C	61.C	594	83.C	64.C	594	81.C	81.C	566
81.C	160.C	594	83.A	61.C	-522	84.C	64.C	920	82.C	81.C	566
82.A	160.C	-522	83.C	61.C	594	85.C	64.C	1148	83.C	81.C	566
82.C	160.C	594	84.C	61.C	920	85.C	65.A	-503	84.C	81.C	821
83.A	160.C	-522	85.C	61.C	1148	65.C	65.C	762	85.C	81.C	999
83.C	160.C	594	85.C	61.A	-503	66.C	65.C	762	84.C	82.A	-686
84.C	160.C	920	61.C	61.C	762	80.C	65.C	552	85.C	82.A	-842
85.C	160.C	1148	62.C	61.C	762	81.A	65.C	-522	82.C	82.C	566
85.C	197.A	-525	63.C	61.C	762	81.C	65.C	594	83.C	82.C	566
85.C	300.A	-525	64.C	61.C	762	82.A	65.C	-522	84.C	82.C	821
85.C	450.A	-525	65.C	61.C	762	82.C	65.C	594	85.C	82.C	999
85.C	52.C	611	66.C	61.C	762	83.A	65.C	-522	84.C	83.A	-686
84.C	53.C	550	80.C	61.C	552	83.C	65.C	594	85.C	83.A	-842
85.C	53.C	687	81.A	61.C	-522	84.C	65.C	920	83.C	83.C	566
84.C	54.C	588	81.C	61.C	594	85.C	65.C	1148	84.C	83.C	821
85.C	54.C	734	82.A	61.C	-522	85.C	66.A	-503	85.C	83.C	999
84.C	55.C	588	82.C	61.C	594	66.C	66.C	762	84.C	84.C	1214
85.C	55.C	734	83.A	61.C	-522	80.C	66.C	552	85.C	84.C	1490
84.C	56.C	588	83.C	61.C	594	81.A	66.C	-522	85.C	85.C	1835
85.C	56.C	734	84.C	61.C	920	81.C	66.C	594	86.A	85.C	-607
60.C	57.C	575	85.C	61.C	1148	82.A	66.C	-522	86.C	85.C	582
61.C	57.C	575	85.C	62.A	-503	82.C	66.C	594	87.A	85.C	-607
61.C	57.C	575	62.C	62.C	762	83.A	66.C	-522	87.C	85.C	582
62.C	57.C	575	63.C	62.C	762	83.C	66.C	594	88.A	85.C	-607
63.C	57.C	575	64.C	62.C	762	84.C	66.C	920	89.A	85.C	-607
64.C	57.C	575	65.C	62.C	762	85.C	66.C	1148	89.C	85.C	582
65.C	57.C	575	66.C	62.C	762	85.C	67.A	-525	91.A	85.C	-607
66.C	57.C	575	80.C	62.C	552	85.C	68.A	-525	91.C	85.C	582
84.C	57.C	694	81.A	62.C	-522	85.C	69.A	-525	92.C	85.C	582
85.C	57.C	866	81.C	62.C	594	85.C	70.A	-525	93.A	85.C	-607
85.C	60.A	-503	82.A	62.C	-522	85.C	71.A	-525	93.C	85.C	582
60.C	60.C	762	82.C	62.C	594	85.C	72.A	-572	94.A	85.C	-607
61.C	60.C	762	83.A	62.C	-522	85.C	72.C	509	95.A	85.C	-607
61.C	60.C	762	83.C	62.C	594	85.C	73.C	509	95.C	85.C	582
62.C	60.C	762	84.C	62.C	920	85.C	74.C	509	97.A	85.C	-525
63.C	60.C	762	85.C	62.C	1148	85.C	75.C	509	98.A	85.C	-525
64.C	60.C	762	85.C	63.A	-503	85.C	76.A	-607	99.A	85.C	-525
65.C	60.C	762	63.C	63.C	762	85.C	76.C	582			

Table H.2: The highest covariance values obtained for Scenario S2

Nodes		Cov.	Nodes		Cov.	Nodes		Cov.	Nodes		Cov.
85.C	100.A	-525	66.C	60.C	762	64.C	63.C	762	84.C	77.A	-563
85.C	101.A	-525	80.C	60.C	552	65.C	63.C	762	85.C	77.A	-688
85.C	105.A	-525	81.A	60.C	-522	66.C	63.C	762	84.C	77.C	603
85.C	108.A	-525	81.C	60.C	594	80.C	63.C	552	85.C	77.C	727
85.C	109.A	-525	82.A	60.C	-522	81.A	63.C	-522	84.C	78.A	-579
85.C	110.A	-525	82.C	60.C	594	81.C	63.C	594	85.C	78.A	-709
85.C	111.A	-525	83.A	60.C	-522	82.A	63.C	-522	84.C	78.C	632
85.C	112.A	-525	83.C	60.C	594	82.C	63.C	594	85.C	78.C	764
85.C	113.A	-525	84.C	60.C	920	83.A	63.C	-522	84.C	79.A	-579
85.C	114.A	-525	85.C	60.C	1148	83.C	63.C	594	85.C	79.A	-709
85.C	160.A	-503	85.C	61.A	-503	84.C	63.C	920	84.C	79.C	632
160.C	160.C	762	61.C	61.C	762	85.C	63.C	1148	85.C	79.C	764
57.C	160.C	575	61.C	61.C	762	85.C	64.A	-503	84.C	80.A	-657
60.C	160.C	762	62.C	61.C	762	64.C	64.C	762	85.C	80.A	-806
61.C	160.C	762	63.C	61.C	762	65.C	64.C	762	80.C	80.C	503
61.C	160.C	762	64.C	61.C	762	66.C	64.C	762	81.C	80.C	534
62.C	160.C	762	65.C	61.C	762	80.C	64.C	552	82.C	80.C	534
63.C	160.C	762	66.C	61.C	762	81.A	64.C	-522	83.C	80.C	534
64.C	160.C	762	80.C	61.C	552	81.C	64.C	594	84.C	80.C	770
65.C	160.C	762	81.A	61.C	-522	82.A	64.C	-522	85.C	80.C	936
66.C	160.C	762	81.C	61.C	594	82.C	64.C	594	84.C	81.A	-686
80.C	160.C	552	82.A	61.C	-522	83.A	64.C	-522	85.C	81.A	-842
81.A	160.C	-522	82.C	61.C	594	83.C	64.C	594	81.C	81.C	566
81.C	160.C	594	83.A	61.C	-522	84.C	64.C	920	82.C	81.C	566
82.A	160.C	-522	83.C	61.C	594	85.C	64.C	1148	83.C	81.C	566
82.C	160.C	594	84.C	61.C	920	85.C	65.A	-503	84.C	81.C	821
83.A	160.C	-522	85.C	61.C	1148	65.C	65.C	762	85.C	81.C	999
83.C	160.C	594	85.C	61.A	-503	66.C	65.C	762	84.C	82.A	-686
84.C	160.C	920	61.C	61.C	762	80.C	65.C	552	85.C	82.A	-842
85.C	160.C	1148	62.C	61.C	762	81.A	65.C	-522	82.C	82.C	566
85.C	197.A	-525	63.C	61.C	762	81.C	65.C	594	83.C	82.C	566
85.C	300.A	-525	64.C	61.C	762	82.A	65.C	-522	84.C	82.C	821
85.C	450.A	-525	65.C	61.C	762	82.C	65.C	594	85.C	82.C	999
85.C	52.C	611	66.C	61.C	762	83.A	65.C	-522	84.C	83.A	-686
84.C	53.C	550	80.C	61.C	552	83.C	65.C	594	85.C	83.A	-842
85.C	53.C	687	81.A	61.C	-522	84.C	65.C	920	83.C	83.C	566
84.C	54.C	588	81.C	61.C	594	85.C	65.C	1148	84.C	83.C	821
85.C	54.C	734	82.A	61.C	-522	85.C	66.A	-503	85.C	83.C	999
84.C	55.C	588	82.C	61.C	594	66.C	66.C	762	84.C	84.C	1214
85.C	55.C	734	83.A	61.C	-522	80.C	66.C	552	85.C	84.C	1490
84.C	56.C	588	83.C	61.C	594	81.A	66.C	-522	85.C	85.C	1835
85.C	56.C	734	84.C	61.C	920	81.C	66.C	594	86.A	85.C	-607

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Nodes		Cov.	Nodes		Cov.	Nodes		Cov.	Nodes		Cov.
60.C	57.C	575	85.C	61.C	1148	82.A	66.C	-522	86.C	85.C	582
61.C	57.C	575	85.C	62.A	-503	82.C	66.C	594	87.A	85.C	-607
61.C	57.C	575	62.C	62.C	762	83.A	66.C	-522	87.C	85.C	582
62.C	57.C	575	63.C	62.C	762	83.C	66.C	594	88.A	85.C	-607
63.C	57.C	575	64.C	62.C	762	84.C	66.C	920	89.A	85.C	-607
64.C	57.C	575	65.C	62.C	762	85.C	66.C	1148	89.C	85.C	582
65.C	57.C	575	66.C	62.C	762	85.C	67.A	-525	91.A	85.C	-607
66.C	57.C	575	80.C	62.C	552	85.C	68.A	-525	91.C	85.C	582
84.C	57.C	694	81.A	62.C	-522	85.C	69.A	-525	92.C	85.C	582
85.C	57.C	866	81.C	62.C	594	85.C	70.A	-525	93.A	85.C	-607
85.C	60.A	-503	82.A	62.C	-522	85.C	71.A	-525	93.C	85.C	582
60.C	60.C	762	82.C	62.C	594	85.C	72.A	-572	94.A	85.C	-607
61.C	60.C	762	83.A	62.C	-522	85.C	72.C	509	95.A	85.C	-607
61.C	60.C	762	83.C	62.C	594	85.C	73.C	509	95.C	85.C	582
62.C	60.C	762	84.C	62.C	920	85.C	74.C	509	97.A	85.C	-525
63.C	60.C	762	85.C	62.C	1148	85.C	75.C	509	98.A	85.C	-525
64.C	60.C	762	85.C	63.A	-503	85.C	76.A	-607	99.A	85.C	-525
65.C	60.C	762	63.C	63.C	762	85.C	76.C	582			

Table H.3: The highest covariance values obtained for Scenario S6

Nodes		Cov.	Nodes		Cov.	Nodes		Cov.	Nodes		Cov.
160.C	135.C	1208	66.C	21.C	1750	63.C	49.C	1359	64.C	60.C	3691
60.C	135.C	1208	60.C	23.C	1208	64.C	49.C	1483	65.A	60.C	-1455
61.C	135.C	1208	61.C	23.C	1208	65.C	49.C	1634	65.C	60.C	4067
61.C	135.C	1208	61.C	23.C	1208	66.C	49.C	1750	66.A	60.C	-1494
62.C	135.C	1297	62.C	23.C	1297	60.C	50.C	1208	66.C	60.C	4354
63.C	135.C	1359	63.C	23.C	1359	61.C	50.C	1208	84.C	60.C	1572
64.C	135.C	1483	64.C	23.C	1483	61.C	50.C	1208	85.C	60.C	2024
65.C	135.C	1634	65.C	23.C	1634	62.C	50.C	1297	61.C	61.A	-1313
66.C	135.C	1750	66.C	23.C	1750	63.C	50.C	1359	61.C	61.A	-1313
160.C	13.C	1208	60.C	24.C	1208	64.C	50.C	1483	62.C	61.A	-1409
60.C	13.C	1208	61.C	24.C	1208	65.C	50.C	1634	63.C	61.A	-1477
61.C	13.C	1208	61.C	24.C	1208	66.C	50.C	1750	64.C	61.A	-1612
61.C	13.C	1208	62.C	24.C	1297	60.C	51.C	1208	65.C	61.A	-1776

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Nodes		Cov.	Nodes		Cov.	Nodes		Cov.	Nodes		Cov.
62.C	13.C	1297	63.C	24.C	1359	61.C	51.C	1208	66.C	61.A	-1902
63.C	13.C	1359	64.C	24.C	1483	61.C	51.C	1208	61.C	61.C	3006
64.C	13.C	1483	65.C	24.C	1634	62.C	51.C	1297	61.A	61.C	-1313
65.C	13.C	1634	66.C	24.C	1750	63.C	51.C	1359	61.C	61.C	3006
66.C	13.C	1750	60.C	250.C	1208	64.C	51.C	1483	62.A	61.C	-1342
160.C	151.C	1208	61.C	250.C	1208	65.C	51.C	1634	62.C	61.C	3227
60.C	151.C	1208	61.C	250.C	1208	66.C	51.C	1750	63.A	61.C	-1363
61.C	151.C	1208	62.C	250.C	1297	54.C	52.C	1031	63.C	61.C	3381
61.C	151.C	1208	63.C	250.C	1359	55.C	52.C	1031	64.A	61.C	-1404
62.C	151.C	1297	64.C	250.C	1483	56.C	52.C	1031	64.C	61.C	3691
63.C	151.C	1359	65.C	250.C	1634	57.C	52.C	1215	65.A	61.C	-1455
64.C	151.C	1483	66.C	250.C	1750	60.C	52.C	1607	65.C	61.C	4067
65.C	151.C	1634	60.C	25.C	1208	61.C	52.C	1607	66.A	61.C	-1494
66.C	151.C	1750	61.C	25.C	1208	61.C	52.C	1607	66.C	61.C	4354
160.C	152.C	1208	61.C	25.C	1208	62.C	52.C	1725	84.C	61.C	1572
60.C	152.C	1208	62.C	25.C	1297	63.C	52.C	1807	85.C	61.C	2024
61.C	152.C	1208	63.C	25.C	1359	64.C	52.C	1973	61.C	61.A	-1313
61.C	152.C	1208	64.C	25.C	1483	65.C	52.C	2174	62.C	61.A	-1409
62.C	152.C	1297	65.C	25.C	1634	66.C	52.C	2327	63.C	61.A	-1477
63.C	152.C	1359	66.C	25.C	1750	85.C	52.C	1082	64.C	61.A	-1612
64.C	152.C	1483	60.C	28.C	1208	65.C	53.A	-1019	65.C	61.A	-1776
65.C	152.C	1634	61.C	28.C	1208	66.C	53.A	-1091	66.C	61.A	-1902
66.C	152.C	1750	61.C	28.C	1208	53.C	53.C	1084	61.C	61.C	3006
160.C	15.C	1208	62.C	28.C	1297	54.C	53.C	1158	62.A	61.C	-1342
60.C	15.C	1208	63.C	28.C	1359	55.C	53.C	1158	62.C	61.C	3227
61.C	15.C	1208	64.C	28.C	1483	56.C	53.C	1158	63.A	61.C	-1363
61.C	15.C	1208	65.C	28.C	1634	57.C	53.C	1365	63.C	61.C	3381
62.C	15.C	1297	66.C	28.C	1750	60.C	53.C	1805	64.A	61.C	-1404

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Nodes		Cov.	Nodes		Cov.	Nodes		Cov.	Nodes		Cov.
63.C	15.C	1359	60.C	29.C	1208	61.C	53.C	1805	64.C	61.C	3691
64.C	15.C	1483	61.C	29.C	1208	61.C	53.C	1805	65.A	61.C	-1455
65.C	15.C	1634	61.C	29.C	1208	62.C	53.C	1938	65.C	61.C	4067
66.C	15.C	1750	62.C	29.C	1297	63.C	53.C	2031	66.A	61.C	-1494
160.C	160.A	-1313	63.C	29.C	1359	64.C	53.C	2217	66.C	61.C	4354
60.C	160.A	-1313	64.C	29.C	1483	65.C	53.C	2442	84.C	61.C	1572
61.C	160.A	-1313	65.C	29.C	1634	66.C	53.C	2615	85.C	61.C	2024
61.C	160.A	-1313	66.C	29.C	1750	85.C	53.C	1216	62.C	62.A	-1441
62.C	160.A	-1409	60.C	300 open.C	1208	65.C	54.A	-1090	63.C	62.A	-1510
63.C	160.A	-1477	61.C	300 open.C	1208	66.C	54.A	-1167	64.C	62.A	-1648
64.C	160.A	-1612	61.C	300 open.C	1208	54.C	54.C	1238	65.C	62.A	-1816
65.C	160.A	-1776	62.C	300 open.C	1297	55.C	54.C	1238	66.C	62.A	-1944
66.C	160.A	-1902	63.C	300 open.C	1359	56.C	54.C	1238	62.C	62.C	3464
160.C	160.C	3006	64.C	300 open.C	1483	57.C	54.C	1459	63.A	62.C	-1463
16.C	160.C	1208	65.C	300 open.C	1634	60.C	54.C	1929	63.C	62.C	3630
17.C	160.C	1208	66.C	300 open.C	1750	61.C	54.C	1929	64.A	62.C	-1508
18.C	160.C	1208	60.C	30.C	1208	61.C	54.C	1929	64.C	62.C	3962
21.C	160.C	1208	61.C	30.C	1208	62.C	54.C	2071	65.A	62.C	-1562
23.C	160.C	1208	61.C	30.C	1208	63.C	54.C	2170	65.C	62.C	4366
24.C	160.C	1208	62.C	30.C	1297	64.C	54.C	2369	66.A	62.C	-1604
250.C	160.C	1208	63.C	30.C	1359	65.C	54.C	2610	66.C	62.C	4674
25.C	160.C	1208	64.C	30.C	1483	66.C	54.C	2794	84.C	62.C	1687
28.C	160.C	1208	65.C	30.C	1634	84.C	54.C	1009	85.C	62.C	2173
29.C	160.C	1208	66.C	30.C	1750	85.C	54.C	1299	63.C	63.A	-1533
300 open.C	160.C	1208	60.C	34.C	1208	65.C	55.A	-1090	64.C	63.A	-1674

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Nodes		Cov.	Nodes		Cov.	Nodes		Cov.	Nodes		Cov.
30.C	160.C	1208	61.C	34.C	1208	66.C	55.A	-1167	65.C	63.A	-1844
34.C	160.C	1208	61.C	34.C	1208	55.C	55.C	1238	66.C	63.A	-1974
35.C	160.C	1208	62.C	34.C	1297	56.C	55.C	1238	63.C	63.C	3804
40.C	160.C	1208	63.C	34.C	1359	57.C	55.C	1459	64.A	63.C	-1580
41.C	160.C	1208	64.C	34.C	1483	60.C	55.C	1929	64.C	63.C	4152
42.C	160.C	1208	65.C	34.C	1634	61.C	55.C	1929	65.A	63.C	-1637
44.C	160.C	1208	66.C	34.C	1750	61.C	55.C	1929	65.C	63.C	4575
47.C	160.C	1208	60.C	35.C	1208	62.C	55.C	2071	66.A	63.C	-1680
48.C	160.C	1208	61.C	35.C	1208	63.C	55.C	2170	66.C	63.C	4898
49.C	160.C	1208	61.C	35.C	1208	64.C	55.C	2369	81.C	63.C	1044
50.C	160.C	1208	62.C	35.C	1297	65.C	55.C	2610	82.C	63.C	1044
51.C	160.C	1208	63.C	35.C	1359	66.C	55.C	2794	83.C	63.C	1044
52.C	160.C	1607	64.C	35.C	1483	84.C	55.C	1009	84.C	63.C	1768
53.C	160.C	1805	65.C	35.C	1634	85.C	55.C	1299	85.C	63.C	2277
54.C	160.C	1929	66.C	35.C	1750	65.C	56.A	-1090	8.C	63.C	1021
55.C	160.C	1929	60.C	40.C	1208	66.C	56.A	-1167	64.C	64.A	-1724
56.C	160.C	1929	61.C	40.C	1208	56.C	56.C	1238	65.C	64.A	-1900
57.C	160.C	2273	61.C	40.C	1208	57.C	56.C	1459	66.C	64.A	-2034
60.A	160.C	-1313	62.C	40.C	1297	60.C	56.C	1929	64.C	64.C	4532
60.C	160.C	3006	63.C	40.C	1359	61.C	56.C	1929	65.A	64.C	-1787
61.A	160.C	-1313	64.C	40.C	1483	61.C	56.C	1929	65.C	64.C	4994
61.C	160.C	3006	65.C	40.C	1634	62.C	56.C	2071	66.A	64.C	-1834
61.A	160.C	-1313	66.C	40.C	1750	63.C	56.C	2170	66.C	64.C	5347
61.C	160.C	3006	60.C	41.C	1208	64.C	56.C	2369	80.C	64.C	1037
62.A	160.C	-1342	61.C	41.C	1208	65.C	56.C	2610	81.C	64.C	1139
62.C	160.C	3227	61.C	41.C	1208	66.C	56.C	2794	82.C	64.C	1139
63.A	160.C	-1363	62.C	41.C	1297	84.C	56.C	1009	83.C	64.C	1139
63.C	160.C	3381	63.C	41.C	1359	85.C	56.C	1299	84.C	64.C	1930

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Nodes		Cov.	Nodes		Cov.	Nodes		Cov.	Nodes		Cov.
64.A	160.C	-1404	64.C	41.C	1483	62.C	57.A	-1038	85.C	64.C	2485
64.C	160.C	3691	65.C	41.C	1634	63.C	57.A	-1088	8.C	64.C	1115
65.A	160.C	-1455	66.C	41.C	1750	64.C	57.A	-1187	65.C	65.A	-1969
65.C	160.C	4067	60.C	42.C	1208	65.C	57.A	-1308	66.C	65.A	-2108
66.A	160.C	-1494	61.C	42.C	1208	66.C	57.A	-1400	65.C	65.C	5502
66.C	160.C	4354	61.C	42.C	1208	57.C	57.C	1719	66.A	65.C	-2021
84.C	160.C	1572	62.C	42.C	1297	60.C	57.C	2273	66.C	65.C	5891
85.C	160.C	2024	63.C	42.C	1359	61.C	57.C	2273	80.A	65.C	-1024
60.C	16.C	1208	64.C	42.C	1483	61.C	57.C	2273	80.C	65.C	1143
61.C	16.C	1208	65.C	42.C	1634	62.A	57.C	-1015	81.A	65.C	-1087
61.C	16.C	1208	66.C	42.C	1750	62.C	57.C	2440	81.C	65.C	1255
62.C	16.C	1297	60.C	44.C	1208	63.A	57.C	-1031	82.A	65.C	-1087
63.C	16.C	1359	61.C	44.C	1208	63.C	57.C	2557	82.C	65.C	1255
64.C	16.C	1483	61.C	44.C	1208	64.A	57.C	-1062	83.A	65.C	-1087
65.C	16.C	1634	62.C	44.C	1297	64.C	57.C	2791	83.C	65.C	1255
66.C	16.C	1750	63.C	44.C	1359	65.A	57.C	-1100	84.C	65.C	2126
60.C	17.C	1208	64.C	44.C	1483	65.C	57.C	3076	85.C	65.C	2738
61.C	17.C	1208	65.C	44.C	1634	66.A	57.C	-1130	8.C	65.C	1228
61.C	17.C	1208	66.C	44.C	1750	66.C	57.C	3293	94 open.A	65.C	-1090
62.C	17.C	1297	60.C	47.C	1208	84.C	57.C	1189	66.C	66.A	-2164
63.C	17.C	1359	61.C	47.C	1208	85.C	57.C	1531	85.C	66.A	-1006
64.C	17.C	1483	61.C	47.C	1208	60.C	60.A	-1313	66.C	66.C	6308
65.C	17.C	1634	62.C	47.C	1297	61.C	60.A	-1313	7.C	66.C	1024
66.C	17.C	1750	63.C	47.C	1359	61.C	60.A	-1313	80.A	66.C	-1095
60.C	18.C	1208	64.C	47.C	1483	62.C	60.A	-1409	80.C	66.C	1223

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Nodes		Cov.	Nodes		Cov.	Nodes		Cov.	Nodes		Cov.
61.C	18.C	1208	65.C	47.C	1634	63.C	60.A	-1477	81.A	66.C	-1163
61.C	18.C	1208	66.C	47.C	1750	64.C	60.A	-1612	81.C	66.C	1344
62.C	18.C	1297	60.C	48.C	1208	65.C	60.A	-1776	82.A	66.C	-1163
63.C	18.C	1359	61.C	48.C	1208	66.C	60.A	-1902	82.C	66.C	1344
64.C	18.C	1483	61.C	48.C	1208	60.C	60.C	3006	83.A	66.C	-1163
65.C	18.C	1634	62.C	48.C	1297	61.A	60.C	-1313	83.C	66.C	1344
66.C	18.C	1750	63.C	48.C	1359	61.C	60.C	3006	84.C	66.C	2276
60.C	21.C	1208	64.C	48.C	1483	61.A	60.C	-1313	85.C	66.C	2932
61.C	21.C	1208	65.C	48.C	1634	61.C	60.C	3006	8.C	66.C	1315
61.C	21.C	1208	66.C	48.C	1750	62.A	60.C	-1342	94 open.A	66.C	-1167
62.C	21.C	1297	60.C	49.C	1208	62.C	60.C	3227	85.C	84.C	1116
63.C	21.C	1359	61.C	49.C	1208	63.A	60.C	-1363	85.C	85.C	1422
64.C	21.C	1483	61.C	49.C	1208	63.C	60.C	3381			
65.C	21.C	1634	62.C	49.C	1297	64.A	60.C	-1404			

Appendix I

Results of simulations scenarios presented on Chapter 3 - Average standardised covariance calculated and weighs of two main eigenvector after PCA

I.0.1 Considering OLTCs connected without capacitors compensation in radial configuration

Table I.1: Av. normalised covariance values and first two eigenvectors from PCA obtained for Scenario S1

Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigenvector weights	Second eigenvector weights
S85.C	-5.08%	0.99	0.24	-0.04
S84.C	-4.19%	0.86	0.20	0.00
S64.C	-2.93%	0.75	0.15	-0.14
S65.C	-2.93%	0.75	0.15	-0.14
S66.C	-2.93%	0.75	0.15	-0.14
S160.C	-2.93%	0.75	0.15	-0.14
S63.C	-2.93%	0.75	0.15	-0.14
S61.C	-2.93%	0.75	0.15	-0.14
S61s.C	-2.93%	0.75	0.15	-0.14
S62.C	-2.93%	0.75	0.15	-0.14
S60.C	-2.93%	0.75	0.15	-0.14

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S83.C	-2.94%	0.67	0.13	0.06
S81.C	-2.94%	0.67	0.13	0.06
S82.C	-2.94%	0.67	0.13	0.06
S80.C	-2.77%	0.65	0.12	0.07
S57.C	-2.21%	0.64	0.11	-0.11
S78.C	-2.33%	0.58	0.10	0.09
S79.C	-2.33%	0.58	0.10	0.09
S77.C	-2.24%	0.57	0.10	0.10
S54.C	-1.87%	0.59	0.10	-0.09
S55.C	-1.87%	0.59	0.10	-0.09
S56.C	-1.87%	0.59	0.10	-0.09
S53.C	-1.75%	0.57	0.09	-0.08
S52.C	-1.56%	0.55	0.08	-0.07
S87.C	-1.87%	0.51	0.08	0.11
S76.C	-1.87%	0.51	0.08	0.11
S86.C	-1.87%	0.51	0.08	0.11
S89.C	-1.87%	0.51	0.08	0.11
S91.C	-1.87%	0.51	0.08	0.11
S92.C	-1.87%	0.51	0.08	0.11
S93.C	-1.87%	0.51	0.08	0.11
S95.C	-1.87%	0.51	0.08	0.11
S74.C	-1.68%	0.49	0.07	0.12
S75.C	-1.68%	0.49	0.07	0.12
S72.C	-1.68%	0.49	0.07	0.12
S73.C	-1.68%	0.49	0.07	0.12
S152.C	-1.17%	0.49	0.06	-0.06
S135.C	-1.17%	0.49	0.06	-0.06
S18.C	-1.17%	0.49	0.06	-0.06
S250.C	-1.17%	0.49	0.06	-0.06
S25.C	-1.17%	0.49	0.06	-0.06
S42.C	-1.17%	0.49	0.06	-0.06
S50.C	-1.17%	0.49	0.06	-0.06
S51.C	-1.17%	0.49	0.06	-0.06
S35.C	-1.17%	0.49	0.06	-0.06
S49.C	-1.17%	0.49	0.06	-0.06
S30.C	-1.17%	0.49	0.06	-0.06
S15.C	-1.17%	0.49	0.06	-0.06
S16.C	-1.17%	0.49	0.06	-0.06
S17.C	-1.17%	0.49	0.06	-0.06
S34.C	-1.17%	0.49	0.06	-0.06
S21.C	-1.17%	0.49	0.06	-0.06
S23.C	-1.17%	0.49	0.06	-0.06

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S24.C	-1.17%	0.49	0.06	-0.06
S28.C	-1.17%	0.49	0.06	-0.06
S29.C	-1.17%	0.49	0.06	-0.06
S40.C	-1.17%	0.49	0.06	-0.06
S41.C	-1.17%	0.49	0.06	-0.06
S47.C	-1.17%	0.49	0.06	-0.06
S48.C	-1.17%	0.49	0.06	-0.06
S13.C	-1.17%	0.49	0.06	-0.06
S151.C	-1.17%	0.49	0.06	-0.06
S300_open.C	-1.17%	0.49	0.06	-0.06
S44.C	-1.17%	0.49	0.06	-0.06
S102.C	-1.48%	0.45	0.05	0.14
S450.C	-1.48%	0.45	0.05	0.14
S104.C	-1.48%	0.45	0.05	0.14
S101.C	-1.48%	0.45	0.05	0.14
S103.C	-1.48%	0.45	0.05	0.14
S98.C	-1.48%	0.45	0.05	0.14
S300.C	-1.48%	0.45	0.05	0.14
S99.C	-1.48%	0.45	0.05	0.14
S105.C	-1.48%	0.45	0.05	0.14
S108.C	-1.48%	0.45	0.05	0.14
S67.C	-1.48%	0.45	0.05	0.14
S197.C	-1.48%	0.45	0.05	0.14
S97.C	-1.48%	0.45	0.05	0.14
S100.C	-1.48%	0.45	0.05	0.14
S8.C	0.88%	0.44	0.04	-0.04
S160r.C	1.45%	0.40	0.04	0.15
S7.C	0.68%	0.41	0.03	-0.03
S81.B	-0.45%	0.38	0.02	-0.03
S82.B	-0.45%	0.38	0.02	-0.03
S83.B	-0.45%	0.38	0.02	-0.03
S80.B	-0.44%	0.38	0.02	-0.03
S78.B	-0.41%	0.37	0.02	-0.02
S79.B	-0.41%	0.37	0.02	-0.02
S77.B	-0.40%	0.37	0.02	-0.02
S3.C	0.39%	0.37	0.02	-0.02
S4.C	0.39%	0.37	0.02	-0.02
S1.C	0.39%	0.37	0.02	-0.02
S5.C	0.39%	0.37	0.02	-0.02
S6.C	0.39%	0.37	0.02	-0.02
S89.B	-0.37%	0.37	0.02	-0.02
S90.B	-0.37%	0.37	0.02	-0.02

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S76.B	-0.37%	0.37	0.02	-0.02
S86.B	-0.37%	0.37	0.02	-0.02
S87.B	-0.37%	0.37	0.02	-0.02
S93.B	-0.37%	0.37	0.02	-0.02
S95.B	-0.37%	0.37	0.02	-0.02
S96.B	-0.37%	0.37	0.02	-0.02
S91.B	-0.37%	0.37	0.02	-0.02
S72.B	-0.35%	0.36	0.02	-0.02
S101.B	-0.32%	0.36	0.02	-0.02
S300.B	-0.32%	0.36	0.02	-0.02
S67.B	-0.32%	0.36	0.02	-0.02
S98.B	-0.32%	0.36	0.02	-0.02
S106.B	-0.32%	0.36	0.02	-0.02
S99.B	-0.32%	0.36	0.02	-0.02
S108.B	-0.32%	0.36	0.02	-0.02
S197.B	-0.32%	0.36	0.02	-0.02
S97.B	-0.32%	0.36	0.02	-0.02
S105.B	-0.32%	0.36	0.02	-0.02
S450.B	-0.32%	0.36	0.02	-0.02
S100.B	-0.32%	0.36	0.02	-0.02
S107.B	-0.32%	0.36	0.02	-0.02
S160.B	0.29%	0.36	0.01	-0.02
S60.B	0.29%	0.36	0.01	-0.02
S61.B	0.29%	0.36	0.01	-0.02
S61s.B	0.29%	0.36	0.01	-0.02
S62.B	0.29%	0.36	0.01	-0.02
S64.B	0.29%	0.36	0.01	-0.02
S63.B	0.29%	0.36	0.01	-0.02
S66.B	0.29%	0.36	0.01	-0.02
S65.B	0.29%	0.36	0.01	-0.02
S160r.B	-0.29%	0.36	0.01	-0.02
S59.B	0.20%	0.34	0.01	-0.01
S58.B	0.20%	0.34	0.01	-0.01
S57.B	0.20%	0.34	0.01	-0.01
S54.B	0.16%	0.34	0.01	-0.01
S55.B	0.16%	0.34	0.01	-0.01
S56.B	0.16%	0.34	0.01	-0.01
S53.B	0.15%	0.33	0.01	-0.01
S52.B	0.13%	0.33	0.01	-0.01
S135.B	0.10%	0.33	0.01	-0.01
S18.B	0.10%	0.33	0.01	-0.01
S25.B	0.10%	0.33	0.01	-0.01

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S35.B	0.10%	0.33	0.01	-0.01
S38.B	0.10%	0.33	0.01	-0.01
S40.B	0.10%	0.33	0.01	-0.01
S43.B	0.10%	0.33	0.01	-0.01
S47.B	0.10%	0.33	0.01	-0.01
S48.B	0.10%	0.33	0.01	-0.01
S151.B	0.10%	0.33	0.01	-0.01
S300_open.B	0.10%	0.33	0.01	-0.01
S51.B	0.10%	0.33	0.01	-0.01
S28.B	0.10%	0.33	0.01	-0.01
S44.B	0.10%	0.33	0.01	-0.01
S49.B	0.10%	0.33	0.01	-0.01
S13.B	0.10%	0.33	0.01	-0.01
S152.B	0.10%	0.33	0.01	-0.01
S39.B	0.10%	0.33	0.01	-0.01
S21.B	0.10%	0.33	0.01	-0.01
S22.B	0.10%	0.33	0.01	-0.01
S23.B	0.10%	0.33	0.01	-0.01
S250.B	0.10%	0.33	0.01	-0.01
S29.B	0.10%	0.33	0.01	-0.01
S30.B	0.10%	0.33	0.01	-0.01
S36.B	0.10%	0.33	0.01	-0.01
S42.B	0.10%	0.33	0.01	-0.01
S50.B	0.10%	0.33	0.01	-0.01
S12.B	0.08%	0.32	0.00	0.00
S8.B	0.08%	0.32	0.00	0.00
S27.A	-0.42%	0.33	0.00	-0.04
S33.A	-0.42%	0.33	0.00	-0.04
S26.A	-0.42%	0.33	0.00	-0.04
S25r.A	-0.42%	0.33	0.00	-0.04
S7.B	0.06%	0.32	0.00	0.00
S1.B	0.03%	0.32	0.00	0.00
S2.B	0.03%	0.32	0.00	0.00
S149.C	0.00%	0.31	0.00	0.00
S149.A	0.00%	0.31	0.00	0.00
S149.B	0.00%	0.31	0.00	0.00
S32.C	0.18%	0.29	0.00	0.02
S26.C	0.18%	0.29	0.00	0.02
S27.C	0.18%	0.29	0.00	0.02
S31.C	0.18%	0.29	0.00	0.02
S25r.C	0.18%	0.29	0.00	0.02
S1.A	0.16%	0.29	-0.01	0.01

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S7.A	0.29%	0.27	-0.01	0.01
S10.A	-0.36%	0.26	-0.02	0.02
S11.A	-0.36%	0.26	-0.02	0.02
S14.A	-0.36%	0.26	-0.02	0.02
S9r.A	-0.36%	0.26	-0.02	0.02
S8.A	0.37%	0.26	-0.02	0.02
S9.A	0.37%	0.26	-0.02	0.02
S20.A	0.49%	0.24	-0.02	0.02
S40.A	0.49%	0.24	-0.02	0.02
S19.A	0.49%	0.24	-0.02	0.02
S49.A	0.49%	0.24	-0.02	0.02
S37.A	0.49%	0.24	-0.02	0.02
S250.A	0.49%	0.24	-0.02	0.02
S13.A	0.49%	0.24	-0.02	0.02
S152.A	0.49%	0.24	-0.02	0.02
S135.A	0.49%	0.24	-0.02	0.02
S18.A	0.49%	0.24	-0.02	0.02
S21.A	0.49%	0.24	-0.02	0.02
S29.A	0.49%	0.24	-0.02	0.02
S30.A	0.49%	0.24	-0.02	0.02
S36.A	0.49%	0.24	-0.02	0.02
S42.A	0.49%	0.24	-0.02	0.02
S46.A	0.49%	0.24	-0.02	0.02
S48.A	0.49%	0.24	-0.02	0.02
S47.A	0.49%	0.24	-0.02	0.02
S151.A	0.49%	0.24	-0.02	0.02
S23.A	0.49%	0.24	-0.02	0.02
S28.A	0.49%	0.24	-0.02	0.02
S300_open.A	0.49%	0.24	-0.02	0.02
S35.A	0.49%	0.24	-0.02	0.02
S44.A	0.49%	0.24	-0.02	0.02
S45.A	0.49%	0.24	-0.02	0.02
S51.A	0.49%	0.24	-0.02	0.02
S25.A	0.49%	0.24	-0.02	0.02
S50.A	0.49%	0.24	-0.02	0.02
S52.A	0.65%	0.21	-0.03	0.03
S53.A	0.74%	0.20	-0.04	0.04
S55.A	0.79%	0.19	-0.04	0.04
S56.A	0.79%	0.19	-0.04	0.04
S54.A	0.79%	0.19	-0.04	0.04
S94_open.A	0.79%	0.19	-0.04	0.04
S57.A	0.95%	0.17	-0.05	0.05

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S160r.A	1.35%	0.15	-0.06	-0.07
S61.A	1.28%	0.12	-0.07	0.06
S61s.A	1.28%	0.12	-0.07	0.06
S62.A	1.28%	0.12	-0.07	0.06
S63.A	1.28%	0.12	-0.07	0.06
S66.A	1.28%	0.12	-0.07	0.06
S160.A	1.28%	0.12	-0.07	0.06
S60.A	1.28%	0.12	-0.07	0.06
S65.A	1.28%	0.12	-0.07	0.06
S64.A	1.28%	0.12	-0.07	0.06
S71.A	1.45%	0.13	-0.07	-0.06
S67.A	1.45%	0.13	-0.07	-0.06
S70.A	1.45%	0.13	-0.07	-0.06
S100.A	1.45%	0.13	-0.07	-0.06
S111.A	1.45%	0.13	-0.07	-0.06
S112.A	1.45%	0.13	-0.07	-0.06
S197.A	1.45%	0.13	-0.07	-0.06
S69.A	1.45%	0.13	-0.07	-0.06
S97.A	1.45%	0.13	-0.07	-0.06
S108.A	1.45%	0.13	-0.07	-0.06
S105.A	1.45%	0.13	-0.07	-0.06
S109.A	1.45%	0.13	-0.07	-0.06
S114.A	1.45%	0.13	-0.07	-0.06
S300.A	1.45%	0.13	-0.07	-0.06
S68.A	1.45%	0.13	-0.07	-0.06
S98.A	1.45%	0.13	-0.07	-0.06
S99.A	1.45%	0.13	-0.07	-0.06
S110.A	1.45%	0.13	-0.07	-0.06
S113.A	1.45%	0.13	-0.07	-0.06
S450.A	1.45%	0.13	-0.07	-0.06
S101.A	1.45%	0.13	-0.07	-0.06
S72.A	1.57%	0.11	-0.08	-0.05
S91.A	1.66%	0.10	-0.08	-0.05
S76.A	1.66%	0.10	-0.08	-0.05
S89.A	1.66%	0.10	-0.08	-0.05
S86.A	1.66%	0.10	-0.08	-0.05
S88.A	1.66%	0.10	-0.08	-0.05
S87.A	1.66%	0.10	-0.08	-0.05
S93.A	1.66%	0.10	-0.08	-0.05
S94.A	1.66%	0.10	-0.08	-0.05
S95.A	1.66%	0.10	-0.08	-0.05
S77.A	1.87%	0.06	-0.09	-0.04

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S78.A	1.92%	0.06	-0.10	-0.04
S79.A	1.92%	0.06	-0.10	-0.04
S80.A	2.17%	0.02	-0.11	-0.02
S81.A	2.26%	0.01	-0.11	-0.02
S82.A	2.26%	0.01	-0.11	-0.02
S83.A	2.26%	0.01	-0.11	-0.02

Table I.2: Av. normalised covariance values and first two eigenvectors from PCA obtained for Scenario S2

Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S85.C	4.92%	0.99	0.25	0.05
S84.C	4.08%	0.87	0.21	0.07
S81.C	2.89%	0.70	0.15	0.10
S82.C	2.89%	0.70	0.15	0.10
S83.C	2.89%	0.70	0.15	0.10
S80.C	2.73%	0.68	0.14	0.10
S64.C	2.51%	0.65	0.13	-0.01
S66.C	2.51%	0.65	0.13	-0.01
S160.C	2.51%	0.65	0.13	-0.01
S63.C	2.51%	0.65	0.13	-0.01
S65.C	2.51%	0.65	0.13	-0.01
S62.C	2.51%	0.65	0.13	-0.01
S60.C	2.51%	0.65	0.13	-0.01
S61.C	2.51%	0.65	0.13	-0.01
S61s.C	2.51%	0.65	0.13	-0.01
S78.C	2.31%	0.62	0.12	0.11
S79.C	2.31%	0.62	0.12	0.11
S77.C	2.22%	0.61	0.12	0.11
S92.C	1.87%	0.56	0.10	0.11
S93.C	1.87%	0.56	0.10	0.11
S95.C	1.87%	0.56	0.10	0.11
S91.C	1.87%	0.56	0.10	0.11
S89.C	1.87%	0.56	0.10	0.11
S76.C	1.87%	0.56	0.10	0.11
S87.C	1.87%	0.56	0.10	0.11
S86.C	1.87%	0.56	0.10	0.11
S57.C	1.88%	0.56	0.10	-0.01
S73.C	1.69%	0.54	0.09	0.11
S74.C	1.69%	0.54	0.09	0.11

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S75.C	1.69%	0.54	0.09	0.11
S72.C	1.69%	0.54	0.09	0.11
S55.C	1.59%	0.52	0.08	-0.01
S56.C	1.59%	0.52	0.08	-0.01
S54.C	1.59%	0.52	0.08	-0.01
S101.C	1.45%	0.50	0.08	0.11
S103.C	1.45%	0.50	0.08	0.11
S98.C	1.45%	0.50	0.08	0.11
S99.C	1.45%	0.50	0.08	0.11
S300.C	1.45%	0.50	0.08	0.11
S100.C	1.45%	0.50	0.08	0.11
S102.C	1.45%	0.50	0.08	0.11
S104.C	1.45%	0.50	0.08	0.11
S105.C	1.45%	0.50	0.08	0.11
S108.C	1.45%	0.50	0.08	0.11
S197.C	1.45%	0.50	0.08	0.11
S97.C	1.45%	0.50	0.08	0.11
S67.C	1.45%	0.50	0.08	0.11
S450.C	1.45%	0.50	0.08	0.11
S53.C	1.48%	0.51	0.08	-0.01
S52.C	1.32%	0.48	0.07	-0.01
S160r.C	-1.14%	0.46	0.06	0.12
S152.C	0.99%	0.44	0.05	0.00
S40.C	0.99%	0.44	0.05	0.00
S151.C	0.99%	0.44	0.05	0.00
S15.C	0.99%	0.44	0.05	0.00
S28.C	0.99%	0.44	0.05	0.00
S300_open.C	0.99%	0.44	0.05	0.00
S13.C	0.99%	0.44	0.05	0.00
S34.C	0.99%	0.44	0.05	0.00
S135.C	0.99%	0.44	0.05	0.00
S18.C	0.99%	0.44	0.05	0.00
S250.C	0.99%	0.44	0.05	0.00
S25.C	0.99%	0.44	0.05	0.00
S30.C	0.99%	0.44	0.05	0.00
S35.C	0.99%	0.44	0.05	0.00
S42.C	0.99%	0.44	0.05	0.00
S44.C	0.99%	0.44	0.05	0.00
S49.C	0.99%	0.44	0.05	0.00
S50.C	0.99%	0.44	0.05	0.00
S51.C	0.99%	0.44	0.05	0.00
S16.C	0.99%	0.44	0.05	0.00

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S17.C	0.99%	0.44	0.05	0.00
S24.C	0.99%	0.44	0.05	0.00
S29.C	0.99%	0.44	0.05	0.00
S41.C	0.99%	0.44	0.05	0.00
S47.C	0.99%	0.44	0.05	0.00
S48.C	0.99%	0.44	0.05	0.00
S21.C	0.99%	0.44	0.05	0.00
S23.C	0.99%	0.44	0.05	0.00
S8.C	0.74%	0.40	0.04	0.00
S81.B	0.75%	0.39	0.03	-0.10
S82.B	0.75%	0.39	0.03	-0.10
S83.B	0.75%	0.39	0.03	-0.10
S80.B	-0.73%	0.39	0.03	-0.10
S7.C	0.57%	0.38	0.03	0.00
S78.B	-0.66%	0.38	0.03	-0.09
S79.B	-0.66%	0.38	0.03	-0.09
S77.B	-0.64%	0.38	0.03	-0.09
S89.B	-0.58%	0.37	0.03	-0.08
S90.B	-0.58%	0.37	0.03	-0.08
S91.B	-0.58%	0.37	0.03	-0.08
S76.B	-0.58%	0.37	0.03	-0.08
S86.B	-0.58%	0.37	0.03	-0.08
S96.B	-0.58%	0.37	0.03	-0.08
S87.B	-0.58%	0.37	0.03	-0.08
S93.B	-0.58%	0.37	0.03	-0.08
S95.B	-0.58%	0.37	0.03	-0.08
S72.B	-0.54%	0.37	0.02	-0.08
S107.B	-0.49%	0.36	0.02	-0.07
S100.B	-0.49%	0.36	0.02	-0.07
S197.B	-0.49%	0.36	0.02	-0.07
S97.B	-0.49%	0.36	0.02	-0.07
S101.B	-0.49%	0.36	0.02	-0.07
S106.B	-0.49%	0.36	0.02	-0.07
S108.B	-0.49%	0.36	0.02	-0.07
S98.B	-0.49%	0.36	0.02	-0.07
S99.B	-0.49%	0.36	0.02	-0.07
S105.B	-0.49%	0.36	0.02	-0.07
S300.B	-0.49%	0.36	0.02	-0.07
S450.B	-0.49%	0.36	0.02	-0.07
S67.B	-0.49%	0.36	0.02	-0.07
S61.B	0.45%	0.36	0.02	-0.06
S61s.B	0.45%	0.36	0.02	-0.06

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S64.B	0.45%	0.36	0.02	-0.06
S63.B	0.45%	0.36	0.02	-0.06
S66.B	0.45%	0.36	0.02	-0.06
S160.B	0.45%	0.36	0.02	-0.06
S60.B	0.45%	0.36	0.02	-0.06
S62.B	0.45%	0.36	0.02	-0.06
S65.B	0.45%	0.36	0.02	-0.06
S160r.B	-0.44%	0.35	0.02	-0.06
S5.C	0.33%	0.35	0.02	0.00
S6.C	0.33%	0.35	0.02	0.00
S1.C	0.33%	0.35	0.02	0.00
S3.C	0.33%	0.35	0.02	0.00
S4.C	0.33%	0.35	0.02	0.00
S57.B	0.31%	0.34	0.01	-0.05
S58.B	0.31%	0.34	0.01	-0.05
S59.B	0.31%	0.34	0.01	-0.05
S25r.C	-0.34%	0.34	0.01	0.01
S32.C	-0.34%	0.34	0.01	0.01
S26.C	-0.34%	0.34	0.01	0.01
S27.C	-0.34%	0.34	0.01	0.01
S31.C	-0.34%	0.34	0.01	0.01
S56.B	0.25%	0.33	0.01	-0.04
S54.B	0.25%	0.33	0.01	-0.04
S55.B	0.25%	0.33	0.01	-0.04
S53.B	0.23%	0.33	0.01	-0.04
S52.B	0.21%	0.33	0.01	-0.03
S21.B	0.15%	0.32	0.01	-0.02
S29.B	0.15%	0.32	0.01	-0.02
S49.B	0.15%	0.32	0.01	-0.02
S44.B	0.15%	0.32	0.01	-0.02
S151.B	0.15%	0.32	0.01	-0.02
S300_open.B	0.15%	0.32	0.01	-0.02
S51.B	0.15%	0.32	0.01	-0.02
S25.B	0.15%	0.32	0.01	-0.02
S38.B	0.15%	0.32	0.01	-0.02
S39.B	0.15%	0.32	0.01	-0.02
S40.B	0.15%	0.32	0.01	-0.02
S43.B	0.15%	0.32	0.01	-0.02
S47.B	0.15%	0.32	0.01	-0.02
S48.B	0.15%	0.32	0.01	-0.02
S35.B	0.15%	0.32	0.01	-0.02
S50.B	0.15%	0.32	0.01	-0.02

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S135.B	0.15%	0.32	0.01	-0.02
S18.B	0.15%	0.32	0.01	-0.02
S22.B	0.15%	0.32	0.01	-0.02
S23.B	0.15%	0.32	0.01	-0.02
S36.B	0.15%	0.32	0.01	-0.02
S42.B	0.15%	0.32	0.01	-0.02
S250.B	0.15%	0.32	0.01	-0.02
S30.B	0.15%	0.32	0.01	-0.02
S13.B	0.15%	0.32	0.01	-0.02
S152.B	0.15%	0.32	0.01	-0.02
S28.B	0.15%	0.32	0.01	-0.02
S8.B	0.11%	0.31	0.00	-0.02
S12.B	0.11%	0.31	0.00	-0.02
S7.B	0.09%	0.31	0.00	-0.01
S1.B	0.05%	0.31	0.00	-0.01
S2.B	0.05%	0.31	0.00	-0.01
S25r.A	0.47%	0.31	0.00	-0.09
S33.A	0.47%	0.31	0.00	-0.09
S26.A	0.47%	0.31	0.00	-0.09
S27.A	0.47%	0.31	0.00	-0.09
S149.C	0.00%	0.30	0.00	0.00
S149.A	0.00%	0.30	0.00	0.00
S149.B	0.00%	0.30	0.00	0.00
S1.A	0.15%	0.28	-0.01	0.01
S7.A	0.26%	0.26	-0.01	0.01
S10.A	-0.33%	0.25	-0.02	0.02
S11.A	-0.33%	0.25	-0.02	0.02
S14.A	-0.33%	0.25	-0.02	0.02
S9r.A	-0.33%	0.25	-0.02	0.02
S9.A	0.34%	0.25	-0.02	0.02
S8.A	0.34%	0.25	-0.02	0.02
S25.A	0.45%	0.24	-0.02	0.02
S44.A	0.45%	0.24	-0.02	0.02
S51.A	0.45%	0.24	-0.02	0.02
S135.A	0.45%	0.24	-0.02	0.02
S18.A	0.45%	0.24	-0.02	0.02
S42.A	0.45%	0.24	-0.02	0.02
S13.A	0.45%	0.24	-0.02	0.02
S151.A	0.45%	0.24	-0.02	0.02
S152.A	0.45%	0.24	-0.02	0.02
S21.A	0.45%	0.24	-0.02	0.02
S23.A	0.45%	0.24	-0.02	0.02

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S28.A	0.45%	0.24	-0.02	0.02
S29.A	0.45%	0.24	-0.02	0.02
S300_open.A	0.45%	0.24	-0.02	0.02
S35.A	0.45%	0.24	-0.02	0.02
S36.A	0.45%	0.24	-0.02	0.02
S45.A	0.45%	0.24	-0.02	0.02
S46.A	0.45%	0.24	-0.02	0.02
S47.A	0.45%	0.24	-0.02	0.02
S48.A	0.45%	0.24	-0.02	0.02
S20.A	0.45%	0.24	-0.02	0.02
S19.A	0.45%	0.24	-0.02	0.02
S250.A	0.45%	0.24	-0.02	0.02
S40.A	0.45%	0.24	-0.02	0.02
S49.A	0.45%	0.24	-0.02	0.02
S50.A	0.45%	0.24	-0.02	0.02
S30.A	0.45%	0.24	-0.02	0.02
S37.A	0.45%	0.24	-0.02	0.02
S52.A	0.60%	0.22	-0.03	0.03
S53.A	-0.67%	0.21	-0.03	0.03
S54.A	-0.72%	0.20	-0.04	0.04
S94_open.A	-0.72%	0.20	-0.04	0.04
S55.A	-0.72%	0.20	-0.04	0.04
S56.A	-0.72%	0.20	-0.04	0.04
S57.A	-0.86%	0.18	-0.04	0.04
S160.A	-1.17%	0.14	-0.06	0.06
S60.A	-1.17%	0.14	-0.06	0.06
S66.A	-1.17%	0.14	-0.06	0.06
S61.A	-1.17%	0.14	-0.06	0.06
S61s.A	-1.17%	0.14	-0.06	0.06
S62.A	-1.17%	0.14	-0.06	0.06
S63.A	-1.17%	0.14	-0.06	0.06
S64.A	-1.17%	0.14	-0.06	0.06
S65.A	-1.17%	0.14	-0.06	0.06
S160r.A	1.18%	0.13	-0.06	0.06
S67.A	-1.35%	0.11	-0.07	0.07
S71.A	-1.35%	0.11	-0.07	0.07
S108.A	-1.35%	0.11	-0.07	0.07
S197.A	-1.35%	0.11	-0.07	0.07
S97.A	-1.35%	0.11	-0.07	0.07
S70.A	-1.35%	0.11	-0.07	0.07
S101.A	-1.35%	0.11	-0.07	0.07
S100.A	-1.35%	0.11	-0.07	0.07

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigenvector weights	Second eigenvector weights
S112.A	-1.35%	0.11	-0.07	0.07
S109.A	-1.35%	0.11	-0.07	0.07
S110.A	-1.35%	0.11	-0.07	0.07
S111.A	-1.35%	0.11	-0.07	0.07
S300.A	-1.35%	0.11	-0.07	0.07
S69.A	-1.35%	0.11	-0.07	0.07
S98.A	-1.35%	0.11	-0.07	0.07
S99.A	-1.35%	0.11	-0.07	0.07
S450.A	-1.35%	0.11	-0.07	0.07
S114.A	-1.35%	0.11	-0.07	0.07
S105.A	-1.35%	0.11	-0.07	0.07
S113.A	-1.35%	0.11	-0.07	0.07
S68.A	-1.35%	0.11	-0.07	0.07
S72.A	-1.47%	0.09	-0.07	0.07
S86.A	-1.55%	0.08	-0.08	0.08
S76.A	-1.55%	0.08	-0.08	0.08
S89.A	-1.55%	0.08	-0.08	0.08
S87.A	-1.55%	0.08	-0.08	0.08
S88.A	-1.55%	0.08	-0.08	0.08
S91.A	-1.55%	0.08	-0.08	0.08
S93.A	-1.55%	0.08	-0.08	0.08
S94.A	-1.55%	0.08	-0.08	0.08
S95.A	-1.55%	0.08	-0.08	0.08
S77.A	-1.75%	0.05	-0.09	0.08
S78.A	-1.80%	0.05	-0.09	0.09
S79.A	-1.80%	0.05	-0.09	0.09
S80.A	-2.04%	0.01	-0.10	0.10
S83.A	-2.13%	0.00	-0.11	0.10
S81.A	-2.13%	0.00	-0.11	0.10
S82.A	-2.13%	0.00	-0.11	0.10

Table I.3: Av. normalised covariance values and first two eigenvectors from PCA obtained for Scenario S3

Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigenvector weights	Second eigenvector weights
S66.C	-5.52%	0.99	0.32	0.18
S65.C	-4.94%	0.91	0.29	0.16
S64.C	-4.19%	0.81	0.25	0.14
S63.C	-3.58%	0.72	0.21	0.12
S62.C	-3.27%	0.68	0.19	0.11

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S160.C	-2.83%	0.62	0.17	0.09
S60.C	-2.83%	0.62	0.17	0.09
S61.C	-2.83%	0.62	0.17	0.09
S61s.C	-2.83%	0.62	0.17	0.09
S57.C	-2.13%	0.53	0.12	0.07
S54.C	-1.81%	0.48	0.11	0.06
S55.C	-1.81%	0.48	0.11	0.06
S56.C	-1.81%	0.48	0.11	0.06
S53.C	-1.69%	0.46	0.10	0.06
S52.C	-1.50%	0.44	0.09	0.05
S24.C	1.13%	0.39	0.07	0.04
S41.C	1.13%	0.39	0.07	0.04
S47.C	1.13%	0.39	0.07	0.04
S48.C	1.13%	0.39	0.07	0.04
S15.C	1.13%	0.39	0.07	0.04
S21.C	1.13%	0.39	0.07	0.04
S23.C	1.13%	0.39	0.07	0.04
S28.C	1.13%	0.39	0.07	0.04
S34.C	1.13%	0.39	0.07	0.04
S40.C	1.13%	0.39	0.07	0.04
S250.C	1.13%	0.39	0.07	0.04
S30.C	1.13%	0.39	0.07	0.04
S42.C	1.13%	0.39	0.07	0.04
S152.C	1.13%	0.39	0.07	0.04
S35.C	1.13%	0.39	0.07	0.04
S16.C	1.13%	0.39	0.07	0.04
S17.C	1.13%	0.39	0.07	0.04
S29.C	1.13%	0.39	0.07	0.04
S49.C	1.13%	0.39	0.07	0.04
S151.C	1.13%	0.39	0.07	0.04
S300 open.C	1.13%	0.39	0.07	0.04
S44.C	1.13%	0.39	0.07	0.04
S135.C	1.13%	0.39	0.07	0.04
S18.C	1.13%	0.39	0.07	0.04
S25.C	1.13%	0.39	0.07	0.04
S50.C	1.13%	0.39	0.07	0.04
S51.C	1.13%	0.39	0.07	0.04
S13.C	1.13%	0.39	0.07	0.04
S8.C	0.85%	0.35	0.05	0.03
S79.C	1.01%	0.34	0.05	-0.09
S89.C	1.01%	0.34	0.05	-0.09
S78.C	1.01%	0.34	0.05	-0.09

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S82.C	1.01%	0.34	0.05	-0.09
S83.C	1.01%	0.34	0.05	-0.09
S85.C	1.01%	0.34	0.05	-0.09
S86.C	1.01%	0.34	0.05	-0.09
S450.C	1.01%	0.34	0.05	-0.09
S81.C	1.01%	0.34	0.05	-0.09
S84.C	1.01%	0.34	0.05	-0.09
S101.C	1.01%	0.34	0.05	-0.09
S103.C	1.01%	0.34	0.05	-0.09
S300.C	1.01%	0.34	0.05	-0.09
S73.C	1.01%	0.34	0.05	-0.09
S76.C	1.01%	0.34	0.05	-0.09
S91.C	1.01%	0.34	0.05	-0.09
S98.C	1.01%	0.34	0.05	-0.09
S99.C	1.01%	0.34	0.05	-0.09
S77.C	1.01%	0.34	0.05	-0.09
S87.C	1.01%	0.34	0.05	-0.09
S102.C	1.01%	0.34	0.05	-0.09
S104.C	1.01%	0.34	0.05	-0.09
S105.C	1.01%	0.34	0.05	-0.09
S108.C	1.01%	0.34	0.05	-0.09
S160r.C	1.01%	0.34	0.05	-0.09
S197.C	1.01%	0.34	0.05	-0.09
S67.C	1.01%	0.34	0.05	-0.09
S72.C	1.01%	0.34	0.05	-0.09
S74.C	1.01%	0.34	0.05	-0.09
S75.C	1.01%	0.34	0.05	-0.09
S80.C	1.01%	0.34	0.05	-0.09
S92.C	1.01%	0.34	0.05	-0.09
S93.C	1.01%	0.34	0.05	-0.09
S95.C	1.01%	0.34	0.05	-0.09
S97.C	1.01%	0.34	0.05	-0.09
S100.C	1.01%	0.34	0.05	-0.09
S7.C	0.66%	0.32	0.04	0.02
S3.C	0.38%	0.28	0.02	0.01
S4.C	0.38%	0.28	0.02	0.01
S1.C	0.38%	0.28	0.02	0.01
S5.C	0.38%	0.28	0.02	0.01
S6.C	0.38%	0.28	0.02	0.01
S61.B	0.32%	0.28	0.02	0.01
S61s.B	0.32%	0.28	0.02	0.01
S160.B	0.32%	0.28	0.02	0.01

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S60.B	0.32%	0.28	0.02	0.01
S101.B	-0.32%	0.27	0.02	0.01
S77.B	-0.32%	0.27	0.02	0.01
S98.B	-0.32%	0.27	0.02	0.01
S99.B	-0.32%	0.27	0.02	0.01
S450.B	-0.32%	0.27	0.02	0.01
S91.B	-0.32%	0.27	0.02	0.01
S105.B	-0.32%	0.27	0.02	0.01
S160r.B	-0.32%	0.27	0.02	0.01
S80.B	-0.32%	0.27	0.02	0.01
S81.B	-0.32%	0.27	0.02	0.01
S82.B	-0.32%	0.27	0.02	0.01
S83.B	-0.32%	0.27	0.02	0.01
S89.B	-0.32%	0.27	0.02	0.01
S90.B	-0.32%	0.27	0.02	0.01
S300.B	-0.32%	0.27	0.02	0.01
S67.B	-0.32%	0.27	0.02	0.01
S107.B	-0.32%	0.27	0.02	0.01
S100.B	-0.32%	0.27	0.02	0.01
S106.B	-0.32%	0.27	0.02	0.01
S108.B	-0.32%	0.27	0.02	0.01
S197.B	-0.32%	0.27	0.02	0.01
S72.B	-0.32%	0.27	0.02	0.01
S76.B	-0.32%	0.27	0.02	0.01
S78.B	-0.32%	0.27	0.02	0.01
S79.B	-0.32%	0.27	0.02	0.01
S86.B	-0.32%	0.27	0.02	0.01
S87.B	-0.32%	0.27	0.02	0.01
S93.B	-0.32%	0.27	0.02	0.01
S95.B	-0.32%	0.27	0.02	0.01
S96.B	-0.32%	0.27	0.02	0.01
S97.B	-0.32%	0.27	0.02	0.01
S62.B	0.24%	0.26	0.01	0.01
S57.B	0.22%	0.26	0.01	0.01
S58.B	0.22%	0.26	0.01	0.01
S59.B	0.22%	0.26	0.01	0.01
S63.B	0.19%	0.26	0.01	0.01
S54.B	0.18%	0.26	0.01	0.01
S55.B	0.18%	0.26	0.01	0.01
S56.B	0.18%	0.26	0.01	0.01
S53.B	0.17%	0.25	0.01	0.01
S52.B	0.15%	0.25	0.01	0.01

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S135.B	0.11%	0.25	0.01	0.00
S18.B	0.11%	0.25	0.01	0.00
S25.B	0.11%	0.25	0.01	0.00
S35.B	0.11%	0.25	0.01	0.00
S36.B	0.11%	0.25	0.01	0.00
S38.B	0.11%	0.25	0.01	0.00
S40.B	0.11%	0.25	0.01	0.00
S43.B	0.11%	0.25	0.01	0.00
S47.B	0.11%	0.25	0.01	0.00
S48.B	0.11%	0.25	0.01	0.00
S51.B	0.11%	0.25	0.01	0.00
S22.B	0.11%	0.25	0.01	0.00
S23.B	0.11%	0.25	0.01	0.00
S250.B	0.11%	0.25	0.01	0.00
S30.B	0.11%	0.25	0.01	0.00
S42.B	0.11%	0.25	0.01	0.00
S50.B	0.11%	0.25	0.01	0.00
S21.B	0.11%	0.25	0.01	0.00
S29.B	0.11%	0.25	0.01	0.00
S13.B	0.11%	0.25	0.01	0.00
S152.B	0.11%	0.25	0.01	0.00
S28.B	0.11%	0.25	0.01	0.00
S151.B	0.11%	0.25	0.01	0.00
S300 open.B	0.11%	0.25	0.01	0.00
S39.B	0.11%	0.25	0.01	0.00
S44.B	0.11%	0.25	0.01	0.00
S49.B	0.11%	0.25	0.01	0.00
S12.B	0.08%	0.24	0.00	0.00
S8.B	0.08%	0.24	0.00	0.00
S64.B	0.08%	0.24	0.00	0.01
S27.A	-0.42%	0.24	0.00	0.07
S26.A	-0.42%	0.24	0.00	0.07
S25r.A	-0.42%	0.24	0.00	0.07
S33.A	-0.42%	0.24	0.00	0.07
S7.B	0.07%	0.24	0.00	0.00
S1.B	0.04%	0.24	0.00	0.00
S2.B	0.04%	0.24	0.00	0.00
S149.C	0.00%	0.23	0.00	0.00
S149.A	0.00%	0.23	0.00	0.00
S149.B	0.00%	0.23	0.00	0.00
S65.B	0.06%	0.22	0.00	0.00
S26.C	0.21%	0.21	-0.01	-0.02

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S27.C	0.21%	0.21	-0.01	-0.02
S31.C	0.21%	0.21	-0.01	-0.02
S32.C	0.21%	0.21	-0.01	-0.02
S25r.C	0.21%	0.21	-0.01	-0.02
S1.A	0.16%	0.21	-0.01	-0.01
S66.B	0.16%	0.21	-0.01	0.00
S7.A	0.28%	0.19	-0.02	-0.01
S9r.A	-0.36%	0.18	-0.02	-0.01
S10.A	-0.36%	0.18	-0.02	-0.01
S11.A	-0.36%	0.18	-0.02	-0.01
S14.A	-0.36%	0.18	-0.02	-0.01
S9.A	0.37%	0.18	-0.02	-0.01
S8.A	0.37%	0.18	-0.02	-0.01
S37.A	0.49%	0.16	-0.03	-0.02
S135.A	0.49%	0.16	-0.03	-0.02
S47.A	0.49%	0.16	-0.03	-0.02
S19.A	0.49%	0.16	-0.03	-0.02
S20.A	0.49%	0.16	-0.03	-0.02
S21.A	0.49%	0.16	-0.03	-0.02
S250.A	0.49%	0.16	-0.03	-0.02
S29.A	0.49%	0.16	-0.03	-0.02
S30.A	0.49%	0.16	-0.03	-0.02
S36.A	0.49%	0.16	-0.03	-0.02
S40.A	0.49%	0.16	-0.03	-0.02
S42.A	0.49%	0.16	-0.03	-0.02
S48.A	0.49%	0.16	-0.03	-0.02
S49.A	0.49%	0.16	-0.03	-0.02
S18.A	0.49%	0.16	-0.03	-0.02
S13.A	0.49%	0.16	-0.03	-0.02
S152.A	0.49%	0.16	-0.03	-0.02
S25.A	0.49%	0.16	-0.03	-0.02
S50.A	0.49%	0.16	-0.03	-0.02
S151.A	0.49%	0.16	-0.03	-0.02
S300 open.A	0.49%	0.16	-0.03	-0.02
S46.A	0.49%	0.16	-0.03	-0.02
S23.A	0.49%	0.16	-0.03	-0.02
S28.A	0.49%	0.16	-0.03	-0.02
S35.A	0.49%	0.16	-0.03	-0.02
S45.A	0.49%	0.16	-0.03	-0.02
S44.A	0.49%	0.16	-0.03	-0.02
S51.A	0.49%	0.16	-0.03	-0.02
S52.A	0.65%	0.14	-0.04	-0.02

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S53.A	0.73%	0.13	-0.04	-0.02
S56.A	0.78%	0.12	-0.05	-0.03
S55.A	0.78%	0.12	-0.05	-0.03
S54.A	0.78%	0.12	-0.05	-0.03
S94 open.A	0.78%	0.12	-0.05	-0.03
S57.A	0.94%	0.10	-0.05	-0.03
S101.A	1.34%	0.07	-0.07	0.11
S83.A	1.34%	0.07	-0.07	0.11
S113.A	1.34%	0.07	-0.07	0.11
S450.A	1.34%	0.07	-0.07	0.11
S68.A	1.34%	0.07	-0.07	0.11
S77.A	1.34%	0.07	-0.07	0.11
S88.A	1.34%	0.07	-0.07	0.11
S87.A	1.34%	0.07	-0.07	0.11
S67.A	1.34%	0.07	-0.07	0.11
S71.A	1.34%	0.07	-0.07	0.11
S82.A	1.34%	0.07	-0.07	0.11
S93.A	1.34%	0.07	-0.07	0.11
S94.A	1.34%	0.07	-0.07	0.11
S95.A	1.34%	0.07	-0.07	0.11
S109.A	1.34%	0.07	-0.07	0.11
S112.A	1.34%	0.07	-0.07	0.11
S160r.A	1.34%	0.07	-0.07	0.11
S300.A	1.34%	0.07	-0.07	0.11
S69.A	1.34%	0.07	-0.07	0.11
S76.A	1.34%	0.07	-0.07	0.11
S89.A	1.34%	0.07	-0.07	0.11
S100.A	1.34%	0.07	-0.07	0.11
S108.A	1.34%	0.07	-0.07	0.11
S70.A	1.34%	0.07	-0.07	0.11
S81.A	1.34%	0.07	-0.07	0.11
S110.A	1.34%	0.07	-0.07	0.11
S99.A	1.34%	0.07	-0.07	0.11
S114.A	1.34%	0.07	-0.07	0.11
S72.A	1.34%	0.07	-0.07	0.11
S78.A	1.34%	0.07	-0.07	0.11
S79.A	1.34%	0.07	-0.07	0.11
S86.A	1.34%	0.07	-0.07	0.11
S98.A	1.34%	0.07	-0.07	0.11
S105.A	1.34%	0.07	-0.07	0.11
S91.A	1.34%	0.07	-0.07	0.11
S111.A	1.34%	0.07	-0.07	0.11

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S197.A	1.34%	0.07	-0.07	0.11
S80.A	1.34%	0.07	-0.07	0.11
S97.A	1.34%	0.07	-0.07	0.11
S61.A	1.27%	0.06	-0.07	-0.04
S61s.A	1.27%	0.06	-0.07	-0.04
S160.A	1.27%	0.06	-0.07	-0.04
S60.A	1.27%	0.06	-0.07	-0.04
S62.A	1.33%	0.05	-0.08	-0.05
S63.A	1.38%	0.04	-0.08	-0.05
S64.A	1.46%	0.03	-0.09	-0.05
S65.A	1.57%	0.01	-0.09	-0.05
S83.A	1.75%	0.01	-0.09	-0.03

Table I.4: Av. normalised covariance values and first two eigenvectors from PCA obtained for Scenario S4

Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S85.C	-4.88%	0.99	0.24	-0.06
S84.C	-4.00%	0.85	0.19	-0.03
S65.C	-3.12%	0.75	0.16	-0.10
S160.C	-3.12%	0.75	0.16	-0.10
S62.C	-3.12%	0.75	0.16	-0.10
S61.C	-3.12%	0.75	0.16	-0.10
S61s.C	-3.12%	0.75	0.16	-0.10
S64.C	-3.12%	0.75	0.16	-0.10
S66.C	-3.12%	0.75	0.16	-0.10
S60.C	-3.12%	0.75	0.16	-0.10
S63.C	-3.12%	0.75	0.16	-0.10
S82.C	-2.78%	0.66	0.13	0.01
S83.C	-2.78%	0.66	0.13	0.01
S81.C	-2.75%	0.66	0.13	0.01
S57.C	-2.34%	0.63	0.12	-0.07
S80.C	-2.56%	0.63	0.12	0.02
S56.C	-1.98%	0.57	0.10	-0.06
S55.C	-1.98%	0.57	0.10	-0.06
S54.C	-1.98%	0.57	0.10	-0.06
S53.C	-1.85%	0.55	0.09	-0.06
S78.C	-2.06%	0.55	0.09	0.03
S79.C	-2.06%	0.55	0.09	0.03
S77.C	-1.96%	0.54	0.09	0.04

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S52.C	-1.64%	0.52	0.08	-0.05
S64.A	-1.49%	0.49	0.08	-0.05
S65.A	-1.49%	0.49	0.08	-0.05
S66.A	-1.49%	0.49	0.08	-0.05
S160.A	-1.49%	0.49	0.08	-0.05
S62.A	-1.49%	0.49	0.08	-0.05
S63.A	-1.49%	0.49	0.08	-0.05
S61.A	-1.49%	0.49	0.08	-0.05
S61s.A	-1.49%	0.49	0.08	-0.05
S60.A	-1.49%	0.49	0.08	-0.05
S82.A	-1.86%	0.51	0.07	0.10
S83.A	-1.86%	0.51	0.07	0.10
S87.C	-1.53%	0.47	0.07	0.05
S92.C	-1.53%	0.47	0.07	0.05
S93.C	-1.53%	0.47	0.07	0.05
S95.C	-1.53%	0.47	0.07	0.05
S76.C	-1.53%	0.47	0.07	0.05
S89.C	-1.53%	0.47	0.07	0.05
S91.C	-1.53%	0.47	0.07	0.05
S86.C	-1.53%	0.47	0.07	0.05
S25.C	-1.23%	0.45	0.06	-0.04
S51.C	-1.23%	0.45	0.06	-0.04
S151.C	-1.23%	0.45	0.06	-0.04
S21.C	-1.23%	0.45	0.06	-0.04
S23.C	-1.23%	0.45	0.06	-0.04
S28.C	-1.23%	0.45	0.06	-0.04
S300 open.C	-1.23%	0.45	0.06	-0.04
S44.C	-1.23%	0.45	0.06	-0.04
S135.C	-1.23%	0.45	0.06	-0.04
S152.C	-1.23%	0.45	0.06	-0.04
S18.C	-1.23%	0.45	0.06	-0.04
S50.C	-1.23%	0.45	0.06	-0.04
S13.C	-1.23%	0.45	0.06	-0.04
S16.C	-1.23%	0.45	0.06	-0.04
S17.C	-1.23%	0.45	0.06	-0.04
S250.C	-1.23%	0.45	0.06	-0.04
S29.C	-1.23%	0.45	0.06	-0.04
S30.C	-1.23%	0.45	0.06	-0.04
S35.C	-1.23%	0.45	0.06	-0.04
S42.C	-1.23%	0.45	0.06	-0.04
S49.C	-1.23%	0.45	0.06	-0.04
S15.C	-1.23%	0.45	0.06	-0.04

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S24.C	-1.23%	0.45	0.06	-0.04
S41.C	-1.23%	0.45	0.06	-0.04
S47.C	-1.23%	0.45	0.06	-0.04
S48.C	-1.23%	0.45	0.06	-0.04
S34.C	-1.23%	0.45	0.06	-0.04
S40.C	-1.23%	0.45	0.06	-0.04
S81.A	-1.64%	0.47	0.06	0.11
S80.A	-1.57%	0.46	0.06	0.11
S57.A	1.15%	0.44	0.06	-0.04
S75.C	-1.33%	0.44	0.05	0.06
S72.C	-1.33%	0.44	0.05	0.06
S74.C	-1.33%	0.44	0.05	0.06
S73.C	-1.33%	0.44	0.05	0.06
S78.A	-1.40%	0.44	0.05	0.11
S79.A	-1.40%	0.44	0.05	0.11
S55.A	0.99%	0.42	0.05	-0.03
S56.A	0.99%	0.42	0.05	-0.03
S54.A	0.99%	0.42	0.05	-0.03
S94 open.A	0.99%	0.42	0.05	-0.03
S77.A	-1.39%	0.43	0.05	0.12
S8.C	0.93%	0.41	0.05	-0.03
S53.A	0.92%	0.41	0.05	-0.03
S52.A	0.82%	0.39	0.04	-0.03
S93.A	1.38%	0.41	0.04	0.12
S87.A	1.38%	0.41	0.04	0.12
S94.A	1.38%	0.41	0.04	0.12
S95.A	1.38%	0.41	0.04	0.12
S91.A	1.38%	0.41	0.04	0.12
S76.A	1.38%	0.41	0.04	0.12
S89.A	1.38%	0.41	0.04	0.12
S86.A	1.38%	0.41	0.04	0.12
S88.A	1.38%	0.41	0.04	0.12
S102.C	-1.05%	0.40	0.04	0.06
S450.C	-1.05%	0.40	0.04	0.06
S103.C	-1.05%	0.40	0.04	0.06
S300.C	-1.05%	0.40	0.04	0.06
S98.C	-1.05%	0.40	0.04	0.06
S99.C	-1.05%	0.40	0.04	0.06
S104.C	-1.05%	0.40	0.04	0.06
S197.C	-1.05%	0.40	0.04	0.06
S97.C	-1.05%	0.40	0.04	0.06
S67.C	-1.05%	0.40	0.04	0.06

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S100.C	-1.05%	0.40	0.04	0.06
S101.C	-1.05%	0.40	0.04	0.06
S105.C	-1.05%	0.40	0.04	0.06
S108.C	-1.05%	0.40	0.04	0.06
S72.A	1.37%	0.39	0.04	0.12
S7.C	0.72%	0.38	0.04	-0.02
S35.A	0.62%	0.36	0.03	-0.02
S28.A	0.62%	0.36	0.03	-0.02
S151.A	0.62%	0.36	0.03	-0.02
S152.A	0.62%	0.36	0.03	-0.02
S23.A	0.62%	0.36	0.03	-0.02
S300 open.A	0.62%	0.36	0.03	-0.02
S45.A	0.62%	0.36	0.03	-0.02
S46.A	0.62%	0.36	0.03	-0.02
S49.A	0.62%	0.36	0.03	-0.02
S135.A	0.62%	0.36	0.03	-0.02
S18.A	0.62%	0.36	0.03	-0.02
S250.A	0.62%	0.36	0.03	-0.02
S29.A	0.62%	0.36	0.03	-0.02
S30.A	0.62%	0.36	0.03	-0.02
S36.A	0.62%	0.36	0.03	-0.02
S42.A	0.62%	0.36	0.03	-0.02
S47.A	0.62%	0.36	0.03	-0.02
S48.A	0.62%	0.36	0.03	-0.02
S37.A	0.62%	0.36	0.03	-0.02
S13.A	0.62%	0.36	0.03	-0.02
S21.A	0.62%	0.36	0.03	-0.02
S25.A	0.62%	0.36	0.03	-0.02
S44.A	0.62%	0.36	0.03	-0.02
S51.A	0.62%	0.36	0.03	-0.02
S19.A	0.62%	0.36	0.03	-0.02
S20.A	0.62%	0.36	0.03	-0.02
S40.A	0.62%	0.36	0.03	-0.02
S50.A	0.62%	0.36	0.03	-0.02
S101.A	1.36%	0.37	0.03	0.13
S108.A	1.36%	0.37	0.03	0.13
S197.A	1.36%	0.37	0.03	0.13
S67.A	1.36%	0.37	0.03	0.13
S71.A	1.36%	0.37	0.03	0.13
S97.A	1.36%	0.37	0.03	0.13
S111.A	1.36%	0.37	0.03	0.13
S70.A	1.36%	0.37	0.03	0.13

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S113.A	1.36%	0.37	0.03	0.13
S450.A	1.36%	0.37	0.03	0.13
S112.A	1.36%	0.37	0.03	0.13
S100.A	1.36%	0.37	0.03	0.13
S69.A	1.36%	0.37	0.03	0.13
S105.A	1.36%	0.37	0.03	0.13
S109.A	1.36%	0.37	0.03	0.13
S110.A	1.36%	0.37	0.03	0.13
S114.A	1.36%	0.37	0.03	0.13
S300.A	1.36%	0.37	0.03	0.13
S98.A	1.36%	0.37	0.03	0.13
S99.A	1.36%	0.37	0.03	0.13
S68.A	1.36%	0.37	0.03	0.13
S160r.A	1.35%	0.35	0.02	0.13
S8.A	0.47%	0.34	0.02	-0.01
S9.A	0.46%	0.34	0.02	-0.01
S9r.A	-0.46%	0.34	0.02	-0.01
S10.A	-0.46%	0.34	0.02	-0.01
S11.A	-0.46%	0.34	0.02	-0.01
S14.A	-0.46%	0.34	0.02	-0.01
S160r.C	0.85%	0.34	0.02	0.08
S3.C	0.41%	0.33	0.02	-0.01
S4.C	0.41%	0.33	0.02	-0.01
S1.C	0.41%	0.33	0.02	-0.01
S5.C	0.41%	0.33	0.02	-0.01
S6.C	0.41%	0.33	0.02	-0.01
S7.A	0.36%	0.32	0.02	-0.01
S1.A	0.21%	0.30	0.01	-0.01
S27.A	0.36%	0.26	0.00	0.02
S26.A	0.36%	0.26	0.00	0.02
S25r.A	0.36%	0.26	0.00	0.02
S33.A	0.36%	0.26	0.00	0.02
S149.C	0.00%	0.26	0.00	0.00
S149.A	0.00%	0.26	0.00	0.00
S149.B	0.00%	0.26	0.00	0.00
S31.C	-0.12%	0.26	0.00	0.01
S32.C	-0.12%	0.26	0.00	0.01
S26.C	-0.12%	0.26	0.00	0.01
S27.C	-0.12%	0.26	0.00	0.01
S25r.C	-0.12%	0.26	0.00	0.01
S1.B	0.16%	0.24	-0.01	0.01
S2.B	0.16%	0.24	-0.01	0.01

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S7.B	0.29%	0.22	-0.01	0.01
S8.B	0.37%	0.21	-0.02	0.01
S12.B	0.37%	0.21	-0.02	0.01
S35.B	0.49%	0.19	-0.03	0.02
S38.B	0.49%	0.19	-0.03	0.02
S43.B	0.49%	0.19	-0.03	0.02
S25.B	0.49%	0.19	-0.03	0.02
S135.B	0.49%	0.19	-0.03	0.02
S18.B	0.49%	0.19	-0.03	0.02
S250.B	0.49%	0.19	-0.03	0.02
S30.B	0.49%	0.19	-0.03	0.02
S36.B	0.49%	0.19	-0.03	0.02
S40.B	0.49%	0.19	-0.03	0.02
S42.B	0.49%	0.19	-0.03	0.02
S47.B	0.49%	0.19	-0.03	0.02
S48.B	0.49%	0.19	-0.03	0.02
S50.B	0.49%	0.19	-0.03	0.02
S51.B	0.49%	0.19	-0.03	0.02
S22.B	0.49%	0.19	-0.03	0.02
S23.B	0.49%	0.19	-0.03	0.02
S44.B	0.49%	0.19	-0.03	0.02
S49.B	0.49%	0.19	-0.03	0.02
S28.B	0.49%	0.19	-0.03	0.02
S151.B	0.49%	0.19	-0.03	0.02
S300 open.B	0.49%	0.19	-0.03	0.02
S39.B	0.49%	0.19	-0.03	0.02
S13.B	0.49%	0.19	-0.03	0.02
S152.B	0.49%	0.19	-0.03	0.02
S21.B	0.49%	0.19	-0.03	0.02
S29.B	0.49%	0.19	-0.03	0.02
S52.B	0.66%	0.16	-0.03	0.02
S53.B	0.74%	0.15	-0.04	0.02
S54.B	0.79%	0.14	-0.04	0.03
S55.B	0.79%	0.14	-0.04	0.03
S56.B	0.79%	0.14	-0.04	0.03
S59.B	0.88%	0.13	-0.05	0.03
S58.B	0.88%	0.13	-0.05	0.03
S57.B	0.88%	0.13	-0.05	0.03
S160r.B	-1.22%	0.12	-0.05	-0.06
S106.B	-1.28%	0.11	-0.05	-0.06
S100.B	-1.28%	0.11	-0.05	-0.06
S107.B	-1.28%	0.11	-0.05	-0.06

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S108.B	-1.28%	0.11	-0.05	-0.06
S197.B	-1.28%	0.11	-0.05	-0.06
S97.B	-1.28%	0.11	-0.05	-0.06
S300.B	-1.28%	0.11	-0.05	-0.06
S450.B	-1.28%	0.11	-0.05	-0.06
S101.B	-1.28%	0.11	-0.05	-0.06
S105.B	-1.28%	0.11	-0.05	-0.06
S98.B	-1.28%	0.11	-0.05	-0.06
S99.B	-1.28%	0.11	-0.05	-0.06
S67.B	-1.28%	0.11	-0.05	-0.06
S62.B	1.07%	0.10	-0.05	0.03
S160.B	1.07%	0.10	-0.05	0.03
S60.B	1.07%	0.10	-0.05	0.03
S61.B	1.07%	0.10	-0.05	0.03
S61s.B	1.07%	0.10	-0.05	0.03
S65.B	1.07%	0.10	-0.05	0.03
S63.B	1.07%	0.10	-0.05	0.03
S64.B	1.07%	0.10	-0.05	0.03
S66.B	1.07%	0.10	-0.05	0.03
S72.B	-1.32%	0.09	-0.06	-0.06
S76.B	1.34%	0.09	-0.06	-0.06
S86.B	1.34%	0.09	-0.06	-0.06
S87.B	1.34%	0.09	-0.06	-0.06
S91.B	1.34%	0.09	-0.06	-0.06
S93.B	1.34%	0.09	-0.06	-0.06
S95.B	1.34%	0.09	-0.06	-0.06
S96.B	1.34%	0.09	-0.06	-0.06
S89.B	1.34%	0.09	-0.06	-0.06
S90.B	1.34%	0.09	-0.06	-0.06
S77.B	1.41%	0.07	-0.07	-0.05
S78.B	1.43%	0.06	-0.07	-0.05
S79.B	1.43%	0.06	-0.07	-0.05
S80.B	1.57%	0.04	-0.07	-0.05
S81.B	1.62%	0.03	-0.08	-0.05
S82.B	1.72%	0.02	-0.08	-0.04
S83.B	1.72%	0.02	-0.08	-0.04

Table I.5: Av. normalised covariance values and first two eigenvectors from PCA obtained for Scenario S5

Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S88.A	-0.88%	0.93	0.09	-0.03
S113.A	-0.88%	0.93	0.09	-0.03
S114.A	-0.88%	0.93	0.09	-0.03
S68.A	-0.88%	0.93	0.09	-0.03
S77.A	-0.88%	0.93	0.09	-0.03
S87.A	-0.88%	0.93	0.09	-0.03
S450.A	-0.88%	0.93	0.09	-0.03
S100.A	-0.88%	0.93	0.09	-0.03
S108.A	-0.88%	0.93	0.09	-0.03
S111.A	-0.88%	0.93	0.09	-0.03
S160r.A	-0.88%	0.93	0.09	-0.03
S197.A	-0.88%	0.93	0.09	-0.03
S67.A	-0.88%	0.93	0.09	-0.03
S70.A	-0.88%	0.93	0.09	-0.03
S71.A	-0.88%	0.93	0.09	-0.03
S80.A	-0.88%	0.93	0.09	-0.03
S81.A	-0.88%	0.93	0.09	-0.03
S82.A	-0.88%	0.93	0.09	-0.03
S91.A	-0.88%	0.93	0.09	-0.03
S93.A	-0.88%	0.93	0.09	-0.03
S95.A	-0.88%	0.93	0.09	-0.03
S97.A	-0.88%	0.93	0.09	-0.03
S83.A	-0.88%	0.93	0.09	-0.03
S94.A	-0.88%	0.93	0.09	-0.03
S69.A	-0.88%	0.93	0.09	-0.03
S105.A	-0.88%	0.93	0.09	-0.03
S109.A	-0.88%	0.93	0.09	-0.03
S110.A	-0.88%	0.93	0.09	-0.03
S300.A	-0.88%	0.93	0.09	-0.03
S72.A	-0.88%	0.93	0.09	-0.03
S76.A	-0.88%	0.93	0.09	-0.03
S78.A	-0.88%	0.93	0.09	-0.03
S79.A	-0.88%	0.93	0.09	-0.03
S86.A	-0.88%	0.93	0.09	-0.03
S89.A	-0.88%	0.93	0.09	-0.03
S98.A	-0.88%	0.93	0.09	-0.03
S99.A	-0.88%	0.93	0.09	-0.03
S112.A	-0.88%	0.93	0.09	-0.03
S101.A	-0.88%	0.93	0.09	-0.03
S73.C	-0.84%	0.88	0.08	-0.04

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S98.C	-0.84%	0.88	0.08	-0.04
S450.C	-0.84%	0.88	0.08	-0.04
S72.C	-0.84%	0.88	0.08	-0.04
S81.C	-0.84%	0.88	0.08	-0.04
S84.C	-0.84%	0.88	0.08	-0.04
S78.C	-0.84%	0.88	0.08	-0.04
S79.C	-0.84%	0.88	0.08	-0.04
S300.C	-0.84%	0.88	0.08	-0.04
S76.C	-0.84%	0.88	0.08	-0.04
S89.C	-0.84%	0.88	0.08	-0.04
S99.C	-0.84%	0.88	0.08	-0.04
S86.C	-0.84%	0.88	0.08	-0.04
S82.C	-0.84%	0.88	0.08	-0.04
S83.C	-0.84%	0.88	0.08	-0.04
S85.C	-0.84%	0.88	0.08	-0.04
S77.C	-0.84%	0.88	0.08	-0.04
S100.C	-0.84%	0.88	0.08	-0.04
S102.C	-0.84%	0.88	0.08	-0.04
S104.C	-0.84%	0.88	0.08	-0.04
S105.C	-0.84%	0.88	0.08	-0.04
S108.C	-0.84%	0.88	0.08	-0.04
S160r.C	-0.84%	0.88	0.08	-0.04
S197.C	-0.84%	0.88	0.08	-0.04
S74.C	-0.84%	0.88	0.08	-0.04
S75.C	-0.84%	0.88	0.08	-0.04
S87.C	-0.84%	0.88	0.08	-0.04
S92.C	-0.84%	0.88	0.08	-0.04
S93.C	-0.84%	0.88	0.08	-0.04
S95.C	-0.84%	0.88	0.08	-0.04
S97.C	-0.84%	0.88	0.08	-0.04
S101.C	-0.84%	0.88	0.08	-0.04
S103.C	-0.84%	0.88	0.08	-0.04
S67.C	-0.84%	0.88	0.08	-0.04
S80.C	-0.84%	0.88	0.08	-0.04
S91.C	-0.84%	0.88	0.08	-0.04
S10.A	-0.82%	0.85	0.08	-0.04
S11.A	-0.82%	0.85	0.08	-0.04
S14.A	-0.82%	0.85	0.08	-0.04
S9r.A	-0.82%	0.85	0.08	-0.04
S100.B	-0.82%	0.85	0.08	-0.04
S107.B	-0.82%	0.85	0.08	-0.04
S197.B	-0.82%	0.85	0.08	-0.04

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S72.B	-0.82%	0.85	0.08	-0.04
S76.B	-0.82%	0.85	0.08	-0.04
S80.B	-0.82%	0.85	0.08	-0.04
S86.B	-0.82%	0.85	0.08	-0.04
S97.B	-0.82%	0.85	0.08	-0.04
S81.B	-0.82%	0.85	0.08	-0.04
S101.B	-0.82%	0.85	0.08	-0.04
S106.B	-0.82%	0.85	0.08	-0.04
S108.B	-0.82%	0.85	0.08	-0.04
S77.B	-0.82%	0.85	0.08	-0.04
S78.B	-0.82%	0.85	0.08	-0.04
S79.B	-0.82%	0.85	0.08	-0.04
S87.B	-0.82%	0.85	0.08	-0.04
S93.B	-0.82%	0.85	0.08	-0.04
S95.B	-0.82%	0.85	0.08	-0.04
S96.B	-0.82%	0.85	0.08	-0.04
S98.B	-0.82%	0.85	0.08	-0.04
S99.B	-0.82%	0.85	0.08	-0.04
S300.B	-0.82%	0.85	0.08	-0.04
S105.B	-0.82%	0.85	0.08	-0.04
S160r.B	-0.82%	0.85	0.08	-0.04
S450.B	-0.82%	0.85	0.08	-0.04
S67.B	-0.82%	0.85	0.08	-0.04
S82.B	-0.82%	0.85	0.08	-0.04
S83.B	-0.82%	0.85	0.08	-0.04
S89.B	-0.82%	0.85	0.08	-0.04
S90.B	-0.82%	0.85	0.08	-0.04
S91.B	-0.82%	0.85	0.08	-0.04
S48.A	0.69%	0.84	0.07	0.13
S47.A	0.66%	0.80	0.06	0.12
S49.A	0.66%	0.80	0.06	0.12
S151.A	0.66%	0.80	0.06	0.12
S300 open.A	0.66%	0.80	0.06	0.12
S51.A	0.66%	0.80	0.06	0.12
S50.A	0.66%	0.80	0.06	0.12
S48.C	0.64%	0.78	0.06	0.12
S49.C	0.62%	0.75	0.06	0.12
S50.C	0.62%	0.75	0.06	0.12
S47.C	0.62%	0.75	0.06	0.12
S151.C	0.62%	0.75	0.06	0.12
S300 open.C	0.62%	0.75	0.06	0.12
S51.C	0.62%	0.75	0.06	0.12

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S45.A	0.61%	0.74	0.06	0.11
S46.A	0.61%	0.74	0.06	0.11
S44.A	0.61%	0.74	0.06	0.11
S48.B	0.59%	0.72	0.06	0.11
S44.C	0.57%	0.70	0.06	0.11
S42.A	0.56%	0.69	0.05	0.11
S51.B	0.56%	0.68	0.05	0.11
S47.B	0.56%	0.68	0.05	0.11
S151.B	0.56%	0.68	0.05	0.11
S300 open.B	0.56%	0.68	0.05	0.11
S49.B	0.56%	0.68	0.05	0.11
S50.B	0.56%	0.68	0.05	0.11
S42.C	0.54%	0.65	0.05	0.10
S44.B	0.52%	0.64	0.05	0.10
S40.A	0.51%	0.62	0.05	0.10
S40.C	0.49%	0.60	0.05	0.09
S41.C	0.49%	0.60	0.05	0.09
S42.B	0.49%	0.60	0.05	0.09
S43.B	0.49%	0.60	0.05	0.09
S35.A	0.46%	0.56	0.04	0.09
S36.A	0.46%	0.56	0.04	0.09
S37.A	0.46%	0.56	0.04	0.09
S40.B	0.45%	0.55	0.04	0.09
S35.C	0.45%	0.54	0.04	0.08
S35.B	0.41%	0.50	0.04	0.08
S38.B	0.41%	0.50	0.04	0.08
S39.B	0.41%	0.50	0.04	0.08
S36.B	0.41%	0.50	0.04	0.08
S250.C	0.39%	0.47	0.04	0.07
S29.C	0.39%	0.47	0.04	0.07
S30.C	0.39%	0.47	0.04	0.07
S24.C	0.39%	0.47	0.04	0.07
S135.C	0.39%	0.47	0.04	0.07
S25.C	0.39%	0.47	0.04	0.07
S18.C	0.39%	0.47	0.04	0.07
S21.C	0.39%	0.47	0.04	0.07
S23.C	0.39%	0.47	0.04	0.07
S28.C	0.39%	0.47	0.04	0.07
S23.A	0.38%	0.47	0.04	0.07
S28.A	0.38%	0.47	0.04	0.07
S19.A	0.38%	0.47	0.04	0.07
S20.A	0.38%	0.47	0.04	0.07

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S250.A	0.38%	0.47	0.04	0.07
S30.A	0.38%	0.47	0.04	0.07
S135.A	0.38%	0.47	0.04	0.07
S21.A	0.38%	0.47	0.04	0.07
S29.A	0.38%	0.47	0.04	0.07
S18.A	0.38%	0.47	0.04	0.07
S25.A	0.38%	0.47	0.04	0.07
S30.B	0.34%	0.41	0.03	0.06
S21.B	0.34%	0.41	0.03	0.06
S25.B	0.34%	0.41	0.03	0.06
S28.B	0.34%	0.41	0.03	0.06
S29.B	0.34%	0.41	0.03	0.06
S135.B	0.34%	0.41	0.03	0.06
S18.B	0.34%	0.41	0.03	0.06
S22.B	0.34%	0.41	0.03	0.06
S23.B	0.34%	0.41	0.03	0.06
S250.B	0.34%	0.41	0.03	0.06
S26.C	-0.65%	0.25	0.03	-0.11
S27.C	-0.65%	0.25	0.03	-0.11
S31.C	-0.65%	0.25	0.03	-0.11
S32.C	-0.65%	0.25	0.03	-0.11
S25r.C	-0.65%	0.25	0.03	-0.11
S33.A	-0.65%	0.24	0.03	-0.11
S25r.A	-0.65%	0.24	0.03	-0.11
S26.A	-0.65%	0.24	0.03	-0.11
S27.A	-0.65%	0.24	0.03	-0.11
S65.A	0.25%	0.31	0.02	0.05
S64.A	0.25%	0.31	0.02	0.05
S60.A	0.25%	0.31	0.02	0.05
S160.A	0.25%	0.31	0.02	0.05
S52.A	0.25%	0.31	0.02	0.05
S54.A	0.25%	0.31	0.02	0.05
S57.A	0.25%	0.31	0.02	0.05
S61.A	0.25%	0.31	0.02	0.05
S61s.A	0.25%	0.31	0.02	0.05
S63.A	0.25%	0.31	0.02	0.05
S66.A	0.25%	0.31	0.02	0.05
S94 open.A	0.25%	0.31	0.02	0.05
S62.A	0.25%	0.31	0.02	0.05
S53.A	0.25%	0.31	0.02	0.05
S56.A	0.25%	0.31	0.02	0.05
S55.A	0.25%	0.31	0.02	0.05

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S13.A	0.25%	0.31	0.02	0.05
S152.A	0.25%	0.31	0.02	0.05
S160.C	0.21%	0.26	0.02	0.04
S60.C	0.21%	0.26	0.02	0.04
S54.C	0.21%	0.26	0.02	0.04
S62.C	0.21%	0.26	0.02	0.04
S63.C	0.21%	0.26	0.02	0.04
S65.C	0.21%	0.26	0.02	0.04
S52.C	0.21%	0.26	0.02	0.04
S57.C	0.21%	0.26	0.02	0.04
S61.C	0.21%	0.26	0.02	0.04
S61s.C	0.21%	0.26	0.02	0.04
S64.C	0.21%	0.26	0.02	0.04
S66.C	0.21%	0.26	0.02	0.04
S13.C	0.21%	0.26	0.02	0.04
S152.C	0.21%	0.26	0.02	0.04
S15.C	0.21%	0.26	0.02	0.04
S34.C	0.21%	0.26	0.02	0.04
S16.C	0.21%	0.26	0.02	0.04
S56.C	0.21%	0.26	0.02	0.04
S53.C	0.21%	0.26	0.02	0.04
S55.C	0.21%	0.26	0.02	0.04
S17.C	0.21%	0.26	0.02	0.04
S9.A	0.19%	0.23	0.02	0.04
S8.A	0.19%	0.23	0.02	0.04
S53.B	0.19%	0.23	0.02	0.04
S160.B	0.19%	0.23	0.02	0.04
S55.B	0.19%	0.23	0.02	0.04
S56.B	0.19%	0.23	0.02	0.04
S57.B	0.19%	0.23	0.02	0.04
S60.B	0.19%	0.23	0.02	0.04
S61.B	0.19%	0.23	0.02	0.04
S61s.B	0.19%	0.23	0.02	0.04
S62.B	0.19%	0.23	0.02	0.04
S63.B	0.19%	0.23	0.02	0.04
S66.B	0.19%	0.23	0.02	0.04
S54.B	0.19%	0.23	0.02	0.04
S64.B	0.19%	0.23	0.02	0.04
S65.B	0.19%	0.23	0.02	0.04
S59.B	0.19%	0.23	0.02	0.04
S52.B	0.19%	0.23	0.02	0.04
S58.B	0.19%	0.23	0.02	0.04

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S13.B	0.19%	0.23	0.02	0.04
S152.B	0.19%	0.23	0.02	0.04
S8.C	0.16%	0.20	0.02	0.03
S7.A	0.15%	0.18	0.01	0.03
S12.B	0.14%	0.17	0.01	0.03
S8.B	0.14%	0.17	0.01	0.03
S7.C	0.13%	0.15	0.01	0.02
S7.B	0.11%	0.13	0.01	0.02
S1.A	0.08%	0.10	0.01	0.02
S1.C	0.07%	0.09	0.01	0.01
S3.C	0.07%	0.09	0.01	0.01
S4.C	0.07%	0.09	0.01	0.01
S5.C	0.07%	0.09	0.01	0.01
S6.C	0.07%	0.09	0.01	0.01
S1.B	0.06%	0.08	0.01	0.01
S2.B	0.06%	0.08	0.01	0.01
S149.A	0.00%	0.00	0.00	0.00
S149.B	0.00%	0.00	0.00	0.00
S149.C	0.00%	0.00	0.00	0.00

Table I.6: Av. normalised covariance values and first two eigenvectors from PCA obtained for Scenario S6

Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S66.C	-8.39%	0.99	0.29	0.08
S65.C	-7.84%	0.94	0.27	0.08
S64.C	-7.12%	0.88	0.24	0.07
S63.C	-6.52%	0.83	0.22	0.06
S62.C	-6.22%	0.80	0.21	0.06
S160.C	-5.80%	0.77	0.20	0.05
S61.C	-5.80%	0.77	0.20	0.05
S61s.C	-5.80%	0.77	0.20	0.05
S60.C	-5.80%	0.77	0.20	0.05
S57.C	-4.39%	0.64	0.15	0.04
S85.C	-4.43%	0.62	0.14	-0.05
S55.C	-3.72%	0.58	0.13	0.03
S54.C	-3.72%	0.58	0.13	0.03
S56.C	-3.72%	0.58	0.13	0.03
S53.C	-3.48%	0.56	0.12	0.03
S52.C	-3.10%	0.53	0.11	0.03

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S84.C	-3.56%	0.55	0.11	-0.06
S42.C	-2.33%	0.46	0.08	0.02
S152.C	-2.33%	0.46	0.08	0.02
S35.C	-2.33%	0.46	0.08	0.02
S151.C	-2.33%	0.46	0.08	0.02
S15.C	-2.33%	0.46	0.08	0.02
S16.C	-2.33%	0.46	0.08	0.02
S17.C	-2.33%	0.46	0.08	0.02
S21.C	-2.33%	0.46	0.08	0.02
S23.C	-2.33%	0.46	0.08	0.02
S24.C	-2.33%	0.46	0.08	0.02
S28.C	-2.33%	0.46	0.08	0.02
S29.C	-2.33%	0.46	0.08	0.02
S300 open.C	-2.33%	0.46	0.08	0.02
S34.C	-2.33%	0.46	0.08	0.02
S40.C	-2.33%	0.46	0.08	0.02
S41.C	-2.33%	0.46	0.08	0.02
S47.C	-2.33%	0.46	0.08	0.02
S48.C	-2.33%	0.46	0.08	0.02
S49.C	-2.33%	0.46	0.08	0.02
S50.C	-2.33%	0.46	0.08	0.02
S51.C	-2.33%	0.46	0.08	0.02
S135.C	-2.33%	0.46	0.08	0.02
S13.C	-2.33%	0.46	0.08	0.02
S18.C	-2.33%	0.46	0.08	0.02
S25.C	-2.33%	0.46	0.08	0.02
S44.C	-2.33%	0.46	0.08	0.02
S250.C	-2.33%	0.46	0.08	0.02
S30.C	-2.33%	0.46	0.08	0.02
S82.C	-2.31%	0.44	0.06	-0.07
S83.C	-2.31%	0.44	0.06	-0.07
S81.C	-2.31%	0.44	0.06	-0.07
S8.C	-1.75%	0.41	0.06	0.02
S80.C	-2.15%	0.42	0.06	-0.07
S7.C	-1.36%	0.38	0.05	0.01
S79.C	-1.71%	0.39	0.04	-0.08
S78.C	-1.71%	0.39	0.04	-0.08
S77.C	-1.62%	0.38	0.04	-0.08
S76.C	-1.24%	0.35	0.03	-0.08
S89.C	-1.24%	0.35	0.03	-0.08
S87.C	-1.24%	0.35	0.03	-0.08
S91.C	-1.24%	0.35	0.03	-0.08

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S92.C	-1.24%	0.35	0.03	-0.08
S93.C	-1.24%	0.35	0.03	-0.08
S95.C	-1.24%	0.35	0.03	-0.08
S86.C	-1.24%	0.35	0.03	-0.08
S1.C	0.78%	0.33	0.03	0.01
S5.C	0.78%	0.33	0.03	0.01
S6.C	0.78%	0.33	0.03	0.01
S3.C	0.78%	0.33	0.03	0.01
S4.C	0.78%	0.33	0.03	0.01
S81.B	-0.64%	0.32	0.02	0.01
S82.B	-0.64%	0.32	0.02	0.01
S83.B	-0.64%	0.32	0.02	0.01
S80.B	-0.63%	0.32	0.02	0.01
S73.C	-1.08%	0.33	0.02	-0.08
S74.C	-1.08%	0.33	0.02	-0.08
S75.C	-1.08%	0.33	0.02	-0.08
S72.C	-1.08%	0.33	0.02	-0.08
S78.B	-0.60%	0.31	0.02	0.01
S79.B	-0.60%	0.31	0.02	0.01
S77.B	-0.60%	0.31	0.02	0.01
S89.B	-0.58%	0.31	0.02	0.01
S91.B	-0.58%	0.31	0.02	0.01
S90.B	-0.58%	0.31	0.02	0.01
S76.B	-0.58%	0.31	0.02	0.01
S87.B	-0.58%	0.31	0.02	0.01
S93.B	-0.58%	0.31	0.02	0.01
S95.B	-0.58%	0.31	0.02	0.01
S96.B	-0.58%	0.31	0.02	0.01
S86.B	-0.58%	0.31	0.02	0.01
S72.B	-0.56%	0.31	0.02	0.01
S100.B	-0.53%	0.31	0.02	0.01
S107.B	-0.53%	0.31	0.02	0.01
S108.B	-0.53%	0.31	0.02	0.01
S197.B	-0.53%	0.31	0.02	0.01
S97.B	-0.53%	0.31	0.02	0.01
S101.B	-0.53%	0.31	0.02	0.01
S106.B	-0.53%	0.31	0.02	0.01
S300.B	-0.53%	0.31	0.02	0.01
S450.B	-0.53%	0.31	0.02	0.01
S67.B	-0.53%	0.31	0.02	0.01
S98.B	-0.53%	0.31	0.02	0.01
S99.B	-0.53%	0.31	0.02	0.01

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S105.B	-0.53%	0.31	0.02	0.01
S160.B	0.52%	0.31	0.02	0.01
S60.B	0.52%	0.31	0.02	0.01
S61.B	0.52%	0.31	0.02	0.01
S61s.B	0.52%	0.31	0.02	0.01
S160r.B	-0.51%	0.31	0.02	0.01
S62.B	0.43%	0.30	0.01	0.01
S63.B	0.38%	0.29	0.01	0.01
S59.B	0.36%	0.29	0.01	0.01
S57.B	0.36%	0.29	0.01	0.01
S58.B	0.36%	0.29	0.01	0.01
S104.C	1.06%	0.31	0.01	-0.08
S197.C	1.06%	0.31	0.01	-0.08
S97.C	1.06%	0.31	0.01	-0.08
S108.C	1.06%	0.31	0.01	-0.08
S100.C	1.06%	0.31	0.01	-0.08
S103.C	1.06%	0.31	0.01	-0.08
S67.C	1.06%	0.31	0.01	-0.08
S101.C	1.06%	0.31	0.01	-0.08
S105.C	1.06%	0.31	0.01	-0.08
S98.C	1.06%	0.31	0.01	-0.08
S99.C	1.06%	0.31	0.01	-0.08
S300.C	1.06%	0.31	0.01	-0.08
S102.C	1.06%	0.31	0.01	-0.08
S450.C	1.06%	0.31	0.01	-0.08
S27.A	-0.38%	0.29	0.01	0.01
S26.A	-0.38%	0.29	0.01	0.01
S25r.A	-0.38%	0.29	0.01	0.01
S33.A	-0.38%	0.29	0.01	0.01
S55.B	0.28%	0.29	0.01	0.00
S56.B	0.28%	0.29	0.01	0.00
S54.B	0.28%	0.29	0.01	0.00
S53.B	0.26%	0.28	0.01	0.00
S64.B	0.26%	0.28	0.01	0.01
S52.B	0.24%	0.28	0.01	0.00
S25.B	0.18%	0.28	0.01	0.00
S35.B	0.18%	0.28	0.01	0.00
S38.B	0.18%	0.28	0.01	0.00
S43.B	0.18%	0.28	0.01	0.00
S13.B	0.18%	0.28	0.01	0.00
S151.B	0.18%	0.28	0.01	0.00
S152.B	0.18%	0.28	0.01	0.00

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S28.B	0.18%	0.28	0.01	0.00
S300 open.B	0.18%	0.28	0.01	0.00
S39.B	0.18%	0.28	0.01	0.00
S44.B	0.18%	0.28	0.01	0.00
S49.B	0.18%	0.28	0.01	0.00
S135.B	0.18%	0.28	0.01	0.00
S18.B	0.18%	0.28	0.01	0.00
S22.B	0.18%	0.28	0.01	0.00
S23.B	0.18%	0.28	0.01	0.00
S36.B	0.18%	0.28	0.01	0.00
S40.B	0.18%	0.28	0.01	0.00
S42.B	0.18%	0.28	0.01	0.00
S47.B	0.18%	0.28	0.01	0.00
S48.B	0.18%	0.28	0.01	0.00
S51.B	0.18%	0.28	0.01	0.00
S250.B	0.18%	0.28	0.01	0.00
S30.B	0.18%	0.28	0.01	0.00
S50.B	0.18%	0.28	0.01	0.00
S21.B	0.18%	0.28	0.01	0.00
S29.B	0.18%	0.28	0.01	0.00
S12.B	0.14%	0.27	0.00	0.00
S8.B	0.14%	0.27	0.00	0.00
S65.B	0.13%	0.27	0.00	0.01
S7.B	0.11%	0.27	0.00	0.00
S1.B	0.06%	0.27	0.00	0.00
S2.B	0.06%	0.27	0.00	0.00
S160r.C	1.03%	0.28	0.00	-0.09
S66.B	0.07%	0.26	0.00	0.00
S149.C	0.00%	0.26	0.00	0.00
S149.A	0.00%	0.26	0.00	0.00
S149.B	0.00%	0.26	0.00	0.00
S25r.C	0.33%	0.24	-0.01	-0.03
S31.C	0.33%	0.24	-0.01	-0.03
S32.C	0.33%	0.24	-0.01	-0.03
S27.C	0.33%	0.24	-0.01	-0.03
S26.C	0.33%	0.24	-0.01	-0.03
S1.A	0.32%	0.23	-0.01	0.00
S7.A	0.56%	0.21	-0.02	-0.01
S160r.A	-1.46%	0.18	-0.02	0.14
S10.A	-0.72%	0.20	-0.02	-0.01
S11.A	-0.72%	0.20	-0.02	-0.01
S14.A	-0.72%	0.20	-0.02	-0.01

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S9r.A	-0.72%	0.20	-0.02	-0.01
S8.A	0.73%	0.20	-0.02	-0.01
S9.A	0.73%	0.20	-0.02	-0.01
S69.A	1.47%	0.17	-0.03	0.13
S68.A	1.47%	0.17	-0.03	0.13
S101.A	1.47%	0.17	-0.03	0.13
S113.A	1.47%	0.17	-0.03	0.13
S450.A	1.47%	0.17	-0.03	0.13
S100.A	1.47%	0.17	-0.03	0.13
S112.A	1.47%	0.17	-0.03	0.13
S108.A	1.47%	0.17	-0.03	0.13
S111.A	1.47%	0.17	-0.03	0.13
S197.A	1.47%	0.17	-0.03	0.13
S67.A	1.47%	0.17	-0.03	0.13
S71.A	1.47%	0.17	-0.03	0.13
S97.A	1.47%	0.17	-0.03	0.13
S70.A	1.47%	0.17	-0.03	0.13
S105.A	1.47%	0.17	-0.03	0.13
S109.A	1.47%	0.17	-0.03	0.13
S114.A	1.47%	0.17	-0.03	0.13
S300.A	1.47%	0.17	-0.03	0.13
S98.A	1.47%	0.17	-0.03	0.13
S99.A	1.47%	0.17	-0.03	0.13
S110.A	1.47%	0.17	-0.03	0.13
S72.A	1.53%	0.16	-0.03	0.13
S13.A	0.97%	0.18	-0.03	-0.01
S152.A	0.97%	0.18	-0.03	-0.01
S46.A	0.97%	0.18	-0.03	-0.01
S151.A	0.97%	0.18	-0.03	-0.01
S23.A	0.97%	0.18	-0.03	-0.01
S25.A	0.97%	0.18	-0.03	-0.01
S28.A	0.97%	0.18	-0.03	-0.01
S300 open.A	0.97%	0.18	-0.03	-0.01
S35.A	0.97%	0.18	-0.03	-0.01
S44.A	0.97%	0.18	-0.03	-0.01
S45.A	0.97%	0.18	-0.03	-0.01
S50.A	0.97%	0.18	-0.03	-0.01
S51.A	0.97%	0.18	-0.03	-0.01
S21.A	0.97%	0.18	-0.03	-0.01
S29.A	0.97%	0.18	-0.03	-0.01
S40.A	0.97%	0.18	-0.03	-0.01
S49.A	0.97%	0.18	-0.03	-0.01

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S20.A	0.97%	0.18	-0.03	-0.01
S135.A	0.97%	0.18	-0.03	-0.01
S18.A	0.97%	0.18	-0.03	-0.01
S48.A	0.97%	0.18	-0.03	-0.01
S19.A	0.97%	0.18	-0.03	-0.01
S250.A	0.97%	0.18	-0.03	-0.01
S30.A	0.97%	0.18	-0.03	-0.01
S36.A	0.97%	0.18	-0.03	-0.01
S37.A	0.97%	0.18	-0.03	-0.01
S42.A	0.97%	0.18	-0.03	-0.01
S47.A	0.97%	0.18	-0.03	-0.01
S91.A	1.60%	0.15	-0.04	0.13
S76.A	1.60%	0.15	-0.04	0.13
S89.A	1.60%	0.15	-0.04	0.13
S86.A	1.60%	0.15	-0.04	0.13
S87.A	1.60%	0.15	-0.04	0.13
S88.A	1.60%	0.15	-0.04	0.13
S93.A	1.60%	0.15	-0.04	0.13
S94.A	1.60%	0.15	-0.04	0.13
S95.A	1.60%	0.15	-0.04	0.13
S77.A	1.80%	0.13	-0.04	0.13
S52.A	1.29%	0.15	-0.04	-0.01
S79.A	1.86%	0.13	-0.04	0.13
S78.A	1.86%	0.13	-0.04	0.13
S53.A	1.45%	0.13	-0.05	-0.01
S80.A	2.10%	0.11	-0.05	0.13
S54.A	1.55%	0.13	-0.05	-0.02
S94 open.A	1.55%	0.13	-0.05	-0.02
S55.A	1.55%	0.13	-0.05	-0.02
S56.A	1.55%	0.13	-0.05	-0.02
S82.A	2.19%	0.10	-0.06	0.13
S83.A	2.19%	0.10	-0.06	0.13
S81.A	2.19%	0.10	-0.06	0.13
S57.A	1.86%	0.10	-0.06	-0.02
S160.A	2.53%	0.04	-0.09	-0.03
S60.A	2.53%	0.04	-0.09	-0.03
S61.A	2.53%	0.04	-0.09	-0.03
S61s.A	2.53%	0.04	-0.09	-0.03
S62.A	2.59%	0.04	-0.09	-0.03
S63.A	2.63%	0.03	-0.09	-0.03
S64.A	2.71%	0.03	-0.09	-0.03
S65.A	2.80%	0.02	-0.10	-0.03

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S66.A	2.88%	0.01	-0.10	-0.03

I.0.2 Considering OLTCs connected with capacitors compensation in radial configuration

Table I.7: Av. normalised covariance values and first two eigenvectors from PCA obtained for Scenario S1

Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S85.C	-5.21%	1.00	0.26	-0.03
S84.C	-4.33%	0.85	0.21	0.01
S66.C	-3.02%	0.73	0.16	-0.13
S65.C	-3.02%	0.73	0.16	-0.13
S62.C	-3.02%	0.73	0.16	-0.13
S63.C	-3.02%	0.73	0.16	-0.13
S64.C	-3.02%	0.73	0.16	-0.13
S61.C	-3.02%	0.73	0.16	-0.13
S61s.C	-3.02%	0.73	0.16	-0.13
S160.C	-3.02%	0.73	0.16	-0.13
S60.C	-3.02%	0.73	0.16	-0.13
S83.C	-3.10%	0.66	0.15	0.07
S82.C	-3.09%	0.65	0.15	0.07
S81.C	-3.08%	0.65	0.15	0.07
S80.C	-2.92%	0.63	0.14	0.07
S57.C	-2.28%	0.61	0.12	-0.10
S78.C	-2.46%	0.55	0.11	0.10
S79.C	-2.46%	0.55	0.11	0.10
S77.C	-2.36%	0.54	0.11	0.10
S54.C	-1.93%	0.55	0.10	-0.08
S55.C	-1.93%	0.55	0.10	-0.08
S56.C	-1.93%	0.55	0.10	-0.08
S53.C	-1.81%	0.54	0.10	-0.08
S92.C	-1.99%	0.48	0.09	0.12
S93.C	-1.99%	0.48	0.09	0.12
S95.C	-1.99%	0.48	0.09	0.12
S91.C	-1.99%	0.48	0.09	0.12
S89.C	-1.98%	0.48	0.09	0.12
S87.C	-1.98%	0.48	0.09	0.12
S86.C	-1.98%	0.48	0.09	0.12

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S76.C	-1.98%	0.48	0.09	0.12
S52.C	-1.61%	0.50	0.09	-0.07
S72.C	-1.78%	0.44	0.08	0.12
S75.C	-1.78%	0.44	0.08	0.12
S73.C	-1.78%	0.44	0.08	0.12
S74.C	-1.78%	0.44	0.08	0.12
S15.C	-1.21%	0.44	0.06	-0.05
S28.C	-1.21%	0.44	0.06	-0.05
S34.C	-1.21%	0.44	0.06	-0.05
S40.C	-1.21%	0.44	0.06	-0.05
S41.C	-1.21%	0.44	0.06	-0.05
S47.C	-1.21%	0.44	0.06	-0.05
S48.C	-1.21%	0.44	0.06	-0.05
S152.C	-1.21%	0.44	0.06	-0.05
S250.C	-1.21%	0.44	0.06	-0.05
S30.C	-1.21%	0.44	0.06	-0.05
S35.C	-1.21%	0.44	0.06	-0.05
S42.C	-1.21%	0.44	0.06	-0.05
S49.C	-1.21%	0.44	0.06	-0.05
S16.C	-1.21%	0.44	0.06	-0.05
S17.C	-1.21%	0.44	0.06	-0.05
S24.C	-1.21%	0.44	0.06	-0.05
S29.C	-1.21%	0.44	0.06	-0.05
S151.C	-1.21%	0.44	0.06	-0.05
S21.C	-1.21%	0.44	0.06	-0.05
S23.C	-1.21%	0.44	0.06	-0.05
S300 open.C	-1.21%	0.44	0.06	-0.05
S44.C	-1.21%	0.44	0.06	-0.05
S135.C	-1.21%	0.44	0.06	-0.05
S13.C	-1.21%	0.44	0.06	-0.05
S18.C	-1.21%	0.44	0.06	-0.05
S25.C	-1.21%	0.44	0.06	-0.05
S50.C	-1.21%	0.44	0.06	-0.05
S51.C	-1.21%	0.44	0.06	-0.05
S108.C	-1.59%	0.40	0.06	0.14
S101.C	-1.59%	0.40	0.06	0.14
S103.C	-1.59%	0.40	0.06	0.14
S67.C	-1.59%	0.40	0.06	0.14
S98.C	-1.59%	0.40	0.06	0.14
S300.C	-1.59%	0.40	0.06	0.14
S99.C	-1.59%	0.40	0.06	0.14
S100.C	-1.59%	0.40	0.06	0.14

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S105.C	-1.59%	0.40	0.06	0.14
S102.C	-1.59%	0.40	0.06	0.14
S104.C	-1.59%	0.40	0.06	0.14
S197.C	-1.59%	0.40	0.06	0.14
S450.C	-1.59%	0.40	0.06	0.14
S97.C	-1.59%	0.40	0.06	0.14
S8.C	-0.91%	0.39	0.05	-0.04
S160r.C	-1.56%	0.35	0.04	0.15
S7.C	-0.71%	0.36	0.04	-0.03
S81.B	-0.44%	0.32	0.02	-0.03
S82.B	-0.44%	0.32	0.02	-0.03
S83.B	-0.44%	0.32	0.02	-0.03
S80.B	-0.42%	0.32	0.02	-0.03
S1.C	-0.40%	0.31	0.02	-0.02
S3.C	-0.40%	0.31	0.02	-0.02
S4.C	-0.40%	0.31	0.02	-0.02
S5.C	-0.40%	0.31	0.02	-0.02
S6.C	-0.40%	0.31	0.02	-0.02
S79.B	-0.39%	0.31	0.02	-0.03
S78.B	-0.39%	0.31	0.02	-0.03
S77.B	-0.38%	0.31	0.02	-0.02
S91.B	-0.36%	0.30	0.02	-0.02
S93.B	-0.36%	0.30	0.02	-0.02
S95.B	-0.36%	0.30	0.02	-0.02
S96.B	-0.36%	0.30	0.02	-0.02
S90.B	-0.36%	0.30	0.02	-0.02
S89.B	-0.36%	0.30	0.02	-0.02
S87.B	-0.36%	0.30	0.02	-0.02
S86.B	-0.36%	0.30	0.02	-0.02
S76.B	-0.36%	0.30	0.02	-0.02
S72.B	-0.34%	0.30	0.02	-0.02
S105.B	-0.30%	0.30	0.02	-0.02
S450.B	-0.30%	0.30	0.02	-0.02
S197.B	-0.30%	0.30	0.02	-0.02
S97.B	-0.30%	0.30	0.02	-0.02
S100.B	-0.30%	0.30	0.02	-0.02
S107.B	-0.30%	0.30	0.02	-0.02
S108.B	-0.30%	0.30	0.02	-0.02
S101.B	-0.30%	0.30	0.02	-0.02
S106.B	-0.30%	0.30	0.02	-0.02
S300.B	-0.30%	0.30	0.02	-0.02
S67.B	-0.30%	0.30	0.02	-0.02

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S98.B	-0.30%	0.30	0.02	-0.02
S99.B	-0.30%	0.30	0.02	-0.02
S63.B	0.29%	0.29	0.01	-0.02
S160.B	0.29%	0.29	0.01	-0.02
S60.B	0.29%	0.29	0.01	-0.02
S61.B	0.29%	0.29	0.01	-0.02
S61s.B	0.29%	0.29	0.01	-0.02
S62.B	0.29%	0.29	0.01	-0.02
S64.B	0.29%	0.29	0.01	-0.02
S65.B	0.29%	0.29	0.01	-0.02
S66.B	0.29%	0.29	0.01	-0.02
S160r.B	-0.28%	0.29	0.01	-0.02
S59.B	0.19%	0.28	0.01	-0.01
S58.B	0.19%	0.28	0.01	-0.01
S57.B	0.19%	0.28	0.01	-0.01
S55.B	0.15%	0.27	0.01	-0.01
S56.B	0.15%	0.27	0.01	-0.01
S54.B	0.15%	0.27	0.01	-0.01
S53.B	0.14%	0.27	0.01	-0.01
S52.B	0.13%	0.27	0.01	-0.01
S39.B	-0.09%	0.26	0.00	-0.01
S25.B	-0.09%	0.26	0.00	-0.01
S43.B	-0.09%	0.26	0.00	-0.01
S151.B	-0.09%	0.26	0.00	-0.01
S300 open.B	-0.09%	0.26	0.00	-0.01
S35.B	-0.09%	0.26	0.00	-0.01
S38.B	-0.09%	0.26	0.00	-0.01
S22.B	-0.09%	0.26	0.00	-0.01
S23.B	-0.09%	0.26	0.00	-0.01
S42.B	-0.09%	0.26	0.00	-0.01
S135.B	-0.09%	0.26	0.00	-0.01
S18.B	-0.09%	0.26	0.00	-0.01
S250.B	-0.09%	0.26	0.00	-0.01
S30.B	-0.09%	0.26	0.00	-0.01
S36.B	-0.09%	0.26	0.00	-0.01
S40.B	-0.09%	0.26	0.00	-0.01
S47.B	-0.09%	0.26	0.00	-0.01
S48.B	-0.09%	0.26	0.00	-0.01
S50.B	-0.09%	0.26	0.00	-0.01
S51.B	-0.09%	0.26	0.00	-0.01
S21.B	-0.09%	0.26	0.00	-0.01
S13.B	-0.09%	0.26	0.00	-0.01

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S152.B	-0.09%	0.26	0.00	-0.01
S28.B	-0.09%	0.26	0.00	-0.01
S29.B	-0.09%	0.26	0.00	-0.01
S44.B	-0.09%	0.26	0.00	-0.01
S49.B	-0.09%	0.26	0.00	-0.01
S12.B	-0.07%	0.26	0.00	0.00
S8.B	-0.07%	0.26	0.00	0.00
S25r.A	-0.41%	0.27	0.00	-0.03
S33.A	-0.41%	0.27	0.00	-0.03
S27.A	-0.41%	0.27	0.00	-0.03
S26.A	-0.41%	0.27	0.00	-0.03
S7.B	-0.06%	0.26	0.00	0.00
S1.B	-0.03%	0.25	0.00	0.00
S2.B	-0.03%	0.25	0.00	0.00
S149.C	0.00%	0.25	0.00	0.00
S149.B	0.00%	0.25	0.00	0.00
S149.A	0.00%	0.25	0.00	0.00
S31.C	0.17%	0.23	0.00	0.02
S32.C	0.17%	0.23	0.00	0.02
S26.C	0.17%	0.23	0.00	0.02
S27.C	0.17%	0.23	0.00	0.02
S25r.C	0.17%	0.23	0.00	0.02
S1.A	-0.17%	0.22	-0.01	0.01
S7.A	-0.30%	0.20	-0.02	0.01
S9r.A	-0.38%	0.18	-0.02	0.02
S10.A	-0.38%	0.18	-0.02	0.02
S11.A	-0.38%	0.18	-0.02	0.02
S14.A	-0.38%	0.18	-0.02	0.02
S9.A	0.39%	0.18	-0.02	0.02
S8.A	0.39%	0.18	-0.02	0.02
S19.A	0.52%	0.16	-0.03	0.02
S250.A	0.52%	0.16	-0.03	0.02
S30.A	0.52%	0.16	-0.03	0.02
S37.A	0.52%	0.16	-0.03	0.02
S49.A	0.52%	0.16	-0.03	0.02
S20.A	0.52%	0.16	-0.03	0.02
S135.A	0.52%	0.16	-0.03	0.02
S13.A	0.52%	0.16	-0.03	0.02
S152.A	0.52%	0.16	-0.03	0.02
S18.A	0.52%	0.16	-0.03	0.02
S21.A	0.52%	0.16	-0.03	0.02
S29.A	0.52%	0.16	-0.03	0.02

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S47.A	0.52%	0.16	-0.03	0.02
S48.A	0.52%	0.16	-0.03	0.02
S42.A	0.52%	0.16	-0.03	0.02
S36.A	0.52%	0.16	-0.03	0.02
S151.A	0.52%	0.16	-0.03	0.02
S300 open.A	0.52%	0.16	-0.03	0.02
S23.A	0.52%	0.16	-0.03	0.02
S25.A	0.52%	0.16	-0.03	0.02
S35.A	0.52%	0.16	-0.03	0.02
S44.A	0.52%	0.16	-0.03	0.02
S45.A	0.52%	0.16	-0.03	0.02
S46.A	0.52%	0.16	-0.03	0.02
S51.A	0.52%	0.16	-0.03	0.02
S28.A	0.52%	0.16	-0.03	0.02
S50.A	0.52%	0.16	-0.03	0.02
S40.A	0.52%	0.16	-0.03	0.02
S160r.A	-0.78%	0.18	-0.03	-0.08
S52.A	0.69%	0.14	-0.04	0.03
S101.A	-0.88%	0.15	-0.04	-0.07
S450.A	-0.88%	0.15	-0.04	-0.07
S71.A	-0.88%	0.15	-0.04	-0.07
S67.A	-0.88%	0.15	-0.04	-0.07
S108.A	-0.88%	0.15	-0.04	-0.07
S111.A	-0.88%	0.15	-0.04	-0.07
S112.A	-0.88%	0.15	-0.04	-0.07
S197.A	-0.88%	0.15	-0.04	-0.07
S69.A	-0.88%	0.15	-0.04	-0.07
S70.A	-0.88%	0.15	-0.04	-0.07
S97.A	-0.88%	0.15	-0.04	-0.07
S100.A	-0.88%	0.15	-0.04	-0.07
S113.A	-0.88%	0.15	-0.04	-0.07
S105.A	-0.88%	0.15	-0.04	-0.07
S110.A	-0.88%	0.15	-0.04	-0.07
S114.A	-0.88%	0.15	-0.04	-0.07
S68.A	-0.88%	0.15	-0.04	-0.07
S98.A	-0.88%	0.15	-0.04	-0.07
S99.A	-0.88%	0.15	-0.04	-0.07
S109.A	-0.88%	0.15	-0.04	-0.07
S300.A	-0.88%	0.15	-0.04	-0.07
S53.A	0.77%	0.12	-0.04	0.03
S54.A	0.83%	0.11	-0.04	0.04
S94 open.A	0.83%	0.11	-0.04	0.04

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S55.A	0.83%	0.11	-0.04	0.04
S56.A	0.83%	0.11	-0.04	0.04
S72.A	-1.01%	0.13	-0.05	-0.06
S76.A	1.10%	0.11	-0.05	-0.06
S86.A	1.11%	0.11	-0.05	-0.06
S87.A	1.11%	0.11	-0.05	-0.06
S88.A	1.11%	0.11	-0.05	-0.06
S89.A	1.11%	0.11	-0.05	-0.06
S91.A	1.11%	0.11	-0.05	-0.06
S93.A	1.11%	0.11	-0.05	-0.06
S94.A	1.11%	0.11	-0.05	-0.06
S95.A	1.11%	0.11	-0.05	-0.06
S57.A	0.99%	0.09	-0.05	0.04
S77.A	1.32%	0.08	-0.06	-0.05
S78.A	1.38%	0.07	-0.07	-0.05
S79.A	1.38%	0.07	-0.07	-0.05
S62.A	1.35%	0.03	-0.07	0.06
S63.A	1.35%	0.03	-0.07	0.06
S61.A	1.35%	0.03	-0.07	0.06
S61s.A	1.35%	0.03	-0.07	0.06
S66.A	1.35%	0.03	-0.07	0.06
S65.A	1.35%	0.03	-0.07	0.06
S160.A	1.35%	0.03	-0.07	0.06
S60.A	1.35%	0.03	-0.07	0.06
S64.A	1.35%	0.03	-0.07	0.06
S80.A	1.64%	0.03	-0.08	-0.03
S81.A	1.74%	0.01	-0.09	-0.03
S82.A	1.74%	0.01	-0.09	-0.03
S83.A	1.75%	0.01	-0.09	-0.03

Table I.8: Av. normalised covariance values and first two eigenvectors from PCA obtained for Scenario S2

Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S85.C	4.78%	0.99	0.26	0.02
S84.C	3.96%	0.85	0.21	0.06
S63.C	2.56%	0.68	0.15	-0.09
S66.C	2.56%	0.68	0.15	-0.09
S160.C	2.56%	0.68	0.15	-0.09
S64.C	2.56%	0.68	0.15	-0.09

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S65.C	2.56%	0.68	0.15	-0.09
S61.C	2.56%	0.68	0.15	-0.09
S61s.C	2.56%	0.68	0.15	-0.09
S62.C	2.56%	0.68	0.15	-0.09
S60.C	2.56%	0.68	0.15	-0.09
S83.C	2.81%	0.67	0.15	0.10
S82.C	2.81%	0.67	0.15	0.10
S81.C	2.80%	0.67	0.15	0.10
S80.C	2.64%	0.64	0.14	0.11
S78.C	2.23%	0.57	0.11	0.13
S79.C	2.23%	0.57	0.11	0.13
S57.C	1.92%	0.58	0.11	-0.07
S77.C	2.14%	0.56	0.11	0.13
S54.C	1.62%	0.53	0.09	-0.06
S55.C	1.62%	0.53	0.09	-0.06
S56.C	1.62%	0.53	0.09	-0.06
S53.C	1.52%	0.52	0.09	-0.05
S92.C	1.80%	0.50	0.09	0.14
S91.C	1.80%	0.50	0.09	0.14
S93.C	1.80%	0.50	0.09	0.14
S95.C	1.80%	0.50	0.09	0.14
S89.C	1.80%	0.50	0.09	0.14
S87.C	1.80%	0.50	0.09	0.14
S86.C	1.80%	0.50	0.08	0.14
S76.C	1.79%	0.50	0.08	0.14
S52.C	1.35%	0.49	0.08	-0.05
S73.C	1.62%	0.47	0.07	0.15
S74.C	1.62%	0.47	0.07	0.15
S75.C	1.62%	0.47	0.07	0.15
S72.C	1.62%	0.47	0.07	0.15
S100.C	-1.37%	0.43	0.06	0.16
S105.C	-1.37%	0.43	0.06	0.16
S300.C	-1.37%	0.43	0.06	0.16
S99.C	-1.37%	0.43	0.06	0.16
S197.C	-1.37%	0.43	0.06	0.16
S97.C	-1.37%	0.43	0.06	0.16
S102.C	-1.37%	0.43	0.06	0.16
S104.C	-1.37%	0.43	0.06	0.16
S108.C	-1.37%	0.43	0.06	0.16
S450.C	-1.37%	0.43	0.06	0.16
S101.C	-1.37%	0.43	0.06	0.16
S98.C	-1.37%	0.43	0.06	0.16

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S103.C	-1.37%	0.43	0.06	0.16
S67.C	-1.37%	0.43	0.06	0.16
S152.C	1.01%	0.44	0.06	-0.03
S34.C	1.01%	0.44	0.06	-0.03
S44.C	1.01%	0.44	0.06	-0.03
S151.C	1.01%	0.44	0.06	-0.03
S25.C	1.01%	0.44	0.06	-0.03
S300 open.C	1.01%	0.44	0.06	-0.03
S51.C	1.01%	0.44	0.06	-0.03
S250.C	1.01%	0.44	0.06	-0.03
S29.C	1.01%	0.44	0.06	-0.03
S30.C	1.01%	0.44	0.06	-0.03
S135.C	1.01%	0.44	0.06	-0.03
S13.C	1.01%	0.44	0.06	-0.03
S18.C	1.01%	0.44	0.06	-0.03
S35.C	1.01%	0.44	0.06	-0.03
S41.C	1.01%	0.44	0.06	-0.03
S42.C	1.01%	0.44	0.06	-0.03
S24.C	1.01%	0.44	0.06	-0.03
S47.C	1.01%	0.44	0.06	-0.03
S48.C	1.01%	0.44	0.06	-0.03
S49.C	1.01%	0.44	0.06	-0.03
S50.C	1.01%	0.44	0.06	-0.03
S28.C	1.01%	0.44	0.06	-0.03
S21.C	1.01%	0.44	0.06	-0.03
S23.C	1.01%	0.44	0.06	-0.03
S40.C	1.01%	0.44	0.06	-0.03
S16.C	1.01%	0.44	0.06	-0.03
S17.C	1.01%	0.44	0.06	-0.03
S15.C	1.01%	0.44	0.06	-0.03
S8.C	0.76%	0.40	0.04	-0.03
S160r.C	-1.07%	0.38	0.04	0.17
S83.B	0.76%	0.39	0.04	-0.02
S82.B	0.76%	0.39	0.04	-0.02
S81.B	0.75%	0.39	0.04	-0.02
S80.B	0.73%	0.38	0.04	-0.02
S7.C	0.59%	0.37	0.03	-0.02
S78.B	0.66%	0.37	0.03	-0.02
S79.B	0.66%	0.37	0.03	-0.02
S77.B	0.64%	0.37	0.03	-0.02
S96.B	0.58%	0.36	0.03	-0.02
S91.B	0.58%	0.36	0.03	-0.02

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S93.B	0.58%	0.36	0.03	-0.02
S95.B	0.58%	0.36	0.03	-0.02
S90.B	0.58%	0.36	0.03	-0.02
S89.B	0.58%	0.36	0.03	-0.02
S87.B	0.58%	0.36	0.03	-0.02
S86.B	-0.58%	0.36	0.03	-0.02
S76.B	-0.58%	0.36	0.03	-0.02
S72.B	-0.54%	0.36	0.03	-0.02
S300.B	-0.49%	0.35	0.02	-0.02
S67.B	-0.49%	0.35	0.02	-0.02
S101.B	-0.49%	0.35	0.02	-0.02
S106.B	-0.49%	0.35	0.02	-0.02
S98.B	-0.49%	0.35	0.02	-0.02
S99.B	-0.49%	0.35	0.02	-0.02
S105.B	-0.49%	0.35	0.02	-0.02
S450.B	-0.49%	0.35	0.02	-0.02
S107.B	-0.49%	0.35	0.02	-0.02
S108.B	-0.49%	0.35	0.02	-0.02
S197.B	-0.49%	0.35	0.02	-0.02
S97.B	-0.49%	0.35	0.02	-0.02
S100.B	-0.49%	0.35	0.02	-0.02
S160.B	0.45%	0.34	0.02	-0.01
S60.B	0.45%	0.34	0.02	-0.01
S61.B	0.45%	0.34	0.02	-0.01
S61s.B	0.45%	0.34	0.02	-0.01
S62.B	0.45%	0.34	0.02	-0.01
S64.B	0.45%	0.34	0.02	-0.01
S65.B	0.45%	0.34	0.02	-0.01
S63.B	0.45%	0.34	0.02	-0.01
S66.B	0.45%	0.34	0.02	-0.01
S160r.B	-0.44%	0.34	0.02	-0.01
S5.C	-0.34%	0.33	0.02	-0.01
S3.C	-0.34%	0.33	0.02	-0.01
S4.C	-0.34%	0.33	0.02	-0.01
S1.C	-0.34%	0.33	0.02	-0.01
S6.C	-0.34%	0.33	0.02	-0.01
S25r.C	-0.37%	0.33	0.01	0.02
S31.C	-0.37%	0.33	0.01	0.02
S32.C	-0.37%	0.33	0.01	0.02
S26.C	-0.37%	0.33	0.01	0.02
S27.C	-0.37%	0.33	0.01	0.02
S57.B	0.31%	0.32	0.01	-0.01

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S58.B	0.31%	0.32	0.01	-0.01
S59.B	0.31%	0.32	0.01	-0.01
S54.B	0.24%	0.32	0.01	-0.01
S55.B	0.24%	0.32	0.01	-0.01
S56.B	0.24%	0.32	0.01	-0.01
S53.B	0.23%	0.31	0.01	-0.01
S52.B	0.20%	0.31	0.01	-0.01
S152.B	0.15%	0.30	0.01	0.00
S13.B	0.15%	0.30	0.01	0.00
S28.B	0.15%	0.30	0.01	0.00
S44.B	0.15%	0.30	0.01	0.00
S49.B	0.15%	0.30	0.01	0.00
S151.B	0.15%	0.30	0.01	0.00
S300 open.B	0.15%	0.30	0.01	0.00
S39.B	0.15%	0.30	0.01	0.00
S21.B	0.15%	0.30	0.01	0.00
S29.B	0.15%	0.30	0.01	0.00
S25.B	0.15%	0.30	0.01	0.00
S35.B	0.15%	0.30	0.01	0.00
S38.B	0.15%	0.30	0.01	0.00
S40.B	0.15%	0.30	0.01	0.00
S43.B	0.15%	0.30	0.01	0.00
S51.B	0.15%	0.30	0.01	0.00
S135.B	0.15%	0.30	0.01	0.00
S18.B	0.15%	0.30	0.01	0.00
S47.B	0.15%	0.30	0.01	0.00
S48.B	0.15%	0.30	0.01	0.00
S36.B	0.15%	0.30	0.01	0.00
S42.B	0.15%	0.30	0.01	0.00
S22.B	0.15%	0.30	0.01	0.00
S23.B	0.15%	0.30	0.01	0.00
S250.B	0.15%	0.30	0.01	0.00
S30.B	0.15%	0.30	0.01	0.00
S50.B	0.15%	0.30	0.01	0.00
S12.B	-0.11%	0.30	0.01	0.00
S8.B	-0.11%	0.30	0.01	0.00
S7.B	-0.09%	0.29	0.00	0.00
S1.B	-0.05%	0.29	0.00	0.00
S2.B	-0.05%	0.29	0.00	0.00
S149.C	0.00%	0.28	0.00	0.00
S149.B	0.00%	0.28	0.00	0.00
S149.A	0.00%	0.28	0.00	0.00

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S25r.A	0.46%	0.29	0.00	0.01
S26.A	0.46%	0.29	0.00	0.01
S33.A	0.46%	0.29	0.00	0.01
S27.A	0.46%	0.29	0.00	0.01
S1.A	-0.16%	0.26	-0.01	0.01
S7.A	-0.28%	0.24	-0.02	0.01
S9.A	-0.35%	0.23	-0.02	0.01
S9r.A	-0.35%	0.23	-0.02	0.01
S10.A	-0.35%	0.23	-0.02	0.01
S11.A	-0.35%	0.23	-0.02	0.01
S14.A	-0.35%	0.23	-0.02	0.01
S8.A	-0.35%	0.23	-0.02	0.01
S44.A	-0.47%	0.21	-0.03	0.02
S51.A	-0.47%	0.21	-0.03	0.02
S25.A	-0.47%	0.21	-0.03	0.02
S23.A	-0.47%	0.21	-0.03	0.02
S28.A	-0.47%	0.21	-0.03	0.02
S46.A	-0.47%	0.21	-0.03	0.02
S151.A	-0.47%	0.21	-0.03	0.02
S300 open.A	-0.47%	0.21	-0.03	0.02
S45.A	-0.47%	0.21	-0.03	0.02
S35.A	-0.47%	0.21	-0.03	0.02
S48.A	-0.47%	0.21	-0.03	0.02
S135.A	-0.47%	0.21	-0.03	0.02
S13.A	-0.47%	0.21	-0.03	0.02
S152.A	-0.47%	0.21	-0.03	0.02
S18.A	-0.47%	0.21	-0.03	0.02
S19.A	-0.47%	0.21	-0.03	0.02
S20.A	-0.47%	0.21	-0.03	0.02
S21.A	-0.47%	0.21	-0.03	0.02
S250.A	-0.47%	0.21	-0.03	0.02
S30.A	-0.47%	0.21	-0.03	0.02
S36.A	-0.47%	0.21	-0.03	0.02
S37.A	-0.47%	0.21	-0.03	0.02
S40.A	-0.47%	0.21	-0.03	0.02
S42.A	-0.47%	0.21	-0.03	0.02
S47.A	-0.47%	0.21	-0.03	0.02
S49.A	-0.47%	0.21	-0.03	0.02
S50.A	-0.47%	0.21	-0.03	0.02
S29.A	-0.47%	0.21	-0.03	0.02
S52.A	-0.63%	0.18	-0.04	0.02
S53.A	-0.71%	0.17	-0.04	0.03

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S54.A	-0.76%	0.16	-0.04	0.03
S94 open.A	-0.76%	0.16	-0.04	0.03
S55.A	-0.76%	0.16	-0.04	0.03
S56.A	-0.76%	0.16	-0.04	0.03
S160r.A	-0.81%	0.18	-0.04	0.03
S57.A	-0.91%	0.14	-0.05	0.03
S197.A	-0.93%	0.15	-0.05	0.04
S97.A	-0.93%	0.15	-0.05	0.04
S109.A	-0.93%	0.15	-0.05	0.04
S110.A	-0.93%	0.15	-0.05	0.04
S111.A	-0.93%	0.15	-0.05	0.04
S69.A	-0.93%	0.15	-0.05	0.04
S98.A	-0.93%	0.15	-0.05	0.04
S112.A	-0.93%	0.15	-0.05	0.04
S100.A	-0.93%	0.15	-0.05	0.04
S300.A	-0.93%	0.15	-0.05	0.04
S108.A	-0.93%	0.15	-0.05	0.04
S67.A	-0.93%	0.15	-0.05	0.04
S70.A	-0.93%	0.15	-0.05	0.04
S71.A	-0.93%	0.15	-0.05	0.04
S105.A	-0.93%	0.15	-0.05	0.04
S99.A	-0.93%	0.15	-0.05	0.04
S101.A	-0.93%	0.15	-0.05	0.04
S113.A	-0.93%	0.15	-0.05	0.04
S114.A	-0.93%	0.15	-0.05	0.04
S450.A	-0.93%	0.15	-0.05	0.04
S68.A	-0.93%	0.15	-0.05	0.04
S72.A	-1.01%	0.13	-0.06	0.05
S76.A	-1.07%	0.11	-0.07	0.05
S86.A	-1.07%	0.11	-0.07	0.05
S87.A	-1.08%	0.11	-0.07	0.05
S88.A	-1.08%	0.11	-0.07	0.05
S89.A	-1.08%	0.11	-0.07	0.05
S93.A	-1.08%	0.11	-0.07	0.05
S95.A	-1.08%	0.11	-0.07	0.05
S91.A	-1.08%	0.11	-0.07	0.05
S94.A	-1.08%	0.11	-0.07	0.05
S160.A	-1.23%	0.09	-0.07	0.04
S60.A	-1.23%	0.09	-0.07	0.04
S61.A	-1.23%	0.09	-0.07	0.04
S61s.A	-1.23%	0.09	-0.07	0.04
S62.A	-1.23%	0.09	-0.07	0.04

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S63.A	-1.23%	0.09	-0.07	0.04
S64.A	-1.23%	0.09	-0.07	0.04
S66.A	-1.23%	0.09	-0.07	0.04
S65.A	-1.23%	0.09	-0.07	0.04
S77.A	-1.22%	0.08	-0.08	0.06
S78.A	-1.27%	0.07	-0.08	0.06
S79.A	-1.27%	0.07	-0.08	0.06
S80.A	-1.52%	0.03	-0.10	0.07
S81.A	-1.62%	0.02	-0.10	0.07
S82.A	-1.62%	0.01	-0.10	0.07
S83.A	1.75%	0.01	-0.09	-0.03

Table I.9: Av. normalised covariance values and first two eigenvectors from PCA obtained for Scenario S3

Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S66.C	-5.53%	0.99	0.34	0.14
S65.C	-4.96%	0.91	0.31	0.12
S64.C	-4.21%	0.81	0.26	0.10
S63.C	-3.59%	0.73	0.22	0.09
S62.C	-3.28%	0.68	0.20	0.08
S61.C	-2.84%	0.62	0.18	0.07
S61s.C	-2.84%	0.62	0.18	0.07
S160.C	-2.84%	0.62	0.18	0.07
S60.C	-2.84%	0.62	0.18	0.07
S57.C	-2.15%	0.53	0.13	0.05
S54.C	-1.82%	0.48	0.11	0.04
S55.C	-1.82%	0.48	0.11	0.04
S56.C	-1.82%	0.48	0.11	0.04
S53.C	-1.70%	0.47	0.11	0.04
S52.C	-1.52%	0.44	0.09	0.03
S135.C	-1.14%	0.39	0.07	0.03
S152.C	-1.14%	0.39	0.07	0.03
S18.C	-1.14%	0.39	0.07	0.03
S250.C	-1.14%	0.39	0.07	0.03
S30.C	-1.14%	0.39	0.07	0.03
S35.C	-1.14%	0.39	0.07	0.03
S42.C	-1.14%	0.39	0.07	0.03
S49.C	-1.14%	0.39	0.07	0.03
S50.C	-1.14%	0.39	0.07	0.03

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S51.C	-1.14%	0.39	0.07	0.03
S15.C	-1.14%	0.39	0.07	0.03
S16.C	-1.14%	0.39	0.07	0.03
S17.C	-1.14%	0.39	0.07	0.03
S24.C	-1.14%	0.39	0.07	0.03
S29.C	-1.14%	0.39	0.07	0.03
S47.C	-1.14%	0.39	0.07	0.03
S48.C	-1.14%	0.39	0.07	0.03
S151.C	-1.14%	0.39	0.07	0.03
S25.C	-1.14%	0.39	0.07	0.03
S300 open.C	-1.14%	0.39	0.07	0.03
S44.C	-1.14%	0.39	0.07	0.03
S41.C	-1.14%	0.39	0.07	0.03
S21.C	-1.14%	0.39	0.07	0.03
S23.C	-1.14%	0.39	0.07	0.03
S28.C	-1.14%	0.39	0.07	0.03
S34.C	-1.14%	0.39	0.07	0.03
S40.C	-1.14%	0.39	0.07	0.03
S13.C	-1.14%	0.39	0.07	0.03
S8.C	-0.86%	0.35	0.05	0.02
S83.C	1.08%	0.34	0.05	-0.14
S82.C	1.07%	0.34	0.05	-0.14
S81.C	1.07%	0.34	0.05	-0.14
S84.C	1.07%	0.34	0.05	-0.14
S85.C	1.07%	0.34	0.05	-0.14
S80.C	1.07%	0.34	0.05	-0.14
S78.C	1.06%	0.34	0.05	-0.14
S79.C	1.06%	0.34	0.05	-0.14
S92.C	1.06%	0.34	0.05	-0.14
S95.C	1.06%	0.34	0.05	-0.14
S91.C	1.06%	0.34	0.05	-0.14
S93.C	1.06%	0.34	0.05	-0.14
S77.C	1.06%	0.34	0.05	-0.14
S89.C	1.06%	0.34	0.05	-0.14
S87.C	1.06%	0.34	0.05	-0.14
S86.C	1.06%	0.34	0.05	-0.14
S76.C	1.05%	0.34	0.05	-0.14
S73.C	1.05%	0.34	0.04	-0.14
S74.C	1.05%	0.34	0.04	-0.14
S75.C	1.05%	0.34	0.04	-0.14
S72.C	1.05%	0.34	0.04	-0.14
S102.C	-1.05%	0.33	0.04	-0.14

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S104.C	-1.05%	0.33	0.04	-0.14
S197.C	-1.05%	0.33	0.04	-0.14
S450.C	-1.05%	0.33	0.04	-0.14
S97.C	-1.05%	0.33	0.04	-0.14
S103.C	-1.05%	0.33	0.04	-0.14
S300.C	-1.05%	0.33	0.04	-0.14
S98.C	-1.05%	0.33	0.04	-0.14
S99.C	-1.05%	0.33	0.04	-0.14
S108.C	-1.05%	0.33	0.04	-0.14
S100.C	-1.05%	0.33	0.04	-0.14
S101.C	-1.05%	0.33	0.04	-0.14
S105.C	-1.05%	0.33	0.04	-0.14
S67.C	-1.05%	0.33	0.04	-0.14
S160r.C	-1.04%	0.33	0.04	-0.13
S7.C	-0.67%	0.32	0.04	0.02
S5.C	-0.38%	0.28	0.02	0.01
S6.C	-0.38%	0.28	0.02	0.01
S4.C	-0.38%	0.28	0.02	0.01
S1.C	-0.38%	0.28	0.02	0.01
S3.C	-0.38%	0.28	0.02	0.01
S83.B	-0.33%	0.28	0.02	0.02
S82.B	-0.33%	0.28	0.02	0.02
S81.B	-0.33%	0.28	0.02	0.02
S80.B	-0.33%	0.28	0.02	0.02
S160.B	0.33%	0.28	0.02	0.01
S60.B	0.33%	0.28	0.02	0.01
S61.B	0.33%	0.28	0.02	0.01
S61s.B	0.33%	0.28	0.02	0.01
S95.B	-0.33%	0.28	0.02	0.02
S96.B	-0.33%	0.28	0.02	0.02
S93.B	-0.33%	0.28	0.02	0.02
S91.B	-0.33%	0.28	0.02	0.02
S90.B	-0.33%	0.28	0.02	0.02
S89.B	-0.33%	0.28	0.02	0.02
S78.B	-0.33%	0.28	0.02	0.02
S79.B	-0.33%	0.28	0.02	0.02
S87.B	-0.33%	0.28	0.02	0.01
S77.B	-0.33%	0.28	0.02	0.02
S86.B	-0.33%	0.28	0.02	0.01
S76.B	-0.33%	0.28	0.02	0.01
S72.B	-0.33%	0.28	0.02	0.01
S100.B	-0.33%	0.28	0.02	0.01

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S107.B	-0.33%	0.28	0.02	0.01
S108.B	-0.33%	0.28	0.02	0.01
S197.B	-0.33%	0.28	0.02	0.01
S97.B	-0.33%	0.28	0.02	0.01
S105.B	-0.33%	0.28	0.02	0.01
S450.B	-0.33%	0.28	0.02	0.01
S101.B	-0.33%	0.28	0.02	0.01
S106.B	-0.33%	0.28	0.02	0.01
S300.B	-0.33%	0.28	0.02	0.01
S67.B	-0.33%	0.28	0.02	0.01
S98.B	-0.33%	0.28	0.02	0.01
S99.B	-0.33%	0.28	0.02	0.01
S160r.B	-0.33%	0.28	0.02	0.01
S62.B	0.26%	0.27	0.02	0.01
S57.B	0.23%	0.26	0.01	0.01
S58.B	0.23%	0.26	0.01	0.01
S59.B	0.23%	0.26	0.01	0.01
S63.B	0.20%	0.26	0.01	0.01
S55.B	0.18%	0.26	0.01	0.01
S56.B	0.18%	0.26	0.01	0.01
S54.B	0.18%	0.26	0.01	0.01
S53.B	0.17%	0.26	0.01	0.01
S52.B	0.15%	0.25	0.01	0.01
S151.B	-0.11%	0.25	0.01	0.00
S300 open.B	-0.11%	0.25	0.01	0.00
S35.B	-0.11%	0.25	0.01	0.00
S135.B	-0.11%	0.25	0.01	0.00
S18.B	-0.11%	0.25	0.01	0.00
S25.B	-0.11%	0.25	0.01	0.00
S36.B	-0.11%	0.25	0.01	0.00
S38.B	-0.11%	0.25	0.01	0.00
S40.B	-0.11%	0.25	0.01	0.00
S43.B	-0.11%	0.25	0.01	0.00
S47.B	-0.11%	0.25	0.01	0.00
S48.B	-0.11%	0.25	0.01	0.00
S51.B	-0.11%	0.25	0.01	0.00
S28.B	-0.11%	0.25	0.01	0.00
S39.B	-0.11%	0.25	0.01	0.00
S250.B	-0.11%	0.25	0.01	0.00
S30.B	-0.11%	0.25	0.01	0.00
S22.B	-0.11%	0.25	0.01	0.00
S23.B	-0.11%	0.25	0.01	0.00

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S42.B	-0.11%	0.25	0.01	0.00
S50.B	-0.11%	0.25	0.01	0.00
S21.B	-0.11%	0.25	0.01	0.00
S29.B	-0.11%	0.25	0.01	0.00
S13.B	-0.11%	0.25	0.01	0.00
S152.B	-0.11%	0.25	0.01	0.00
S44.B	-0.11%	0.25	0.01	0.00
S49.B	-0.11%	0.25	0.01	0.00
S64.B	0.10%	0.24	0.01	0.01
S12.B	-0.08%	0.24	0.01	0.00
S8.B	-0.08%	0.24	0.01	0.00
S33.A	-0.42%	0.24	0.00	0.08
S27.A	-0.42%	0.24	0.00	0.08
S26.A	-0.42%	0.24	0.00	0.08
S25r.A	-0.42%	0.24	0.00	0.08
S7.B	-0.07%	0.24	0.00	0.00
S2.B	-0.04%	0.24	0.00	0.00
S1.B	-0.04%	0.24	0.00	0.00
S149.C	0.00%	0.23	0.00	0.00
S149.A	0.00%	0.23	0.00	0.00
S149.B	0.00%	0.23	0.00	0.00
S65.B	0.05%	0.23	0.00	0.01
S26.C	0.21%	0.21	-0.01	-0.03
S27.C	0.21%	0.21	-0.01	-0.03
S31.C	0.21%	0.21	-0.01	-0.03
S25r.C	0.21%	0.21	-0.01	-0.03
S32.C	0.21%	0.21	-0.01	-0.03
S66.B	0.15%	0.21	-0.01	0.00
S1.A	-0.17%	0.21	-0.01	0.00
S7.A	-0.29%	0.19	-0.02	-0.01
S10.A	-0.37%	0.18	-0.02	-0.01
S11.A	-0.37%	0.18	-0.02	-0.01
S14.A	-0.37%	0.18	-0.02	-0.01
S9r.A	-0.37%	0.18	-0.02	-0.01
S9.A	0.37%	0.18	-0.02	-0.01
S8.A	0.37%	0.18	-0.02	-0.01
S51.A	0.50%	0.16	-0.03	-0.01
S25.A	0.50%	0.16	-0.03	-0.01
S40.A	0.50%	0.16	-0.03	-0.01
S44.A	0.50%	0.16	-0.03	-0.01
S50.A	0.50%	0.16	-0.03	-0.01
S21.A	0.50%	0.16	-0.03	-0.01

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S47.A	0.50%	0.16	-0.03	-0.01
S48.A	0.50%	0.16	-0.03	-0.01
S29.A	0.50%	0.16	-0.03	-0.01
S49.A	0.50%	0.16	-0.03	-0.01
S135.A	0.50%	0.16	-0.03	-0.01
S18.A	0.50%	0.16	-0.03	-0.01
S19.A	0.50%	0.16	-0.03	-0.01
S20.A	0.50%	0.16	-0.03	-0.01
S250.A	0.50%	0.16	-0.03	-0.01
S30.A	0.50%	0.16	-0.03	-0.01
S36.A	0.50%	0.16	-0.03	-0.01
S37.A	0.50%	0.16	-0.03	-0.01
S42.A	0.50%	0.16	-0.03	-0.01
S13.A	0.50%	0.16	-0.03	-0.01
S152.A	0.50%	0.16	-0.03	-0.01
S151.A	0.50%	0.16	-0.03	-0.01
S23.A	0.50%	0.16	-0.03	-0.01
S28.A	0.50%	0.16	-0.03	-0.01
S300 open.A	0.50%	0.16	-0.03	-0.01
S35.A	0.50%	0.16	-0.03	-0.01
S45.A	0.50%	0.16	-0.03	-0.01
S46.A	0.50%	0.16	-0.03	-0.01
S52.A	0.67%	0.14	-0.04	-0.02
S160r.A	-0.74%	0.13	-0.04	0.07
S110.A	-0.74%	0.13	-0.04	0.07
S100.A	-0.74%	0.13	-0.04	0.07
S105.A	-0.74%	0.13	-0.04	0.07
S109.A	-0.74%	0.13	-0.04	0.07
S112.A	-0.74%	0.13	-0.04	0.07
S114.A	-0.74%	0.13	-0.04	0.07
S300.A	-0.74%	0.13	-0.04	0.07
S68.A	-0.74%	0.13	-0.04	0.07
S69.A	-0.74%	0.13	-0.04	0.07
S98.A	-0.74%	0.13	-0.04	0.07
S99.A	-0.74%	0.13	-0.04	0.07
S111.A	-0.74%	0.13	-0.04	0.07
S450.A	-0.74%	0.13	-0.04	0.07
S113.A	-0.74%	0.13	-0.04	0.07
S101.A	-0.74%	0.13	-0.04	0.07
S71.A	-0.74%	0.13	-0.04	0.07
S67.A	-0.74%	0.13	-0.04	0.07
S197.A	-0.74%	0.13	-0.04	0.07

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S97.A	-0.74%	0.13	-0.04	0.07
S108.A	-0.74%	0.13	-0.04	0.07
S70.A	-0.74%	0.13	-0.04	0.07
S72.A	-0.75%	0.13	-0.04	0.07
S76.A	-0.75%	0.13	-0.04	0.07
S86.A	-0.75%	0.13	-0.04	0.07
S87.A	-0.75%	0.13	-0.04	0.07
S88.A	-0.75%	0.13	-0.04	0.07
S89.A	-0.75%	0.13	-0.04	0.07
S91.A	-0.75%	0.13	-0.04	0.07
S93.A	-0.75%	0.13	-0.04	0.07
S94.A	-0.75%	0.13	-0.04	0.07
S95.A	-0.75%	0.13	-0.04	0.07
S77.A	-0.75%	0.13	-0.04	0.07
S79.A	0.75%	0.13	-0.04	0.07
S78.A	0.75%	0.13	-0.04	0.07
S80.A	0.76%	0.13	-0.05	0.07
S81.A	0.76%	0.13	-0.05	0.07
S82.A	0.77%	0.13	-0.05	0.07
S83.A	0.77%	0.13	-0.05	0.07
S53.A	0.75%	0.13	-0.05	-0.02
S54.A	0.80%	0.12	-0.05	-0.02
S94 open.A	0.80%	0.12	-0.05	-0.02
S55.A	0.80%	0.12	-0.05	-0.02
S56.A	0.80%	0.12	-0.05	-0.02
S57.A	0.96%	0.10	-0.06	-0.02
S160.A	1.31%	0.05	-0.08	-0.03
S60.A	1.31%	0.05	-0.08	-0.03
S61.A	1.31%	0.05	-0.08	-0.03
S61s.A	1.31%	0.05	-0.08	-0.03
S62.A	1.37%	0.04	-0.08	-0.03
S63.A	1.41%	0.04	-0.09	-0.03
S64.A	1.50%	0.03	-0.09	-0.04
S65.A	1.60%	0.01	-0.10	-0.04
S66.A	1.68%	0.00	-0.10	-0.04

Table I.10: Av. normalised covariance values and first two eigenvectors from PCA obtained for Scenario S4

Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S85.C	-4.26%	0.94	0.22	-0.12
S84.C	-3.38%	0.83	0.17	-0.08
S65.C	-3.12%	0.83	0.17	-0.07
S60.C	-3.12%	0.83	0.17	-0.07
S64.C	-3.12%	0.83	0.17	-0.07
S66.C	-3.12%	0.83	0.17	-0.07
S63.C	-3.12%	0.83	0.17	-0.07
S160.C	-3.12%	0.83	0.17	-0.07
S62.C	-3.12%	0.83	0.17	-0.07
S61.C	-3.12%	0.83	0.17	-0.07
S61s.C	-3.12%	0.83	0.17	-0.07
S57.C	-2.34%	0.73	0.13	-0.04
S83.C	-2.18%	0.69	0.11	-0.02
S82.C	-2.17%	0.69	0.11	-0.02
S54.C	-1.98%	0.69	0.11	-0.02
S55.C	-1.98%	0.69	0.11	-0.02
S56.C	-1.98%	0.69	0.11	-0.02
S81.C	-2.13%	0.68	0.11	-0.02
S53.C	-1.85%	0.67	0.10	-0.01
S80.C	-1.95%	0.66	0.10	-0.01
S52.C	-1.64%	0.65	0.09	0.00
S63.A	1.50%	0.63	0.09	0.00
S64.A	1.50%	0.63	0.09	0.00
S65.A	1.50%	0.63	0.09	0.00
S66.A	1.50%	0.63	0.09	0.00
S160.A	1.50%	0.63	0.09	0.00
S62.A	1.50%	0.63	0.09	0.00
S61.A	1.50%	0.63	0.09	0.00
S61s.A	1.50%	0.63	0.09	0.00
S60.A	1.50%	0.63	0.09	0.00
S83.A	1.45%	0.62	0.08	0.03
S82.A	1.44%	0.62	0.08	0.03
S78.C	-1.44%	0.60	0.08	0.01
S79.C	-1.44%	0.60	0.08	0.01
S152.C	-1.33%	0.60	0.07	0.02
S30.C	-1.33%	0.60	0.07	0.02
S35.C	-1.33%	0.60	0.07	0.02
S49.C	-1.33%	0.60	0.07	0.02
S23.C	-1.33%	0.60	0.07	0.02
S44.C	-1.33%	0.60	0.07	0.02

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S13.C	-1.33%	0.60	0.07	0.02
S151.C	-1.33%	0.60	0.07	0.02
S15.C	-1.33%	0.60	0.07	0.02
S16.C	-1.33%	0.60	0.07	0.02
S17.C	-1.33%	0.60	0.07	0.02
S21.C	-1.33%	0.60	0.07	0.02
S24.C	-1.33%	0.60	0.07	0.02
S25.C	-1.33%	0.60	0.07	0.02
S28.C	-1.33%	0.60	0.07	0.02
S29.C	-1.33%	0.60	0.07	0.02
S300 open.C	-1.33%	0.60	0.07	0.02
S34.C	-1.33%	0.60	0.07	0.02
S40.C	-1.33%	0.60	0.07	0.02
S41.C	-1.33%	0.60	0.07	0.02
S47.C	-1.33%	0.60	0.07	0.02
S48.C	-1.33%	0.60	0.07	0.02
S51.C	-1.33%	0.60	0.07	0.02
S42.C	-1.33%	0.60	0.07	0.02
S135.C	-1.33%	0.60	0.07	0.02
S18.C	-1.33%	0.60	0.07	0.02
S250.C	-1.33%	0.60	0.07	0.02
S50.C	-1.33%	0.60	0.07	0.02
S57.A	1.30%	0.59	0.07	0.02
S77.C	-1.33%	0.59	0.07	0.02
S81.A	1.32%	0.60	0.07	0.04
S54.A	-1.21%	0.57	0.06	0.03
S94 open.A	-1.21%	0.57	0.06	0.03
S55.A	-1.21%	0.57	0.06	0.03
S56.A	-1.21%	0.57	0.06	0.03
S80.A	1.28%	0.59	0.06	0.04
S53.A	-1.17%	0.56	0.06	0.03
S8.C	-1.15%	0.56	0.06	0.03
S52.A	-1.11%	0.55	0.05	0.04
S78.A	1.18%	0.57	0.05	0.05
S79.A	1.18%	0.57	0.05	0.05
S77.A	1.16%	0.56	0.05	0.05
S92.C	-1.07%	0.54	0.05	0.04
S91.C	-1.07%	0.54	0.05	0.04
S93.C	-1.07%	0.54	0.05	0.04
S95.C	-1.07%	0.54	0.05	0.04
S89.C	-1.07%	0.54	0.05	0.04
S87.C	-1.07%	0.54	0.05	0.04

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S86.C	-1.07%	0.54	0.05	0.04
S76.C	-1.07%	0.54	0.05	0.04
S7.C	-1.04%	0.53	0.05	0.04
S152.A	-0.99%	0.53	0.04	0.05
S44.A	-0.99%	0.53	0.04	0.05
S51.A	-0.99%	0.53	0.04	0.05
S13.A	-0.99%	0.53	0.04	0.05
S21.A	-0.99%	0.53	0.04	0.05
S29.A	-0.99%	0.53	0.04	0.05
S47.A	-0.99%	0.53	0.04	0.05
S48.A	-0.99%	0.53	0.04	0.05
S20.A	-0.99%	0.53	0.04	0.05
S25.A	-0.99%	0.53	0.04	0.05
S40.A	-0.99%	0.53	0.04	0.05
S50.A	-0.99%	0.53	0.04	0.05
S28.A	-0.99%	0.53	0.04	0.05
S35.A	-0.99%	0.53	0.04	0.05
S45.A	-0.99%	0.53	0.04	0.05
S46.A	-0.99%	0.53	0.04	0.05
S23.A	-0.99%	0.53	0.04	0.05
S151.A	-0.99%	0.53	0.04	0.05
S300 open.A	-0.99%	0.53	0.04	0.05
S49.A	-0.99%	0.53	0.04	0.05
S19.A	-0.99%	0.53	0.04	0.05
S30.A	-0.99%	0.53	0.04	0.05
S36.A	-0.99%	0.53	0.04	0.05
S42.A	-0.99%	0.53	0.04	0.05
S250.A	-0.99%	0.53	0.04	0.05
S37.A	-0.99%	0.53	0.04	0.05
S135.A	-0.99%	0.53	0.04	0.05
S18.A	-0.99%	0.53	0.04	0.05
S91.A	1.08%	0.54	0.04	0.06
S94.A	1.08%	0.54	0.04	0.06
S95.A	1.08%	0.54	0.04	0.06
S93.A	1.08%	0.54	0.04	0.06
S88.A	1.08%	0.54	0.04	0.06
S89.A	1.08%	0.54	0.04	0.06
S87.A	1.08%	0.54	0.04	0.06
S86.A	1.08%	0.54	0.04	0.06
S76.A	1.08%	0.54	0.04	0.06
S72.A	-1.02%	0.53	0.04	0.06
S72.C	-0.98%	0.51	0.04	0.05

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S75.C	-0.98%	0.51	0.04	0.05
S73.C	-0.98%	0.51	0.04	0.05
S74.C	-0.98%	0.51	0.04	0.05
S9.A	-0.90%	0.51	0.04	0.05
S8.A	-0.90%	0.51	0.04	0.05
S100.A	-0.95%	0.52	0.03	0.07
S111.A	-0.95%	0.52	0.03	0.07
S112.A	-0.95%	0.52	0.03	0.07
S69.A	-0.95%	0.52	0.03	0.07
S110.A	-0.95%	0.52	0.03	0.07
S300.A	-0.95%	0.52	0.03	0.07
S98.A	-0.95%	0.52	0.03	0.07
S109.A	-0.95%	0.52	0.03	0.07
S105.A	-0.95%	0.52	0.03	0.07
S113.A	-0.95%	0.52	0.03	0.07
S114.A	-0.95%	0.52	0.03	0.07
S68.A	-0.95%	0.52	0.03	0.07
S99.A	-0.95%	0.52	0.03	0.07
S101.A	-0.95%	0.52	0.03	0.07
S450.A	-0.95%	0.52	0.03	0.07
S108.A	-0.95%	0.52	0.03	0.07
S197.A	-0.95%	0.52	0.03	0.07
S67.A	-0.95%	0.52	0.03	0.07
S70.A	-0.95%	0.52	0.03	0.07
S71.A	-0.95%	0.52	0.03	0.07
S97.A	-0.95%	0.52	0.03	0.07
S1.C	-0.86%	0.50	0.03	0.05
S3.C	-0.86%	0.50	0.03	0.05
S4.C	-0.86%	0.50	0.03	0.05
S5.C	-0.86%	0.50	0.03	0.05
S6.C	-0.86%	0.50	0.03	0.05
S7.A	-0.84%	0.49	0.03	0.06
S160r.A	-0.87%	0.50	0.03	0.08
S9r.A	-1.30%	0.50	0.03	0.08
S10.A	-1.30%	0.50	0.03	0.08
S11.A	-1.30%	0.50	0.03	0.08
S14.A	-1.30%	0.50	0.03	0.08
S98.C	-0.95%	0.48	0.02	0.06
S101.C	-0.95%	0.48	0.02	0.06
S103.C	-0.95%	0.48	0.02	0.06
S300.C	-0.95%	0.48	0.02	0.06
S99.C	-0.95%	0.48	0.02	0.06

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S100.C	-0.95%	0.48	0.02	0.06
S102.C	-0.95%	0.48	0.02	0.06
S104.C	-0.95%	0.48	0.02	0.06
S105.C	-0.95%	0.48	0.02	0.06
S108.C	-0.95%	0.48	0.02	0.06
S197.C	-0.95%	0.48	0.02	0.06
S450.C	-0.95%	0.48	0.02	0.06
S67.C	-0.95%	0.48	0.02	0.06
S97.C	-0.95%	0.48	0.02	0.06
S1.A	-0.75%	0.47	0.02	0.06
S149.A	-0.63%	0.45	0.01	0.07
S149.C	-0.63%	0.45	0.01	0.07
S149.B	-0.63%	0.45	0.01	0.07
S160r.C	-0.92%	0.43	0.01	0.08
S2.B	-0.78%	0.42	0.00	0.08
S1.B	-0.78%	0.42	0.00	0.08
S25r.C	0.13%	0.33	0.00	0.01
S32.C	0.13%	0.33	0.00	0.01
S26.C	0.13%	0.33	0.00	0.01
S27.C	0.13%	0.33	0.00	0.01
S31.C	0.13%	0.33	0.00	0.01
S7.B	0.89%	0.41	0.00	0.09
S12.B	0.97%	0.40	-0.01	0.09
S8.B	0.97%	0.40	-0.01	0.09
S27.A	-0.32%	0.24	-0.01	-0.02
S26.A	-0.32%	0.24	-0.01	-0.02
S25r.A	-0.32%	0.24	-0.01	-0.02
S33.A	-0.32%	0.24	-0.01	-0.02
S25.B	1.09%	0.38	-0.01	0.10
S28.B	1.09%	0.38	-0.01	0.10
S13.B	1.09%	0.38	-0.01	0.10
S151.B	1.09%	0.38	-0.01	0.10
S152.B	1.09%	0.38	-0.01	0.10
S300 open.B	1.09%	0.38	-0.01	0.10
S35.B	1.09%	0.38	-0.01	0.10
S38.B	1.09%	0.38	-0.01	0.10
S39.B	1.09%	0.38	-0.01	0.10
S43.B	1.09%	0.38	-0.01	0.10
S44.B	1.09%	0.38	-0.01	0.10
S48.B	1.09%	0.38	-0.01	0.10
S49.B	1.09%	0.38	-0.01	0.10
S29.B	1.09%	0.38	-0.01	0.10

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S21.B	1.09%	0.38	-0.01	0.10
S40.B	1.09%	0.38	-0.01	0.10
S250.B	1.09%	0.38	-0.01	0.10
S30.B	1.09%	0.38	-0.01	0.10
S135.B	1.09%	0.38	-0.01	0.10
S18.B	1.09%	0.38	-0.01	0.10
S22.B	1.09%	0.38	-0.01	0.10
S23.B	1.09%	0.38	-0.01	0.10
S36.B	1.09%	0.38	-0.01	0.10
S42.B	1.09%	0.38	-0.01	0.10
S47.B	1.09%	0.38	-0.01	0.10
S50.B	1.09%	0.38	-0.01	0.10
S51.B	1.09%	0.38	-0.01	0.10
S52.B	1.24%	0.36	-0.02	0.11
S53.B	1.32%	0.35	-0.03	0.11
S54.B	1.37%	0.34	-0.03	0.11
S56.B	1.37%	0.34	-0.03	0.11
S55.B	1.37%	0.34	-0.03	0.11
S59.B	1.45%	0.33	-0.03	0.12
S58.B	1.45%	0.33	-0.03	0.12
S57.B	1.45%	0.33	-0.03	0.12
S160r.B	-0.68%	0.15	-0.04	-0.01
S197.B	-0.74%	0.14	-0.04	-0.01
S97.B	-0.74%	0.14	-0.04	-0.01
S108.B	-0.74%	0.14	-0.04	-0.01
S101.B	-0.74%	0.14	-0.04	-0.01
S300.B	-0.74%	0.14	-0.04	-0.01
S67.B	-0.74%	0.14	-0.04	-0.01
S98.B	-0.74%	0.14	-0.04	-0.01
S106.B	-0.74%	0.14	-0.04	-0.01
S99.B	-0.74%	0.14	-0.04	-0.01
S450.B	-0.74%	0.14	-0.04	-0.01
S105.B	-0.74%	0.14	-0.04	-0.01
S107.B	-0.74%	0.14	-0.04	-0.01
S100.B	-0.74%	0.14	-0.04	-0.01
S160.B	1.62%	0.30	-0.04	0.12
S60.B	1.62%	0.30	-0.04	0.12
S61.B	1.62%	0.30	-0.04	0.12
S61s.B	1.62%	0.30	-0.04	0.12
S62.B	1.62%	0.30	-0.04	0.12
S63.B	1.62%	0.30	-0.04	0.12
S64.B	1.62%	0.30	-0.04	0.12

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S65.B	1.62%	0.30	-0.04	0.12
S66.B	1.62%	0.30	-0.04	0.12
S72.B	-0.79%	0.13	-0.05	-0.01
S76.B	-0.82%	0.12	-0.05	0.00
S86.B	-0.82%	0.12	-0.05	0.00
S87.B	-0.83%	0.12	-0.05	0.00
S91.B	-0.83%	0.12	-0.05	0.00
S93.B	-0.83%	0.12	-0.05	0.00
S95.B	-0.83%	0.12	-0.05	0.00
S96.B	-0.83%	0.12	-0.05	0.00
S89.B	-0.83%	0.12	-0.05	0.00
S90.B	-0.83%	0.12	-0.05	0.00
S77.B	-0.90%	0.10	-0.06	0.00
S78.B	0.91%	0.10	-0.06	0.00
S79.B	0.91%	0.10	-0.06	0.00
S80.B	1.02%	0.08	-0.06	0.01
S81.B	1.07%	0.07	-0.07	0.01
S82.B	1.18%	0.06	-0.07	0.02
S83.B	1.18%	0.06	-0.07	0.02

Table I.11: Av. normalised covariance values and first two eigenvectors from PCA obtained for Scenario S5

Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S83.A	0.93%	0.93	0.12	0.09
S82.A	0.93%	0.93	0.12	0.09
S81.A	0.93%	0.93	0.12	0.09
S80.A	0.93%	0.93	0.12	0.09
S78.A	-0.93%	0.93	0.12	0.09
S79.A	-0.93%	0.93	0.12	0.09
S77.A	-0.93%	0.92	0.12	0.09
S88.A	-0.93%	0.92	0.12	0.09
S87.A	-0.93%	0.92	0.12	0.09
S89.A	-0.93%	0.92	0.12	0.09
S93.A	-0.93%	0.92	0.12	0.09
S94.A	-0.93%	0.92	0.12	0.09
S95.A	-0.93%	0.92	0.12	0.09
S91.A	-0.93%	0.92	0.12	0.09
S86.A	-0.93%	0.92	0.12	0.09
S76.A	-0.92%	0.92	0.12	0.09

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S72.A	-0.92%	0.92	0.12	0.09
S108.A	-0.92%	0.92	0.12	0.09
S71.A	-0.92%	0.92	0.12	0.09
S67.A	-0.92%	0.92	0.12	0.09
S70.A	-0.92%	0.92	0.12	0.09
S111.A	-0.92%	0.92	0.12	0.09
S112.A	-0.92%	0.92	0.12	0.09
S69.A	-0.92%	0.92	0.12	0.09
S100.A	-0.92%	0.92	0.12	0.09
S197.A	-0.92%	0.92	0.12	0.09
S97.A	-0.92%	0.92	0.12	0.09
S109.A	-0.92%	0.92	0.12	0.09
S110.A	-0.92%	0.92	0.12	0.09
S300.A	-0.92%	0.92	0.12	0.09
S98.A	-0.92%	0.92	0.12	0.09
S101.A	-0.92%	0.92	0.12	0.09
S105.A	-0.92%	0.92	0.12	0.09
S113.A	-0.92%	0.92	0.12	0.09
S114.A	-0.92%	0.92	0.12	0.09
S450.A	-0.92%	0.92	0.12	0.09
S68.A	-0.92%	0.92	0.12	0.09
S99.A	-0.92%	0.92	0.12	0.09
S160r.A	-0.92%	0.92	0.12	0.09
S48.A	-0.70%	0.92	0.10	-0.10
S151.A	-0.67%	0.89	0.09	-0.09
S300 open.A	-0.67%	0.89	0.09	-0.09
S51.A	-0.67%	0.89	0.09	-0.09
S47.A	-0.67%	0.89	0.09	-0.09
S49.A	-0.67%	0.89	0.09	-0.09
S50.A	-0.67%	0.89	0.09	-0.09
S48.C	-0.63%	0.84	0.09	-0.09
S46.A	-0.62%	0.82	0.09	-0.08
S45.A	-0.62%	0.82	0.09	-0.08
S44.A	-0.62%	0.82	0.09	-0.08
S47.C	-0.61%	0.81	0.08	-0.09
S151.C	-0.61%	0.81	0.08	-0.09
S300 open.C	-0.61%	0.81	0.08	-0.09
S49.C	-0.61%	0.81	0.08	-0.09
S50.C	-0.61%	0.81	0.08	-0.09
S51.C	-0.61%	0.81	0.08	-0.09
S48.B	-0.59%	0.78	0.08	-0.08
S42.A	-0.58%	0.76	0.08	-0.08

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S44.C	-0.56%	0.75	0.08	-0.08
S151.B	-0.56%	0.74	0.08	-0.08
S300 open.B	-0.56%	0.74	0.08	-0.08
S49.B	-0.56%	0.74	0.08	-0.08
S47.B	-0.56%	0.74	0.08	-0.08
S51.B	-0.56%	0.74	0.08	-0.08
S50.B	-0.56%	0.74	0.08	-0.08
S42.C	-0.53%	0.71	0.07	-0.08
S40.A	-0.52%	0.69	0.07	-0.07
S44.B	-0.52%	0.69	0.07	-0.07
S43.B	-0.49%	0.65	0.07	-0.07
S42.B	-0.49%	0.65	0.07	-0.07
S41.C	-0.48%	0.65	0.07	-0.07
S40.C	-0.48%	0.65	0.07	-0.07
S35.A	-0.47%	0.62	0.07	-0.06
S36.A	-0.47%	0.62	0.07	-0.06
S37.A	-0.47%	0.62	0.07	-0.06
S40.B	-0.45%	0.59	0.06	-0.06
S35.C	-0.44%	0.59	0.06	-0.06
S39.B	-0.41%	0.54	0.06	-0.06
S35.B	-0.41%	0.54	0.06	-0.06
S38.B	-0.41%	0.54	0.06	-0.06
S36.B	-0.41%	0.54	0.06	-0.06
S25.A	-0.40%	0.52	0.06	-0.05
S30.A	-0.40%	0.52	0.06	-0.05
S250.A	-0.40%	0.52	0.06	-0.05
S135.A	-0.40%	0.52	0.06	-0.05
S18.A	-0.40%	0.52	0.06	-0.05
S21.A	-0.40%	0.52	0.06	-0.05
S23.A	-0.40%	0.52	0.06	-0.05
S28.A	-0.40%	0.52	0.06	-0.05
S29.A	-0.40%	0.52	0.06	-0.05
S19.A	-0.40%	0.52	0.06	-0.05
S20.A	-0.40%	0.52	0.06	-0.05
S18.C	-0.38%	0.51	0.05	-0.06
S25.C	-0.38%	0.51	0.05	-0.06
S135.C	-0.38%	0.51	0.05	-0.06
S250.C	-0.38%	0.51	0.05	-0.06
S30.C	-0.38%	0.51	0.05	-0.06
S21.C	-0.38%	0.51	0.05	-0.06
S28.C	-0.38%	0.51	0.05	-0.06
S23.C	-0.38%	0.51	0.05	-0.06

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S29.C	-0.38%	0.51	0.05	-0.06
S24.C	-0.38%	0.51	0.05	-0.06
S29.B	-0.33%	0.44	0.05	-0.05
S25.B	-0.33%	0.44	0.05	-0.05
S135.B	-0.33%	0.44	0.05	-0.05
S18.B	-0.33%	0.44	0.05	-0.05
S28.B	-0.33%	0.44	0.05	-0.05
S21.B	-0.33%	0.44	0.05	-0.05
S22.B	-0.33%	0.44	0.05	-0.05
S23.B	-0.33%	0.44	0.05	-0.05
S250.B	-0.33%	0.44	0.05	-0.05
S30.B	-0.33%	0.44	0.05	-0.05
S66.A	0.29%	0.37	0.04	-0.03
S160.A	0.29%	0.37	0.04	-0.03
S60.A	0.29%	0.37	0.04	-0.03
S62.A	0.29%	0.37	0.04	-0.03
S64.A	0.29%	0.37	0.04	-0.03
S65.A	0.29%	0.37	0.04	-0.03
S63.A	0.29%	0.37	0.04	-0.03
S61.A	0.29%	0.37	0.04	-0.03
S61s.A	0.29%	0.37	0.04	-0.03
S57.A	0.28%	0.36	0.04	-0.03
S55.A	0.28%	0.36	0.04	-0.03
S54.A	0.28%	0.36	0.04	-0.03
S94 open.A	0.28%	0.36	0.04	-0.03
S56.A	0.28%	0.36	0.04	-0.03
S53.A	0.28%	0.36	0.04	-0.03
S52.A	0.27%	0.36	0.04	-0.03
S13.A	-0.27%	0.35	0.04	-0.03
S152.A	-0.27%	0.35	0.04	-0.03
S27.A	-0.66%	0.18	0.03	0.14
S25r.A	-0.66%	0.18	0.03	0.14
S26.A	-0.66%	0.18	0.03	0.14
S33.A	-0.66%	0.18	0.03	0.14
S25r.C	-0.65%	0.17	0.03	0.14
S32.C	-0.65%	0.17	0.03	0.14
S31.C	-0.65%	0.17	0.03	0.14
S26.C	-0.65%	0.17	0.03	0.14
S27.C	-0.65%	0.17	0.03	0.14
S34.C	-0.21%	0.28	0.03	-0.03
S13.C	-0.21%	0.28	0.03	-0.03
S152.C	-0.21%	0.28	0.03	-0.03

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S15.C	-0.21%	0.28	0.03	-0.03
S17.C	-0.21%	0.28	0.03	-0.03
S16.C	-0.21%	0.28	0.03	-0.03
S52.C	0.21%	0.28	0.03	-0.03
S53.C	0.21%	0.28	0.03	-0.03
S54.C	0.21%	0.28	0.03	-0.03
S55.C	0.21%	0.28	0.03	-0.03
S56.C	0.21%	0.28	0.03	-0.03
S57.C	0.21%	0.28	0.03	-0.03
S62.C	0.20%	0.28	0.03	-0.03
S65.C	0.20%	0.28	0.03	-0.03
S61.C	0.20%	0.28	0.03	-0.03
S61s.C	0.20%	0.28	0.03	-0.03
S66.C	0.20%	0.28	0.03	-0.03
S160.C	0.20%	0.28	0.03	-0.03
S60.C	0.20%	0.28	0.03	-0.03
S63.C	0.20%	0.28	0.03	-0.03
S64.C	0.20%	0.28	0.03	-0.03
S160r.C	-0.20%	0.27	0.03	-0.03
S104.C	-0.20%	0.27	0.03	-0.03
S197.C	-0.20%	0.27	0.03	-0.03
S97.C	-0.20%	0.27	0.03	-0.03
S108.C	-0.20%	0.27	0.03	-0.03
S101.C	-0.20%	0.27	0.03	-0.03
S98.C	-0.20%	0.27	0.03	-0.03
S103.C	-0.20%	0.27	0.03	-0.03
S105.C	-0.20%	0.27	0.03	-0.03
S100.C	-0.20%	0.27	0.03	-0.03
S67.C	-0.20%	0.27	0.03	-0.03
S99.C	-0.20%	0.27	0.03	-0.03
S300.C	-0.20%	0.27	0.03	-0.03
S102.C	-0.20%	0.27	0.03	-0.03
S450.C	-0.20%	0.27	0.03	-0.03
S73.C	-0.20%	0.27	0.03	-0.03
S74.C	-0.20%	0.27	0.03	-0.03
S72.C	-0.20%	0.27	0.03	-0.03
S75.C	-0.20%	0.27	0.03	-0.03
S92.C	-0.20%	0.27	0.03	-0.03
S76.C	-0.20%	0.27	0.03	-0.03
S93.C	-0.20%	0.27	0.03	-0.03
S95.C	-0.20%	0.27	0.03	-0.03
S91.C	-0.20%	0.27	0.03	-0.03

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S86.C	-0.20%	0.27	0.03	-0.03
S89.C	-0.20%	0.27	0.03	-0.03
S87.C	-0.20%	0.27	0.03	-0.03
S77.C	-0.20%	0.27	0.03	-0.03
S14.A	-0.20%	0.26	0.03	-0.03
S9.A	-0.20%	0.26	0.03	-0.03
S9r.A	-0.20%	0.26	0.03	-0.03
S10.A	-0.20%	0.26	0.03	-0.03
S11.A	-0.20%	0.26	0.03	-0.03
S8.A	-0.20%	0.26	0.03	-0.03
S78.C	-0.20%	0.27	0.03	-0.03
S79.C	-0.20%	0.27	0.03	-0.03
S80.C	-0.20%	0.27	0.03	-0.03
S81.C	-0.20%	0.27	0.03	-0.03
S84.C	-0.20%	0.27	0.03	-0.03
S85.C	-0.20%	0.27	0.03	-0.03
S82.C	-0.20%	0.27	0.03	-0.03
S83.C	-0.20%	0.27	0.03	-0.03
S160.B	0.19%	0.25	0.03	-0.03
S61.B	0.19%	0.25	0.03	-0.03
S61s.B	0.19%	0.25	0.03	-0.03
S60.B	0.19%	0.25	0.03	-0.03
S62.B	0.19%	0.25	0.03	-0.03
S66.B	0.19%	0.25	0.03	-0.03
S65.B	0.19%	0.25	0.03	-0.03
S63.B	0.19%	0.25	0.03	-0.03
S64.B	0.19%	0.25	0.03	-0.03
S57.B	0.19%	0.25	0.03	-0.03
S58.B	0.19%	0.25	0.03	-0.03
S59.B	0.19%	0.25	0.03	-0.03
S13.B	-0.19%	0.25	0.03	-0.03
S152.B	-0.19%	0.25	0.03	-0.03
S52.B	0.19%	0.25	0.03	-0.03
S53.B	0.19%	0.25	0.03	-0.03
S55.B	0.19%	0.25	0.03	-0.03
S56.B	0.19%	0.25	0.03	-0.03
S54.B	0.19%	0.25	0.03	-0.03
S83.B	-0.19%	0.25	0.03	-0.03
S82.B	-0.19%	0.25	0.03	-0.03
S81.B	-0.19%	0.25	0.03	-0.03
S80.B	-0.19%	0.25	0.03	-0.03
S90.B	-0.19%	0.25	0.03	-0.03

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigenvector weights	Second eigenvector weights
S78.B	-0.19%	0.25	0.03	-0.03
S79.B	-0.19%	0.25	0.03	-0.03
S77.B	-0.19%	0.25	0.03	-0.03
S89.B	-0.19%	0.25	0.03	-0.03
S91.B	-0.19%	0.25	0.03	-0.03
S95.B	-0.19%	0.25	0.03	-0.03
S96.B	-0.19%	0.25	0.03	-0.03
S93.B	-0.19%	0.25	0.03	-0.03
S87.B	-0.19%	0.25	0.03	-0.03
S86.B	-0.19%	0.25	0.03	-0.03
S76.B	-0.19%	0.25	0.03	-0.03
S72.B	-0.19%	0.25	0.03	-0.03
S107.B	-0.19%	0.25	0.03	-0.03
S100.B	-0.19%	0.25	0.03	-0.03
S108.B	-0.19%	0.25	0.03	-0.03
S197.B	-0.19%	0.25	0.03	-0.03
S97.B	-0.19%	0.25	0.03	-0.03
S106.B	-0.19%	0.25	0.03	-0.03
S99.B	-0.19%	0.25	0.03	-0.03
S101.B	-0.19%	0.25	0.03	-0.03
S300.B	-0.19%	0.25	0.03	-0.03
S67.B	-0.19%	0.25	0.03	-0.03
S98.B	-0.19%	0.25	0.03	-0.03
S105.B	-0.19%	0.25	0.03	-0.03
S450.B	-0.19%	0.25	0.03	-0.03
S160r.B	-0.18%	0.25	0.03	-0.03
S8.C	-0.16%	0.21	0.02	-0.02
S7.A	-0.16%	0.21	0.02	-0.02
S12.B	-0.14%	0.19	0.02	-0.02
S8.B	-0.14%	0.19	0.02	-0.02
S7.C	-0.12%	0.16	0.02	-0.02
S7.B	-0.11%	0.15	0.02	-0.02
S1.A	-0.09%	0.12	0.01	-0.01
S4.C	-0.07%	0.09	0.01	-0.01
S5.C	-0.07%	0.09	0.01	-0.01
S6.C	-0.07%	0.09	0.01	-0.01
S1.C	-0.07%	0.09	0.01	-0.01
S3.C	-0.07%	0.09	0.01	-0.01
S1.B	-0.06%	0.08	0.01	-0.01
S2.B	-0.06%	0.08	0.01	-0.01
S149.A	0.00%	0.00	0.00	0.00
S149.B	0.00%	0.00	0.00	0.00

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S149.C	0.00%	0.00	0.00	0.00

Table I.12: Av. normalised covariance values and first two eigenvectors from PCA obtained for Scenario S6

Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S66.C	-8.46%	1.00	0.28	0.12
S65.C	-7.91%	0.95	0.26	0.11
S64.C	-7.18%	0.89	0.23	0.09
S63.C	-6.59%	0.84	0.21	0.08
S62.C	-6.29%	0.81	0.21	0.08
S160.C	-5.86%	0.77	0.19	0.07
S60.C	-5.86%	0.77	0.19	0.07
S61.C	-5.86%	0.77	0.19	0.07
S61s.C	-5.86%	0.77	0.19	0.07
S85.C	-5.14%	0.69	0.15	-0.07
S57.C	-4.44%	0.65	0.14	0.05
S84.C	-4.26%	0.61	0.13	-0.08
S55.C	-3.77%	0.59	0.12	0.05
S56.C	-3.77%	0.59	0.12	0.05
S54.C	-3.77%	0.59	0.12	0.05
S53.C	-3.53%	0.57	0.11	0.04
S52.C	-3.14%	0.53	0.10	0.04
S83.C	-3.03%	0.50	0.09	-0.09
S82.C	-3.02%	0.50	0.08	-0.09
S81.C	-3.01%	0.50	0.08	-0.09
S80.C	-2.84%	0.49	0.08	-0.10
S152.C	-2.36%	0.47	0.08	0.03
S250.C	-2.36%	0.47	0.08	0.03
S29.C	-2.36%	0.47	0.08	0.03
S30.C	-2.36%	0.47	0.08	0.03
S35.C	-2.36%	0.47	0.08	0.03
S42.C	-2.36%	0.47	0.08	0.03
S49.C	-2.36%	0.47	0.08	0.03
S50.C	-2.36%	0.47	0.08	0.03
S21.C	-2.36%	0.47	0.08	0.03
S23.C	-2.36%	0.47	0.08	0.03
S40.C	-2.36%	0.47	0.08	0.03
S41.C	-2.36%	0.47	0.08	0.03
S15.C	-2.36%	0.47	0.08	0.03

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S16.C	-2.36%	0.47	0.08	0.03
S17.C	-2.36%	0.47	0.08	0.03
S28.C	-2.36%	0.47	0.08	0.03
S34.C	-2.36%	0.47	0.08	0.03
S24.C	-2.36%	0.47	0.08	0.03
S47.C	-2.36%	0.47	0.08	0.03
S48.C	-2.36%	0.47	0.08	0.03
S135.C	-2.36%	0.47	0.08	0.03
S13.C	-2.36%	0.47	0.08	0.03
S151.C	-2.36%	0.47	0.08	0.03
S18.C	-2.36%	0.47	0.08	0.03
S25.C	-2.36%	0.47	0.08	0.03
S300 open.C	-2.36%	0.47	0.08	0.03
S51.C	-2.36%	0.47	0.08	0.03
S44.C	-2.36%	0.47	0.08	0.03
S78.C	-2.38%	0.45	0.06	-0.10
S79.C	-2.38%	0.45	0.06	-0.10
S77.C	-2.29%	0.44	0.06	-0.10
S8.C	-1.78%	0.41	0.06	0.02
S92.C	-1.91%	0.40	0.05	-0.11
S91.C	-1.91%	0.40	0.05	-0.11
S93.C	-1.91%	0.40	0.05	-0.11
S95.C	-1.91%	0.40	0.05	-0.11
S89.C	-1.91%	0.40	0.05	-0.11
S87.C	-1.91%	0.40	0.05	-0.11
S86.C	-1.90%	0.40	0.05	-0.11
S76.C	-1.90%	0.40	0.05	-0.11
S7.C	-1.38%	0.38	0.05	0.02
S74.C	-1.70%	0.39	0.04	-0.11
S73.C	-1.70%	0.39	0.04	-0.11
S75.C	-1.70%	0.39	0.04	-0.11
S72.C	-1.70%	0.39	0.04	-0.11
S83.B	1.31%	0.36	0.04	-0.05
S82.B	-1.31%	0.36	0.04	-0.05
S81.B	-1.31%	0.36	0.04	-0.05
S80.B	-1.30%	0.36	0.04	-0.05
S78.B	-1.27%	0.36	0.03	-0.05
S79.B	-1.27%	0.36	0.03	-0.05
S77.B	-1.26%	0.36	0.03	-0.05
S91.B	-1.25%	0.36	0.03	-0.05
S93.B	-1.25%	0.36	0.03	-0.05
S95.B	-1.25%	0.36	0.03	-0.05

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S96.B	-1.25%	0.36	0.03	-0.05
S90.B	-1.25%	0.36	0.03	-0.05
S89.B	-1.25%	0.36	0.03	-0.05
S87.B	-1.24%	0.36	0.03	-0.05
S86.B	-1.24%	0.36	0.03	-0.05
S76.B	-1.24%	0.36	0.03	-0.05
S103.C	-1.43%	0.36	0.03	-0.11
S98.C	-1.43%	0.36	0.03	-0.11
S300.C	-1.43%	0.36	0.03	-0.11
S99.C	-1.43%	0.36	0.03	-0.11
S108.C	-1.43%	0.36	0.03	-0.11
S100.C	-1.43%	0.36	0.03	-0.11
S101.C	-1.43%	0.36	0.03	-0.11
S102.C	-1.43%	0.36	0.03	-0.11
S104.C	-1.43%	0.36	0.03	-0.11
S105.C	-1.43%	0.36	0.03	-0.11
S197.C	-1.43%	0.36	0.03	-0.11
S450.C	-1.43%	0.36	0.03	-0.11
S67.C	-1.43%	0.36	0.03	-0.11
S97.C	-1.43%	0.36	0.03	-0.11
S72.B	-1.22%	0.35	0.03	-0.05
S107.B	-1.19%	0.35	0.03	-0.05
S108.B	-1.19%	0.35	0.03	-0.05
S197.B	-1.19%	0.35	0.03	-0.05
S97.B	-1.19%	0.35	0.03	-0.05
S100.B	-1.19%	0.35	0.03	-0.05
S106.B	-1.19%	0.35	0.03	-0.05
S101.B	-1.19%	0.35	0.03	-0.05
S98.B	-1.19%	0.35	0.03	-0.05
S99.B	-1.19%	0.35	0.03	-0.05
S300.B	-1.19%	0.35	0.03	-0.05
S105.B	-1.19%	0.35	0.03	-0.05
S450.B	-1.19%	0.35	0.03	-0.05
S67.B	-1.19%	0.35	0.03	-0.05
S160r.B	-1.17%	0.35	0.03	-0.05
S1.C	-0.79%	0.33	0.03	0.01
S3.C	-0.79%	0.33	0.03	0.01
S5.C	-0.79%	0.33	0.03	0.01
S6.C	-0.79%	0.33	0.03	0.01
S4.C	-0.79%	0.33	0.03	0.01
S160r.C	-1.11%	0.33	0.02	-0.12
S61.B	0.55%	0.31	0.02	0.01

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S61s.B	0.55%	0.31	0.02	0.01
S160.B	0.55%	0.31	0.02	0.01
S60.B	0.55%	0.31	0.02	0.01
S62.B	0.47%	0.30	0.02	0.01
S63.B	0.41%	0.29	0.01	0.01
S58.B	0.38%	0.29	0.01	0.01
S59.B	0.38%	0.29	0.01	0.01
S57.B	0.38%	0.29	0.01	0.01
S27.A	-0.36%	0.28	0.01	0.02
S26.A	-0.36%	0.28	0.01	0.02
S25r.A	-0.36%	0.28	0.01	0.02
S33.A	-0.36%	0.28	0.01	0.02
S64.B	0.30%	0.28	0.01	0.01
S55.B	0.30%	0.28	0.01	0.01
S56.B	0.30%	0.28	0.01	0.01
S54.B	0.30%	0.28	0.01	0.01
S53.B	0.28%	0.28	0.01	0.01
S52.B	-0.25%	0.28	0.01	0.01
S13.B	-0.19%	0.27	0.01	0.00
S47.B	-0.19%	0.27	0.01	0.00
S48.B	-0.19%	0.27	0.01	0.00
S135.B	-0.19%	0.27	0.01	0.00
S18.B	-0.19%	0.27	0.01	0.00
S22.B	-0.19%	0.27	0.01	0.00
S23.B	-0.19%	0.27	0.01	0.00
S250.B	-0.19%	0.27	0.01	0.00
S25.B	-0.19%	0.27	0.01	0.00
S30.B	-0.19%	0.27	0.01	0.00
S36.B	-0.19%	0.27	0.01	0.00
S40.B	-0.19%	0.27	0.01	0.00
S42.B	-0.19%	0.27	0.01	0.00
S50.B	-0.19%	0.27	0.01	0.00
S51.B	-0.19%	0.27	0.01	0.00
S28.B	-0.19%	0.27	0.01	0.00
S151.B	-0.19%	0.27	0.01	0.00
S300 open.B	-0.19%	0.27	0.01	0.00
S35.B	-0.19%	0.27	0.01	0.00
S38.B	-0.19%	0.27	0.01	0.00
S39.B	-0.19%	0.27	0.01	0.00
S43.B	-0.19%	0.27	0.01	0.00
S44.B	-0.19%	0.27	0.01	0.00
S21.B	-0.19%	0.27	0.01	0.00

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S29.B	-0.19%	0.27	0.01	0.00
S49.B	-0.19%	0.27	0.01	0.00
S152.B	-0.19%	0.27	0.01	0.00
S65.B	0.16%	0.27	0.01	0.01
S12.B	-0.14%	0.27	0.00	0.00
S8.B	-0.14%	0.27	0.00	0.00
S7.B	-0.11%	0.27	0.00	0.00
S2.B	-0.06%	0.26	0.00	0.00
S1.B	-0.06%	0.26	0.00	0.00
S66.B	0.08%	0.26	0.00	0.01
S149.C	0.00%	0.26	0.00	0.00
S149.B	0.00%	0.26	0.00	0.00
S149.A	0.00%	0.26	0.00	0.00
S31.C	0.30%	0.25	0.00	-0.04
S32.C	0.30%	0.25	0.00	-0.04
S26.C	0.30%	0.25	0.00	-0.04
S27.C	0.30%	0.25	0.00	-0.04
S25r.C	0.30%	0.25	0.00	-0.04
S160r.A	-0.87%	0.22	-0.01	0.10
S1.A	-0.33%	0.23	-0.01	0.00
S101.A	-0.89%	0.20	-0.02	0.10
S450.A	-0.89%	0.20	-0.02	0.10
S105.A	-0.89%	0.20	-0.02	0.10
S113.A	-0.89%	0.20	-0.02	0.10
S114.A	-0.89%	0.20	-0.02	0.10
S68.A	-0.89%	0.20	-0.02	0.10
S99.A	-0.89%	0.20	-0.02	0.10
S108.A	-0.89%	0.20	-0.02	0.10
S67.A	-0.89%	0.20	-0.02	0.10
S70.A	-0.89%	0.20	-0.02	0.10
S71.A	-0.89%	0.20	-0.02	0.10
S100.A	-0.89%	0.20	-0.02	0.10
S197.A	-0.89%	0.20	-0.02	0.10
S97.A	-0.89%	0.20	-0.02	0.10
S111.A	-0.89%	0.20	-0.02	0.10
S109.A	-0.89%	0.20	-0.02	0.10
S110.A	-0.89%	0.20	-0.02	0.10
S112.A	-0.89%	0.20	-0.02	0.10
S300.A	-0.89%	0.20	-0.02	0.10
S69.A	-0.89%	0.20	-0.02	0.10
S98.A	-0.89%	0.20	-0.02	0.10
S7.A	0.58%	0.21	-0.02	-0.01

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S72.A	-0.97%	0.19	-0.02	0.10
S76.A	1.04%	0.18	-0.02	0.10
S86.A	1.05%	0.18	-0.02	0.10
S87.A	1.05%	0.18	-0.02	0.10
S88.A	1.05%	0.18	-0.02	0.10
S89.A	1.06%	0.18	-0.02	0.10
S93.A	1.06%	0.18	-0.02	0.10
S94.A	1.06%	0.18	-0.02	0.10
S95.A	1.06%	0.18	-0.02	0.10
S91.A	1.06%	0.18	-0.02	0.10
S9r.A	-0.74%	0.19	-0.02	-0.01
S14.A	-0.74%	0.19	-0.02	-0.01
S10.A	-0.74%	0.19	-0.02	-0.01
S11.A	-0.74%	0.19	-0.02	-0.01
S8.A	0.75%	0.19	-0.02	-0.01
S9.A	0.75%	0.19	-0.02	-0.01
S77.A	1.27%	0.16	-0.03	0.10
S250.A	1.00%	0.17	-0.03	-0.01
S49.A	1.00%	0.17	-0.03	-0.01
S37.A	1.00%	0.17	-0.03	-0.01
S19.A	1.00%	0.17	-0.03	-0.01
S135.A	1.00%	0.17	-0.03	-0.01
S18.A	1.00%	0.17	-0.03	-0.01
S21.A	1.00%	0.17	-0.03	-0.01
S36.A	1.00%	0.17	-0.03	-0.01
S30.A	1.00%	0.17	-0.03	-0.01
S42.A	1.00%	0.17	-0.03	-0.01
S13.A	1.00%	0.17	-0.03	-0.01
S29.A	1.00%	0.17	-0.03	-0.01
S47.A	1.00%	0.17	-0.03	-0.01
S48.A	1.00%	0.17	-0.03	-0.01
S44.A	1.00%	0.17	-0.03	-0.01
S151.A	1.00%	0.17	-0.03	-0.01
S152.A	1.00%	0.17	-0.03	-0.01
S20.A	1.00%	0.17	-0.03	-0.01
S23.A	1.00%	0.17	-0.03	-0.01
S25.A	1.00%	0.17	-0.03	-0.01
S28.A	1.00%	0.17	-0.03	-0.01
S300 open.A	1.00%	0.17	-0.03	-0.01
S35.A	1.00%	0.17	-0.03	-0.01
S40.A	1.00%	0.17	-0.03	-0.01
S45.A	1.00%	0.17	-0.03	-0.01

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S46.A	1.00%	0.17	-0.03	-0.01
S51.A	1.00%	0.17	-0.03	-0.01
S50.A	1.00%	0.17	-0.03	-0.01
S78.A	1.32%	0.16	-0.03	0.09
S79.A	1.32%	0.16	-0.03	0.09
S80.A	1.59%	0.13	-0.04	0.09
S52.A	1.33%	0.14	-0.04	-0.02
S81.A	1.69%	0.13	-0.04	0.09
S82.A	1.70%	0.12	-0.04	0.09
S83.A	1.71%	0.12	-0.05	0.09
S53.A	1.50%	0.13	-0.05	-0.02
S56.A	1.60%	0.12	-0.05	-0.02
S54.A	1.60%	0.12	-0.05	-0.02
S94 open.A	1.60%	0.12	-0.05	-0.02
S55.A	1.60%	0.12	-0.05	-0.02
S57.A	1.92%	0.09	-0.06	-0.02
S61.A	2.61%	0.03	-0.08	-0.03
S61s.A	2.61%	0.03	-0.08	-0.03
S160.A	2.61%	0.03	-0.08	-0.03
S60.A	2.61%	0.03	-0.08	-0.03
S62.A	2.66%	0.03	-0.09	-0.03
S63.A	2.70%	0.02	-0.09	-0.03
S64.A	2.78%	0.02	-0.09	-0.04
S65.A	2.88%	0.01	-0.09	-0.04
S66.A	2.96%	0.00	-0.10	-0.04

I.0.3 Considering OLTCs connected without capacitors compensation and meshing the network from the switch between nodes S54A and S94A

Table I.13: Av. normalised covariance values and first two eigenvectors from PCA obtained for Scenario S1

Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S85.C	-4.33%	0.99	0.25	0.01
S84.C	-3.45%	0.84	0.19	0.04
S66.C	-2.86%	0.79	0.18	-0.10
S65.C	-2.86%	0.79	0.18	-0.10

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S64.C	-2.86%	0.79	0.18	-0.10
S61.C	-2.86%	0.79	0.18	-0.10
S61s.C	-2.86%	0.79	0.18	-0.10
S160.C	-2.86%	0.79	0.18	-0.10
S62.C	-2.86%	0.79	0.18	-0.10
S63.C	-2.86%	0.79	0.18	-0.10
S60.C	-2.86%	0.79	0.18	-0.10
S57.C	-2.19%	0.68	0.13	-0.07
S81.C	-2.20%	0.63	0.12	0.08
S82.C	-2.20%	0.63	0.12	0.08
S83.C	-2.20%	0.63	0.12	0.08
S54.C	-1.87%	0.62	0.11	-0.06
S55.C	-1.87%	0.62	0.11	-0.06
S56.C	-1.87%	0.62	0.11	-0.06
S53.C	-1.75%	0.60	0.11	-0.05
S80.C	-2.04%	0.60	0.11	0.09
S52.C	-1.56%	0.57	0.10	-0.05
S78.C	-1.60%	0.52	0.08	0.10
S79.C	-1.60%	0.52	0.08	0.10
S77.C	-1.51%	0.51	0.07	0.10
S135.C	-1.17%	0.50	0.07	-0.04
S152.C	-1.17%	0.50	0.07	-0.04
S18.C	-1.17%	0.50	0.07	-0.04
S50.C	-1.17%	0.50	0.07	-0.04
S51.C	-1.17%	0.50	0.07	-0.04
S250.C	-1.17%	0.50	0.07	-0.04
S29.C	-1.17%	0.50	0.07	-0.04
S30.C	-1.17%	0.50	0.07	-0.04
S16.C	-1.17%	0.50	0.07	-0.04
S17.C	-1.17%	0.50	0.07	-0.04
S24.C	-1.17%	0.50	0.07	-0.04
S35.C	-1.17%	0.50	0.07	-0.04
S42.C	-1.17%	0.50	0.07	-0.04
S47.C	-1.17%	0.50	0.07	-0.04
S48.C	-1.17%	0.50	0.07	-0.04
S49.C	-1.17%	0.50	0.07	-0.04
S28.C	-1.17%	0.50	0.07	-0.04
S15.C	-1.17%	0.50	0.07	-0.04
S34.C	-1.17%	0.50	0.07	-0.04
S40.C	-1.17%	0.50	0.07	-0.04
S41.C	-1.17%	0.50	0.07	-0.04
S151.C	-1.17%	0.50	0.07	-0.04

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S25.C	-1.17%	0.50	0.07	-0.04
S300 open.C	-1.17%	0.50	0.07	-0.04
S13.C	-1.17%	0.50	0.07	-0.04
S21.C	-1.17%	0.50	0.07	-0.04
S23.C	-1.17%	0.50	0.07	-0.04
S44.C	-1.17%	0.50	0.07	-0.04
S8.C	0.88%	0.45	0.05	-0.03
S76.C	-1.14%	0.44	0.05	0.11
S86.C	-1.10%	0.44	0.05	0.11
S87.C	-1.07%	0.43	0.05	0.11
S89.C	-1.05%	0.43	0.05	0.11
S91.C	-1.03%	0.43	0.04	0.11
S92.C	-1.03%	0.43	0.04	0.11
S93.C	-1.02%	0.43	0.04	0.11
S95.C	-1.02%	0.43	0.04	0.11
S7.C	0.68%	0.42	0.04	-0.02
S75.C	-0.97%	0.41	0.04	0.12
S74.C	-0.97%	0.41	0.04	0.12
S73.C	-0.97%	0.41	0.04	0.12
S72.C	-0.97%	0.41	0.04	0.12
S82.B	-0.44%	0.37	0.03	-0.03
S83.B	-0.44%	0.37	0.03	-0.03
S81.B	-0.44%	0.37	0.03	-0.03
S101.C	0.82%	0.37	0.03	0.13
S98.C	0.82%	0.37	0.03	0.13
S103.C	0.82%	0.37	0.03	0.13
S105.C	0.82%	0.37	0.03	0.13
S100.C	0.82%	0.37	0.03	0.13
S67.C	0.82%	0.37	0.03	0.13
S300.C	0.82%	0.37	0.03	0.13
S99.C	0.82%	0.37	0.03	0.13
S197.C	0.82%	0.37	0.03	0.13
S97.C	0.82%	0.37	0.03	0.13
S102.C	0.82%	0.37	0.03	0.13
S108.C	0.82%	0.37	0.03	0.13
S104.C	0.82%	0.37	0.03	0.13
S450.C	0.82%	0.37	0.03	0.13
S80.B	-0.43%	0.37	0.03	-0.03
S3.C	0.39%	0.37	0.02	-0.01
S4.C	0.39%	0.37	0.02	-0.01
S1.C	0.39%	0.37	0.02	-0.01
S5.C	0.39%	0.37	0.02	-0.01

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S6.C	0.39%	0.37	0.02	-0.01
S78.B	-0.40%	0.37	0.02	-0.03
S79.B	-0.40%	0.37	0.02	-0.03
S77.B	-0.39%	0.37	0.02	-0.03
S76.B	-0.36%	0.36	0.02	-0.03
S86.B	-0.37%	0.36	0.02	-0.04
S87.B	-0.37%	0.36	0.02	-0.04
S90.B	-0.38%	0.36	0.02	-0.04
S89.B	-0.38%	0.36	0.02	-0.04
S91.B	-0.38%	0.36	0.02	-0.04
S72.B	-0.34%	0.36	0.02	-0.03
S95.B	-0.38%	0.36	0.02	-0.05
S96.B	-0.38%	0.36	0.02	-0.05
S93.B	-0.38%	0.36	0.02	-0.05
S100.B	-0.31%	0.35	0.02	-0.02
S108.B	-0.31%	0.35	0.02	-0.02
S101.B	-0.31%	0.35	0.02	-0.02
S106.B	-0.31%	0.35	0.02	-0.02
S107.B	-0.31%	0.35	0.02	-0.02
S197.B	-0.31%	0.35	0.02	-0.02
S97.B	-0.31%	0.35	0.02	-0.02
S98.B	-0.31%	0.35	0.02	-0.02
S99.B	-0.31%	0.35	0.02	-0.02
S105.B	-0.31%	0.35	0.02	-0.02
S450.B	-0.31%	0.35	0.02	-0.02
S300.B	-0.31%	0.35	0.02	-0.02
S67.B	-0.31%	0.35	0.02	-0.02
S61.B	0.28%	0.35	0.02	-0.02
S61s.B	0.28%	0.35	0.02	-0.02
S62.B	0.28%	0.35	0.02	-0.02
S160.B	0.28%	0.35	0.02	-0.02
S60.B	0.28%	0.35	0.02	-0.02
S63.B	0.28%	0.35	0.02	-0.02
S64.B	0.28%	0.35	0.02	-0.02
S65.B	0.28%	0.35	0.02	-0.02
S66.B	0.28%	0.35	0.02	-0.02
S160r.B	-0.28%	0.35	0.02	-0.02
S58.B	0.19%	0.33	0.01	-0.01
S59.B	0.19%	0.33	0.01	-0.01
S57.B	0.19%	0.33	0.01	-0.01
S55.B	0.16%	0.33	0.01	-0.01
S56.B	0.16%	0.33	0.01	-0.01

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S54.B	0.16%	0.33	0.01	-0.01
S53.B	0.15%	0.33	0.01	-0.01
S52.B	0.13%	0.32	0.01	0.00
S160r.C	0.81%	0.32	0.01	0.14
S25r.A	-0.43%	0.33	0.01	-0.06
S33.A	-0.43%	0.33	0.01	-0.06
S26.A	-0.43%	0.33	0.01	-0.06
S27.A	-0.43%	0.33	0.01	-0.06
S250.B	0.10%	0.32	0.01	0.00
S30.B	0.10%	0.32	0.01	0.00
S50.B	0.10%	0.32	0.01	0.00
S135.B	0.10%	0.32	0.01	0.00
S151.B	0.10%	0.32	0.01	0.00
S18.B	0.10%	0.32	0.01	0.00
S25.B	0.10%	0.32	0.01	0.00
S300 open.B	0.10%	0.32	0.01	0.00
S35.B	0.10%	0.32	0.01	0.00
S36.B	0.10%	0.32	0.01	0.00
S38.B	0.10%	0.32	0.01	0.00
S39.B	0.10%	0.32	0.01	0.00
S40.B	0.10%	0.32	0.01	0.00
S42.B	0.10%	0.32	0.01	0.00
S43.B	0.10%	0.32	0.01	0.00
S47.B	0.10%	0.32	0.01	0.00
S48.B	0.10%	0.32	0.01	0.00
S51.B	0.10%	0.32	0.01	0.00
S22.B	0.10%	0.32	0.01	0.00
S23.B	0.10%	0.32	0.01	0.00
S21.B	0.10%	0.32	0.01	0.00
S29.B	0.10%	0.32	0.01	0.00
S13.B	0.10%	0.32	0.01	0.00
S152.B	0.10%	0.32	0.01	0.00
S28.B	0.10%	0.32	0.01	0.00
S44.B	0.10%	0.32	0.01	0.00
S49.B	0.10%	0.32	0.01	0.00
S12.B	0.08%	0.31	0.00	0.00
S8.B	0.08%	0.31	0.00	0.00
S7.B	0.06%	0.31	0.00	0.00
S1.B	0.03%	0.31	0.00	0.00
S2.B	0.03%	0.31	0.00	0.00
S149.C	0.00%	0.30	0.00	0.00
S149.A	0.00%	0.30	0.00	0.00

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S149.B	0.00%	0.30	0.00	0.00
S27.C	0.18%	0.28	-0.01	0.03
S31.C	0.18%	0.28	-0.01	0.03
S32.C	0.18%	0.28	-0.01	0.03
S25r.C	0.18%	0.28	-0.01	0.03
S26.C	0.18%	0.28	-0.01	0.03
S1.A	0.16%	0.27	-0.01	0.00
S7.A	0.29%	0.25	-0.02	0.01
S10.A	-0.37%	0.24	-0.02	0.01
S11.A	-0.37%	0.24	-0.02	0.01
S14.A	-0.37%	0.24	-0.02	0.01
S9r.A	-0.37%	0.24	-0.02	0.01
S8.A	0.37%	0.24	-0.02	0.01
S9.A	0.37%	0.24	-0.02	0.01
S19.A	0.50%	0.21	-0.03	0.01
S20.A	0.50%	0.21	-0.03	0.01
S25.A	0.50%	0.21	-0.03	0.01
S50.A	0.50%	0.21	-0.03	0.01
S40.A	0.50%	0.21	-0.03	0.01
S49.A	0.50%	0.21	-0.03	0.01
S152.A	0.50%	0.21	-0.03	0.01
S13.A	0.50%	0.21	-0.03	0.01
S151.A	0.50%	0.21	-0.03	0.01
S23.A	0.50%	0.21	-0.03	0.01
S300 open.A	0.50%	0.21	-0.03	0.01
S35.A	0.50%	0.21	-0.03	0.01
S45.A	0.50%	0.21	-0.03	0.01
S28.A	0.50%	0.21	-0.03	0.01
S46.A	0.50%	0.21	-0.03	0.01
S51.A	0.50%	0.21	-0.03	0.01
S37.A	0.50%	0.21	-0.03	0.01
S135.A	0.50%	0.21	-0.03	0.01
S18.A	0.50%	0.21	-0.03	0.01
S30.A	0.50%	0.21	-0.03	0.01
S36.A	0.50%	0.21	-0.03	0.01
S42.A	0.50%	0.21	-0.03	0.01
S48.A	0.50%	0.21	-0.03	0.01
S29.A	0.50%	0.21	-0.03	0.01
S250.A	0.50%	0.21	-0.03	0.01
S21.A	0.50%	0.21	-0.03	0.01
S47.A	0.50%	0.21	-0.03	0.01
S44.A	0.50%	0.21	-0.03	0.01

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S52.A	0.66%	0.19	-0.04	0.02
S53.A	0.74%	0.17	-0.05	0.02
S54.A	0.79%	0.16	-0.05	0.02
S94.A	0.79%	0.16	-0.05	0.02
S55.A	0.79%	0.16	-0.05	0.02
S56.A	0.79%	0.16	-0.05	0.02
S93.A	0.87%	0.15	-0.05	0.01
S95.A	0.87%	0.15	-0.05	0.01
S91.A	0.92%	0.15	-0.05	0.00
S57.A	0.88%	0.15	-0.05	0.04
S160r.A	-1.08%	0.15	-0.06	-0.12
S89.A	0.97%	0.14	-0.06	-0.01
S87.A	1.02%	0.14	-0.06	-0.02
S88.A	1.02%	0.14	-0.06	-0.02
S101.A	-1.15%	0.13	-0.06	-0.10
S109.A	-1.15%	0.13	-0.06	-0.10
S105.A	-1.15%	0.13	-0.06	-0.10
S110.A	-1.15%	0.13	-0.06	-0.10
S113.A	-1.15%	0.13	-0.06	-0.10
S114.A	-1.15%	0.13	-0.06	-0.10
S68.A	-1.15%	0.13	-0.06	-0.10
S98.A	-1.15%	0.13	-0.06	-0.10
S99.A	-1.15%	0.13	-0.06	-0.10
S300.A	-1.15%	0.13	-0.06	-0.10
S67.A	-1.15%	0.13	-0.06	-0.10
S108.A	-1.15%	0.13	-0.06	-0.10
S197.A	-1.15%	0.13	-0.06	-0.10
S70.A	-1.15%	0.13	-0.06	-0.10
S97.A	-1.15%	0.13	-0.06	-0.10
S71.A	-1.15%	0.13	-0.06	-0.10
S111.A	-1.15%	0.13	-0.06	-0.10
S100.A	-1.15%	0.13	-0.06	-0.10
S112.A	-1.15%	0.13	-0.06	-0.10
S69.A	-1.15%	0.13	-0.06	-0.10
S450.A	-1.15%	0.13	-0.06	-0.10
S86.A	1.12%	0.12	-0.06	-0.04
S160.A	1.14%	0.11	-0.07	0.08
S60.A	1.14%	0.11	-0.07	0.08
S65.A	1.14%	0.11	-0.07	0.08
S64.A	1.14%	0.11	-0.07	0.08
S63.A	1.14%	0.11	-0.07	0.08
S62.A	1.14%	0.11	-0.07	0.08

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S66.A	1.14%	0.11	-0.07	0.08
S61.A	1.14%	0.11	-0.07	0.08
S61s.A	1.14%	0.11	-0.07	0.08
S72.A	1.22%	0.12	-0.07	-0.08
S76.A	1.26%	0.11	-0.07	-0.07
S77.A	1.47%	0.07	-0.08	-0.06
S78.A	1.52%	0.06	-0.09	-0.06
S79.A	1.52%	0.06	-0.09	-0.06
S80.A	1.77%	0.02	-0.10	-0.05
S82.A	1.86%	0.00	-0.11	-0.05
S83.A	1.86%	0.00	-0.11	-0.05
S81.A	1.86%	0.00	-0.11	-0.05

Table I.14: Av. normalised covariance values and first two eigenvectors from PCA obtained for Scenario S2

Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S85.C	4.83%	0.99	0.27	0.02
S84.C	3.99%	0.86	0.22	0.05
S82.C	2.80%	0.68	0.16	0.09
S83.C	2.80%	0.68	0.16	0.09
S81.C	2.80%	0.68	0.16	0.09
S80.C	2.64%	0.66	0.15	0.10
S64.C	2.46%	0.63	0.14	-0.03
S65.C	2.46%	0.63	0.14	-0.03
S66.C	2.46%	0.63	0.14	-0.03
S160.C	2.46%	0.63	0.14	-0.03
S61.C	2.46%	0.63	0.14	-0.03
S61s.C	2.46%	0.63	0.14	-0.03
S62.C	2.46%	0.63	0.14	-0.03
S63.C	2.46%	0.63	0.14	-0.03
S60.C	2.46%	0.63	0.14	-0.03
S78.C	2.22%	0.60	0.13	0.10
S79.C	2.22%	0.60	0.13	0.10
S77.C	2.13%	0.58	0.12	0.10
S57.C	1.87%	0.54	0.10	-0.02
S76.C	1.78%	0.53	0.10	0.11
S86.C	1.74%	0.52	0.10	0.11
S87.C	1.71%	0.52	0.10	0.11
S89.C	1.70%	0.52	0.10	0.11

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S91.C	1.68%	0.52	0.10	0.11
S92.C	1.68%	0.52	0.10	0.11
S95.C	1.67%	0.51	0.10	0.11
S93.C	1.67%	0.51	0.10	0.11
S74.C	1.61%	0.50	0.09	0.11
S73.C	1.61%	0.50	0.09	0.11
S72.C	1.61%	0.50	0.09	0.11
S75.C	1.61%	0.50	0.09	0.11
S54.C	1.59%	0.50	0.09	-0.02
S55.C	1.59%	0.50	0.09	-0.02
S56.C	1.59%	0.50	0.09	-0.02
S53.C	1.49%	0.49	0.08	-0.02
S101.C	-1.38%	0.47	0.08	0.12
S103.C	-1.38%	0.47	0.08	0.12
S98.C	-1.38%	0.47	0.08	0.12
S300.C	-1.38%	0.47	0.08	0.12
S99.C	-1.38%	0.47	0.08	0.12
S450.C	-1.38%	0.47	0.08	0.12
S102.C	-1.38%	0.47	0.08	0.12
S100.C	-1.38%	0.47	0.08	0.12
S104.C	-1.38%	0.47	0.08	0.12
S105.C	-1.38%	0.47	0.08	0.12
S108.C	-1.38%	0.47	0.08	0.12
S197.C	-1.38%	0.47	0.08	0.12
S67.C	-1.38%	0.47	0.08	0.12
S97.C	-1.38%	0.47	0.08	0.12
S52.C	1.32%	0.46	0.07	-0.02
S160r.C	-1.09%	0.43	0.06	0.12
S35.C	0.99%	0.41	0.05	-0.01
S135.C	0.99%	0.41	0.05	-0.01
S18.C	0.99%	0.41	0.05	-0.01
S250.C	0.99%	0.41	0.05	-0.01
S30.C	0.99%	0.41	0.05	-0.01
S42.C	0.99%	0.41	0.05	-0.01
S49.C	0.99%	0.41	0.05	-0.01
S24.C	0.99%	0.41	0.05	-0.01
S41.C	0.99%	0.41	0.05	-0.01
S47.C	0.99%	0.41	0.05	-0.01
S48.C	0.99%	0.41	0.05	-0.01
S152.C	0.99%	0.41	0.05	-0.01
S29.C	0.99%	0.41	0.05	-0.01
S21.C	0.99%	0.41	0.05	-0.01

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S40.C	0.99%	0.41	0.05	-0.01
S44.C	0.99%	0.41	0.05	-0.01
S16.C	0.99%	0.41	0.05	-0.01
S17.C	0.99%	0.41	0.05	-0.01
S151.C	0.99%	0.41	0.05	-0.01
S15.C	0.99%	0.41	0.05	-0.01
S23.C	0.99%	0.41	0.05	-0.01
S28.C	0.99%	0.41	0.05	-0.01
S300 open.C	0.99%	0.41	0.05	-0.01
S34.C	0.99%	0.41	0.05	-0.01
S13.C	0.99%	0.41	0.05	-0.01
S25.C	0.99%	0.41	0.05	-0.01
S50.C	0.99%	0.41	0.05	-0.01
S51.C	0.99%	0.41	0.05	-0.01
S8.C	0.74%	0.37	0.04	-0.01
S81.B	-0.69%	0.36	0.03	-0.11
S82.B	-0.69%	0.36	0.03	-0.11
S83.B	-0.69%	0.36	0.03	-0.11
S7.C	0.58%	0.35	0.03	-0.01
S80.B	-0.67%	0.35	0.03	-0.10
S78.B	-0.60%	0.34	0.03	-0.09
S79.B	-0.60%	0.34	0.03	-0.09
S77.B	-0.58%	0.34	0.03	-0.09
S76.B	-0.53%	0.33	0.02	-0.08
S86.B	-0.51%	0.33	0.02	-0.08
S72.B	-0.49%	0.33	0.02	-0.08
S87.B	-0.49%	0.33	0.02	-0.08
S89.B	-0.49%	0.33	0.02	-0.08
S90.B	-0.49%	0.33	0.02	-0.08
S91.B	-0.48%	0.33	0.02	-0.08
S93.B	-0.47%	0.33	0.02	-0.08
S95.B	-0.47%	0.33	0.02	-0.08
S96.B	-0.47%	0.33	0.02	-0.08
S101.B	-0.45%	0.32	0.02	-0.07
S106.B	-0.45%	0.32	0.02	-0.07
S98.B	-0.45%	0.32	0.02	-0.07
S99.B	-0.45%	0.32	0.02	-0.07
S300.B	-0.45%	0.32	0.02	-0.07
S67.B	-0.45%	0.32	0.02	-0.07
S105.B	-0.45%	0.32	0.02	-0.07
S450.B	-0.45%	0.32	0.02	-0.07
S107.B	-0.45%	0.32	0.02	-0.07

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S108.B	-0.45%	0.32	0.02	-0.07
S197.B	-0.45%	0.32	0.02	-0.07
S97.B	-0.45%	0.32	0.02	-0.07
S100.B	-0.45%	0.32	0.02	-0.07
S62.B	0.41%	0.32	0.02	-0.07
S66.B	0.41%	0.32	0.02	-0.07
S63.B	0.41%	0.32	0.02	-0.07
S160.B	0.41%	0.32	0.02	-0.07
S60.B	0.41%	0.32	0.02	-0.07
S61.B	0.41%	0.32	0.02	-0.07
S61s.B	0.41%	0.32	0.02	-0.07
S64.B	0.41%	0.32	0.02	-0.07
S65.B	0.41%	0.32	0.02	-0.07
S160r.B	-0.41%	0.32	0.02	-0.07
S1.C	0.33%	0.31	0.02	0.00
S5.C	0.33%	0.31	0.02	0.00
S6.C	0.33%	0.31	0.02	0.00
S3.C	0.33%	0.31	0.02	0.00
S4.C	0.33%	0.31	0.02	0.00
S57.B	0.30%	0.30	0.01	-0.05
S58.B	0.30%	0.30	0.01	-0.05
S59.B	0.30%	0.30	0.01	-0.05
S25r.C	-0.34%	0.30	0.01	0.01
S31.C	-0.34%	0.30	0.01	0.01
S32.C	-0.34%	0.30	0.01	0.01
S26.C	-0.34%	0.30	0.01	0.01
S27.C	-0.34%	0.30	0.01	0.01
S54.B	0.25%	0.30	0.01	-0.04
S55.B	0.25%	0.30	0.01	-0.04
S56.B	0.25%	0.30	0.01	-0.04
S53.B	0.23%	0.29	0.01	-0.04
S52.B	0.20%	0.29	0.01	-0.03
S47.B	0.15%	0.28	0.01	-0.03
S48.B	0.15%	0.28	0.01	-0.03
S135.B	0.15%	0.28	0.01	-0.03
S18.B	0.15%	0.28	0.01	-0.03
S40.B	0.15%	0.28	0.01	-0.03
S51.B	0.15%	0.28	0.01	-0.03
S36.B	0.15%	0.28	0.01	-0.03
S250.B	0.15%	0.28	0.01	-0.03
S28.B	0.15%	0.28	0.01	-0.03
S29.B	0.15%	0.28	0.01	-0.03

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S30.B	0.15%	0.28	0.01	-0.03
S13.B	0.15%	0.28	0.01	-0.03
S152.B	0.15%	0.28	0.01	-0.03
S21.B	0.15%	0.28	0.01	-0.03
S22.B	0.15%	0.28	0.01	-0.03
S23.B	0.15%	0.28	0.01	-0.03
S42.B	0.15%	0.28	0.01	-0.03
S44.B	0.15%	0.28	0.01	-0.03
S49.B	0.15%	0.28	0.01	-0.03
S50.B	0.15%	0.28	0.01	-0.03
S25.B	0.15%	0.28	0.01	-0.03
S35.B	0.15%	0.28	0.01	-0.03
S151.B	0.15%	0.28	0.01	-0.03
S300 open.B	0.15%	0.28	0.01	-0.03
S38.B	0.15%	0.28	0.01	-0.03
S39.B	0.15%	0.28	0.01	-0.03
S43.B	0.15%	0.28	0.01	-0.03
S12.B	0.11%	0.28	0.01	-0.02
S8.B	0.11%	0.28	0.01	-0.02
S7.B	0.09%	0.28	0.00	-0.02
S1.B	0.05%	0.27	0.00	-0.01
S2.B	0.05%	0.27	0.00	-0.01
S27.A	0.47%	0.28	0.00	-0.10
S25r.A	0.47%	0.28	0.00	-0.10
S33.A	0.47%	0.28	0.00	-0.10
S26.A	0.47%	0.28	0.00	-0.10
S149.C	0.00%	0.26	0.00	0.00
S149.A	0.00%	0.26	0.00	0.00
S149.B	0.00%	0.26	0.00	0.00
S1.A	0.15%	0.24	-0.01	0.01
S7.A	0.26%	0.22	-0.01	0.02
S9r.A	-0.33%	0.21	-0.02	0.02
S10.A	-0.33%	0.21	-0.02	0.02
S11.A	-0.33%	0.21	-0.02	0.02
S14.A	-0.33%	0.21	-0.02	0.02
S8.A	0.34%	0.21	-0.02	0.02
S9.A	0.34%	0.21	-0.02	0.02
S20.A	0.45%	0.20	-0.02	0.03
S50.A	0.45%	0.20	-0.02	0.03
S40.A	0.45%	0.20	-0.02	0.03
S135.A	0.45%	0.20	-0.02	0.03
S18.A	0.45%	0.20	-0.02	0.03

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S19.A	0.45%	0.20	-0.02	0.03
S250.A	0.45%	0.20	-0.02	0.03
S30.A	0.45%	0.20	-0.02	0.03
S37.A	0.45%	0.20	-0.02	0.03
S49.A	0.45%	0.20	-0.02	0.03
S51.A	0.45%	0.20	-0.02	0.03
S25.A	0.45%	0.20	-0.02	0.03
S44.A	0.45%	0.20	-0.02	0.03
S35.A	0.45%	0.20	-0.02	0.03
S28.A	0.45%	0.20	-0.02	0.03
S13.A	0.45%	0.20	-0.02	0.03
S151.A	0.45%	0.20	-0.02	0.03
S152.A	0.45%	0.20	-0.02	0.03
S21.A	0.45%	0.20	-0.02	0.03
S23.A	0.45%	0.20	-0.02	0.03
S29.A	0.45%	0.20	-0.02	0.03
S300 open.A	0.45%	0.20	-0.02	0.03
S36.A	0.45%	0.20	-0.02	0.03
S42.A	0.45%	0.20	-0.02	0.03
S45.A	0.45%	0.20	-0.02	0.03
S46.A	0.45%	0.20	-0.02	0.03
S47.A	0.45%	0.20	-0.02	0.03
S48.A	0.45%	0.20	-0.02	0.03
S52.A	0.60%	0.17	-0.03	0.04
S53.A	-0.67%	0.16	-0.04	0.04
S54.A	-0.72%	0.16	-0.04	0.04
S94.A	-0.72%	0.16	-0.04	0.04
S55.A	-0.72%	0.16	-0.04	0.04
S56.A	-0.72%	0.16	-0.04	0.04
S57.A	-0.79%	0.14	-0.04	0.05
S93.A	-0.80%	0.14	-0.04	0.05
S95.A	-0.80%	0.14	-0.04	0.05
S91.A	-0.84%	0.14	-0.05	0.05
S89.A	-0.89%	0.13	-0.05	0.05
S87.A	-0.94%	0.12	-0.05	0.06
S88.A	-0.94%	0.12	-0.05	0.06
S160r.A	-0.95%	0.12	-0.05	0.06
S65.A	-0.95%	0.12	-0.05	0.06
S62.A	-0.95%	0.12	-0.05	0.06
S160.A	-0.95%	0.12	-0.05	0.06
S60.A	-0.95%	0.12	-0.05	0.06
S66.A	-0.95%	0.12	-0.05	0.06

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S61.A	-0.95%	0.12	-0.05	0.06
S61s.A	-0.95%	0.12	-0.05	0.06
S64.A	-0.95%	0.12	-0.05	0.06
S63.A	-0.95%	0.12	-0.05	0.06
S86.A	-1.03%	0.11	-0.06	0.06
S101.A	-1.06%	0.10	-0.06	0.06
S67.A	-1.06%	0.10	-0.06	0.06
S70.A	-1.06%	0.10	-0.06	0.06
S71.A	-1.06%	0.10	-0.06	0.06
S108.A	-1.06%	0.10	-0.06	0.06
S197.A	-1.06%	0.10	-0.06	0.06
S97.A	-1.06%	0.10	-0.06	0.06
S113.A	-1.06%	0.10	-0.06	0.06
S450.A	-1.06%	0.10	-0.06	0.06
S68.A	-1.06%	0.10	-0.06	0.06
S111.A	-1.06%	0.10	-0.06	0.06
S100.A	-1.06%	0.10	-0.06	0.06
S105.A	-1.06%	0.10	-0.06	0.06
S109.A	-1.06%	0.10	-0.06	0.06
S110.A	-1.06%	0.10	-0.06	0.06
S112.A	-1.06%	0.10	-0.06	0.06
S114.A	-1.06%	0.10	-0.06	0.06
S300.A	-1.06%	0.10	-0.06	0.06
S69.A	-1.06%	0.10	-0.06	0.06
S98.A	-1.06%	0.10	-0.06	0.06
S99.A	-1.06%	0.10	-0.06	0.06
S72.A	-1.12%	0.09	-0.06	0.07
S76.A	-1.17%	0.09	-0.06	0.07
S77.A	-1.37%	0.06	-0.08	0.08
S79.A	-1.42%	0.05	-0.08	0.08
S78.A	-1.42%	0.05	-0.08	0.08
S80.A	-1.66%	0.01	-0.09	0.10
S82.A	-1.75%	0.00	-0.10	0.10
S83.A	-1.75%	0.00	-0.10	0.10
S81.A	-1.75%	0.00	-0.10	0.10

Table I.15: Av. normalised covariance values and first two eigenvectors from PCA obtained for Scenario S3

Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S66.C	-5.50%	1.00	0.33	0.14
S65.C	-4.93%	0.92	0.30	0.12
S64.C	-4.18%	0.81	0.25	0.11
S63.C	-3.56%	0.73	0.22	0.09
S62.C	-3.25%	0.68	0.20	0.08
S60.C	-2.81%	0.62	0.17	0.07
S160.C	-2.81%	0.62	0.17	0.07
S61.C	-2.81%	0.62	0.17	0.07
S61s.C	-2.81%	0.62	0.17	0.07
S57.C	-2.14%	0.53	0.13	0.05
S56.C	-1.83%	0.48	0.11	0.04
S54.C	-1.83%	0.48	0.11	0.04
S55.C	-1.83%	0.48	0.11	0.04
S53.C	-1.71%	0.47	0.10	0.04
S52.C	-1.52%	0.44	0.09	0.03
S151.C	-1.14%	0.39	0.07	0.03
S25.C	-1.14%	0.39	0.07	0.03
S300 open.C	-1.14%	0.39	0.07	0.03
S44.C	-1.14%	0.39	0.07	0.03
S135.C	-1.14%	0.39	0.07	0.03
S152.C	-1.14%	0.39	0.07	0.03
S18.C	-1.14%	0.39	0.07	0.03
S51.C	-1.14%	0.39	0.07	0.03
S50.C	-1.14%	0.39	0.07	0.03
S42.C	-1.14%	0.39	0.07	0.03
S16.C	-1.14%	0.39	0.07	0.03
S17.C	-1.14%	0.39	0.07	0.03
S24.C	-1.14%	0.39	0.07	0.03
S250.C	-1.14%	0.39	0.07	0.03
S29.C	-1.14%	0.39	0.07	0.03
S30.C	-1.14%	0.39	0.07	0.03
S35.C	-1.14%	0.39	0.07	0.03
S47.C	-1.14%	0.39	0.07	0.03
S48.C	-1.14%	0.39	0.07	0.03
S49.C	-1.14%	0.39	0.07	0.03
S21.C	-1.14%	0.39	0.07	0.03
S40.C	-1.14%	0.39	0.07	0.03
S13.C	-1.14%	0.39	0.07	0.03
S23.C	-1.14%	0.39	0.07	0.03
S28.C	-1.14%	0.39	0.07	0.03

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S34.C	-1.14%	0.39	0.07	0.03
S41.C	-1.14%	0.39	0.07	0.03
S15.C	-1.14%	0.39	0.07	0.03
S8.C	-0.86%	0.35	0.05	0.02
S83.C	0.99%	0.33	0.04	-0.12
S82.C	0.98%	0.33	0.04	-0.12
S81.C	0.98%	0.33	0.04	-0.12
S84.C	0.98%	0.33	0.04	-0.12
S85.C	0.98%	0.33	0.04	-0.12
S80.C	0.98%	0.33	0.04	-0.12
S160r.C	-0.99%	0.33	0.04	-0.13
S79.C	0.97%	0.33	0.04	-0.12
S78.C	0.97%	0.33	0.04	-0.12
S77.C	0.97%	0.33	0.04	-0.12
S102.C	-0.98%	0.33	0.04	-0.12
S450.C	-0.98%	0.33	0.04	-0.12
S104.C	-0.98%	0.33	0.04	-0.12
S197.C	-0.98%	0.33	0.04	-0.12
S97.C	-0.98%	0.33	0.04	-0.12
S108.C	-0.98%	0.33	0.04	-0.12
S105.C	-0.98%	0.33	0.04	-0.12
S67.C	-0.98%	0.33	0.04	-0.12
S100.C	-0.98%	0.33	0.04	-0.12
S103.C	-0.98%	0.33	0.04	-0.12
S300.C	-0.98%	0.33	0.04	-0.12
S101.C	-0.98%	0.33	0.04	-0.12
S98.C	-0.98%	0.33	0.04	-0.12
S99.C	-0.98%	0.33	0.04	-0.12
S72.C	0.97%	0.33	0.04	-0.12
S74.C	0.97%	0.33	0.04	-0.12
S75.C	0.97%	0.33	0.04	-0.12
S73.C	0.97%	0.33	0.04	-0.12
S76.C	0.97%	0.33	0.04	-0.12
S7.C	-0.67%	0.32	0.04	0.01
S86.C	0.94%	0.32	0.04	-0.12
S87.C	0.92%	0.32	0.04	-0.11
S89.C	0.90%	0.32	0.04	-0.11
S92.C	0.89%	0.32	0.04	-0.11
S91.C	0.89%	0.32	0.04	-0.11
S93.C	0.88%	0.32	0.04	-0.11
S95.C	0.88%	0.32	0.04	-0.11
S5.C	-0.38%	0.28	0.02	0.01

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S6.C	-0.38%	0.28	0.02	0.01
S3.C	-0.38%	0.28	0.02	0.01
S4.C	-0.38%	0.28	0.02	0.01
S1.C	-0.38%	0.28	0.02	0.01
S60.B	0.34%	0.28	0.02	0.02
S160.B	0.34%	0.28	0.02	0.02
S61.B	0.34%	0.28	0.02	0.02
S61s.B	0.34%	0.28	0.02	0.02
S83.B	-0.36%	0.28	0.02	0.03
S82.B	-0.36%	0.28	0.02	0.03
S81.B	-0.36%	0.28	0.02	0.03
S80.B	-0.36%	0.28	0.02	0.03
S78.B	-0.36%	0.28	0.02	0.03
S79.B	-0.36%	0.28	0.02	0.03
S77.B	-0.36%	0.28	0.02	0.03
S76.B	-0.36%	0.28	0.02	0.03
S160r.B	-0.34%	0.28	0.02	0.02
S72.B	-0.35%	0.28	0.02	0.03
S300.B	-0.35%	0.28	0.02	0.02
S67.B	-0.35%	0.28	0.02	0.02
S105.B	-0.35%	0.28	0.02	0.02
S450.B	-0.35%	0.28	0.02	0.02
S106.B	-0.35%	0.28	0.02	0.02
S107.B	-0.35%	0.28	0.02	0.02
S108.B	-0.35%	0.28	0.02	0.02
S197.B	-0.35%	0.28	0.02	0.02
S97.B	-0.35%	0.28	0.02	0.02
S100.B	-0.35%	0.28	0.02	0.02
S101.B	-0.35%	0.28	0.02	0.02
S98.B	-0.35%	0.28	0.02	0.02
S99.B	-0.35%	0.28	0.02	0.02
S86.B	-0.37%	0.28	0.02	0.03
S87.B	-0.38%	0.28	0.02	0.04
S90.B	-0.39%	0.28	0.02	0.04
S89.B	-0.39%	0.28	0.02	0.04
S91.B	-0.39%	0.28	0.02	0.04
S93.B	-0.39%	0.27	0.02	0.04
S95.B	-0.39%	0.27	0.02	0.04
S96.B	-0.39%	0.27	0.02	0.04
S62.B	0.27%	0.27	0.02	0.02
S58.B	0.23%	0.26	0.01	0.01
S59.B	0.23%	0.26	0.01	0.01

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S57.B	0.23%	0.26	0.01	0.01
S63.B	0.22%	0.26	0.01	0.02
S54.B	0.18%	0.26	0.01	0.01
S55.B	0.18%	0.26	0.01	0.01
S56.B	0.18%	0.26	0.01	0.01
S53.B	0.17%	0.25	0.01	0.01
S52.B	0.15%	0.25	0.01	0.01
S135.B	-0.11%	0.25	0.01	0.00
S18.B	-0.11%	0.25	0.01	0.00
S51.B	-0.11%	0.25	0.01	0.00
S151.B	-0.11%	0.25	0.01	0.00
S300 open.B	-0.11%	0.25	0.01	0.00
S13.B	-0.11%	0.25	0.01	0.00
S152.B	-0.11%	0.25	0.01	0.00
S28.B	-0.11%	0.25	0.01	0.00
S44.B	-0.11%	0.25	0.01	0.00
S49.B	-0.11%	0.25	0.01	0.00
S39.B	-0.11%	0.25	0.01	0.00
S25.B	-0.11%	0.25	0.01	0.00
S35.B	-0.11%	0.25	0.01	0.00
S43.B	-0.11%	0.25	0.01	0.00
S38.B	-0.11%	0.25	0.01	0.00
S22.B	-0.11%	0.25	0.01	0.00
S23.B	-0.11%	0.25	0.01	0.00
S42.B	-0.11%	0.25	0.01	0.00
S36.B	-0.11%	0.25	0.01	0.00
S21.B	-0.11%	0.25	0.01	0.00
S250.B	-0.11%	0.25	0.01	0.00
S29.B	-0.11%	0.25	0.01	0.00
S30.B	-0.11%	0.25	0.01	0.00
S50.B	-0.11%	0.25	0.01	0.00
S47.B	-0.11%	0.25	0.01	0.00
S48.B	-0.11%	0.25	0.01	0.00
S40.B	-0.11%	0.25	0.01	0.00
S64.B	0.12%	0.24	0.01	0.02
S12.B	-0.09%	0.24	0.01	0.00
S8.B	-0.09%	0.24	0.01	0.00
S25r.A	-0.42%	0.24	0.00	0.08
S27.A	-0.42%	0.24	0.00	0.08
S26.A	-0.42%	0.24	0.00	0.08
S33.A	-0.42%	0.24	0.00	0.08
S7.B	-0.07%	0.24	0.00	0.00

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S2.B	-0.04%	0.24	0.00	0.00
S1.B	-0.04%	0.24	0.00	0.00
S149.C	0.00%	0.23	0.00	0.00
S149.A	0.00%	0.23	0.00	0.00
S149.B	0.00%	0.23	0.00	0.00
S65.B	0.08%	0.22	0.00	0.01
S25r.C	0.20%	0.21	-0.01	-0.03
S31.C	0.20%	0.21	-0.01	-0.03
S32.C	0.20%	0.21	-0.01	-0.03
S27.C	0.20%	0.21	-0.01	-0.03
S26.C	0.20%	0.21	-0.01	-0.03
S66.B	0.16%	0.21	-0.01	0.01
S1.A	-0.17%	0.21	-0.01	0.00
S7.A	-0.30%	0.19	-0.02	-0.01
S14.A	-0.38%	0.18	-0.02	-0.01
S10.A	-0.38%	0.18	-0.02	-0.01
S11.A	-0.38%	0.18	-0.02	-0.01
S9r.A	-0.38%	0.18	-0.02	-0.01
S8.A	0.39%	0.18	-0.02	-0.01
S9.A	0.39%	0.18	-0.02	-0.01
S19.A	0.51%	0.16	-0.03	-0.01
S20.A	0.51%	0.16	-0.03	-0.01
S40.A	0.51%	0.16	-0.03	-0.01
S49.A	0.51%	0.16	-0.03	-0.01
S42.A	0.51%	0.16	-0.03	-0.01
S135.A	0.51%	0.16	-0.03	-0.01
S18.A	0.51%	0.16	-0.03	-0.01
S21.A	0.51%	0.16	-0.03	-0.01
S250.A	0.51%	0.16	-0.03	-0.01
S29.A	0.51%	0.16	-0.03	-0.01
S30.A	0.51%	0.16	-0.03	-0.01
S36.A	0.51%	0.16	-0.03	-0.01
S37.A	0.51%	0.16	-0.03	-0.01
S47.A	0.51%	0.16	-0.03	-0.01
S48.A	0.51%	0.16	-0.03	-0.01
S51.A	0.51%	0.16	-0.03	-0.01
S44.A	0.51%	0.16	-0.03	-0.01
S13.A	0.51%	0.16	-0.03	-0.01
S151.A	0.51%	0.16	-0.03	-0.01
S28.A	0.51%	0.16	-0.03	-0.01
S300 open.A	0.51%	0.16	-0.03	-0.01
S35.A	0.51%	0.16	-0.03	-0.01

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S45.A	0.51%	0.16	-0.03	-0.01
S46.A	0.51%	0.16	-0.03	-0.01
S23.A	0.51%	0.16	-0.03	-0.01
S152.A	0.51%	0.16	-0.03	-0.01
S25.A	0.51%	0.16	-0.03	-0.01
S50.A	0.51%	0.16	-0.03	-0.01
S52.A	0.69%	0.14	-0.04	-0.01
S53.A	0.77%	0.12	-0.05	-0.01
S56.A	0.82%	0.12	-0.05	-0.01
S54.A	0.82%	0.12	-0.05	-0.01
S55.A	0.82%	0.12	-0.05	-0.01
S94.A	0.82%	0.12	-0.05	-0.01
S95.A	0.87%	0.11	-0.05	0.00
S93.A	0.87%	0.11	-0.05	0.00
S91.A	0.90%	0.11	-0.05	0.01
S89.A	0.92%	0.11	-0.05	0.02
S87.A	0.96%	0.10	-0.05	0.03
S88.A	0.96%	0.10	-0.05	0.03
S86.A	1.01%	0.10	-0.06	0.05
S57.A	0.95%	0.10	-0.06	-0.03
S76.A	1.09%	0.09	-0.06	0.08
S77.A	1.10%	0.09	-0.06	0.08
S78.A	1.10%	0.09	-0.06	0.08
S79.A	1.10%	0.09	-0.06	0.08
S72.A	-1.11%	0.09	-0.06	0.08
S80.A	1.11%	0.09	-0.06	0.08
S81.A	1.12%	0.09	-0.06	0.08
S82.A	1.12%	0.09	-0.06	0.08
S101.A	-1.14%	0.09	-0.06	0.09
S450.A	-1.14%	0.09	-0.06	0.09
S68.A	-1.14%	0.09	-0.06	0.09
S71.A	-1.14%	0.09	-0.06	0.09
S67.A	-1.14%	0.09	-0.06	0.09
S108.A	-1.14%	0.09	-0.06	0.09
S70.A	-1.14%	0.09	-0.06	0.09
S113.A	-1.14%	0.09	-0.06	0.09
S99.A	-1.14%	0.09	-0.06	0.09
S105.A	-1.14%	0.09	-0.06	0.09
S114.A	-1.14%	0.09	-0.06	0.09
S111.A	-1.14%	0.09	-0.06	0.09
S109.A	-1.14%	0.09	-0.06	0.09
S110.A	-1.14%	0.09	-0.06	0.09

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S112.A	-1.14%	0.09	-0.06	0.09
S300.A	-1.14%	0.09	-0.06	0.09
S69.A	-1.14%	0.09	-0.06	0.09
S100.A	-1.14%	0.09	-0.06	0.09
S197.A	-1.14%	0.09	-0.06	0.09
S97.A	-1.14%	0.09	-0.06	0.09
S98.A	-1.14%	0.09	-0.06	0.09
S83.A	1.13%	0.09	-0.06	0.08
S160r.A	-1.18%	0.09	-0.06	0.11
S160.A	1.25%	0.06	-0.08	-0.07
S61.A	1.25%	0.06	-0.08	-0.07
S61s.A	1.25%	0.06	-0.08	-0.07
S60.A	1.25%	0.06	-0.08	-0.07
S62.A	1.30%	0.05	-0.08	-0.07
S63.A	1.34%	0.04	-0.08	-0.07
S64.A	1.42%	0.03	-0.09	-0.07
S65.A	1.52%	0.02	-0.09	-0.07
S66.A	1.59%	0.00	-0.10	-0.08

Table I.16: Av. normalised covariance values and first two eigenvectors from PCA obtained for Scenario S4

Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S85.C	-4.62%	0.99	0.23	-0.03
S84.C	-3.74%	0.84	0.19	0.00
S66.C	-2.98%	0.76	0.16	-0.08
S160.C	-2.98%	0.76	0.16	-0.08
S63.C	-2.98%	0.76	0.16	-0.08
S62.C	-2.98%	0.76	0.16	-0.08
S65.C	-2.98%	0.76	0.16	-0.08
S64.C	-2.98%	0.76	0.16	-0.08
S61.C	-2.98%	0.76	0.16	-0.08
S61s.C	-2.98%	0.76	0.16	-0.08
S60.C	-2.98%	0.76	0.16	-0.08
S57.C	-2.30%	0.64	0.13	-0.06
S82.C	-2.52%	0.64	0.12	0.03
S83.C	-2.52%	0.64	0.12	0.03
S81.C	-2.49%	0.63	0.12	0.03
S55.C	-1.98%	0.59	0.11	-0.06
S56.C	-1.98%	0.59	0.11	-0.06

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S54.C	-1.98%	0.59	0.11	-0.06
S80.C	-2.30%	0.60	0.11	0.04
S53.C	-1.85%	0.57	0.10	-0.05
S52.C	-1.65%	0.53	0.09	-0.05
S82.A	-1.77%	0.54	0.09	0.06
S83.A	-1.77%	0.54	0.09	0.06
S66.A	-1.69%	0.50	0.08	-0.11
S61.A	-1.69%	0.50	0.08	-0.11
S61s.A	-1.69%	0.50	0.08	-0.11
S64.A	-1.69%	0.50	0.08	-0.11
S62.A	-1.69%	0.50	0.08	-0.11
S63.A	-1.69%	0.50	0.08	-0.11
S65.A	-1.69%	0.50	0.08	-0.11
S160.A	-1.69%	0.50	0.08	-0.11
S60.A	-1.69%	0.50	0.08	-0.11
S78.C	-1.80%	0.52	0.08	0.05
S79.C	-1.80%	0.52	0.08	0.05
S81.A	-1.55%	0.50	0.08	0.07
S77.C	-1.70%	0.50	0.08	0.06
S80.A	-1.49%	0.49	0.07	0.07
S15.C	-1.23%	0.46	0.07	-0.04
S21.C	-1.23%	0.46	0.07	-0.04
S23.C	-1.23%	0.46	0.07	-0.04
S24.C	-1.23%	0.46	0.07	-0.04
S28.C	-1.23%	0.46	0.07	-0.04
S34.C	-1.23%	0.46	0.07	-0.04
S40.C	-1.23%	0.46	0.07	-0.04
S41.C	-1.23%	0.46	0.07	-0.04
S47.C	-1.23%	0.46	0.07	-0.04
S48.C	-1.23%	0.46	0.07	-0.04
S151.C	-1.23%	0.46	0.07	-0.04
S300 open.C	-1.23%	0.46	0.07	-0.04
S44.C	-1.23%	0.46	0.07	-0.04
S250.C	-1.23%	0.46	0.07	-0.04
S30.C	-1.23%	0.46	0.07	-0.04
S135.C	-1.23%	0.46	0.07	-0.04
S13.C	-1.23%	0.46	0.07	-0.04
S152.C	-1.23%	0.46	0.07	-0.04
S18.C	-1.23%	0.46	0.07	-0.04
S25.C	-1.23%	0.46	0.07	-0.04
S35.C	-1.23%	0.46	0.07	-0.04
S42.C	-1.23%	0.46	0.07	-0.04

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S49.C	-1.23%	0.46	0.07	-0.04
S50.C	-1.23%	0.46	0.07	-0.04
S51.C	-1.23%	0.46	0.07	-0.04
S17.C	-1.23%	0.46	0.07	-0.04
S29.C	-1.23%	0.46	0.07	-0.04
S16.C	-1.23%	0.46	0.07	-0.04
S79.A	-1.31%	0.46	0.06	0.08
S78.A	-1.31%	0.46	0.06	0.08
S57.A	-1.17%	0.45	0.06	-0.06
S77.A	-1.27%	0.46	0.06	0.08
S93.A	1.06%	0.43	0.06	-0.01
S95.A	1.06%	0.43	0.06	-0.01
S91.A	1.06%	0.43	0.06	0.00
S89.A	1.07%	0.43	0.06	0.01
S87.A	1.08%	0.43	0.06	0.02
S88.A	1.08%	0.43	0.06	0.02
S86.A	1.10%	0.43	0.05	0.05
S55.A	0.97%	0.42	0.05	-0.03
S56.A	0.97%	0.42	0.05	-0.03
S54.A	0.97%	0.42	0.05	-0.03
S94.A	0.97%	0.42	0.05	-0.03
S76.A	1.14%	0.43	0.05	0.08
S76.C	-1.27%	0.43	0.05	0.07
S8.C	0.93%	0.41	0.05	-0.03
S53.A	0.91%	0.41	0.05	-0.03
S72.A	1.14%	0.42	0.05	0.10
S86.C	-1.18%	0.41	0.05	0.08
S52.A	0.81%	0.39	0.04	-0.03
S74.C	-1.10%	0.40	0.04	0.07
S72.C	-1.10%	0.40	0.04	0.07
S73.C	-1.10%	0.40	0.04	0.07
S75.C	-1.10%	0.40	0.04	0.07
S87.C	-1.11%	0.40	0.04	0.08
S101.A	1.14%	0.40	0.04	0.11
S105.A	1.14%	0.40	0.04	0.11
S113.A	1.14%	0.40	0.04	0.11
S114.A	1.14%	0.40	0.04	0.11
S450.A	1.14%	0.40	0.04	0.11
S68.A	1.14%	0.40	0.04	0.11
S108.A	1.14%	0.40	0.04	0.11
S67.A	1.14%	0.40	0.04	0.11
S71.A	1.14%	0.40	0.04	0.11

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S70.A	1.14%	0.40	0.04	0.11
S197.A	1.14%	0.40	0.04	0.11
S97.A	1.14%	0.40	0.04	0.11
S111.A	1.14%	0.40	0.04	0.11
S100.A	1.14%	0.40	0.04	0.11
S109.A	1.14%	0.40	0.04	0.11
S112.A	1.14%	0.40	0.04	0.11
S300.A	1.14%	0.40	0.04	0.11
S69.A	1.14%	0.40	0.04	0.11
S98.A	1.14%	0.40	0.04	0.11
S99.A	1.14%	0.40	0.04	0.11
S110.A	1.14%	0.40	0.04	0.11
S89.C	-1.07%	0.39	0.04	0.09
S7.C	0.72%	0.38	0.04	-0.02
S91.C	-1.08%	0.38	0.04	0.09
S92.C	-1.08%	0.38	0.04	0.09
S93.C	1.09%	0.38	0.04	0.09
S95.C	1.09%	0.38	0.04	0.09
S30.A	0.61%	0.36	0.03	-0.02
S36.A	0.61%	0.36	0.03	-0.02
S42.A	0.61%	0.36	0.03	-0.02
S135.A	0.61%	0.36	0.03	-0.02
S18.A	0.61%	0.36	0.03	-0.02
S47.A	0.61%	0.36	0.03	-0.02
S48.A	0.61%	0.36	0.03	-0.02
S152.A	0.61%	0.36	0.03	-0.02
S45.A	0.61%	0.36	0.03	-0.02
S13.A	0.61%	0.36	0.03	-0.02
S23.A	0.61%	0.36	0.03	-0.02
S25.A	0.61%	0.36	0.03	-0.02
S28.A	0.61%	0.36	0.03	-0.02
S35.A	0.61%	0.36	0.03	-0.02
S44.A	0.61%	0.36	0.03	-0.02
S46.A	0.61%	0.36	0.03	-0.02
S51.A	0.61%	0.36	0.03	-0.02
S151.A	0.61%	0.36	0.03	-0.02
S300 open.A	0.61%	0.36	0.03	-0.02
S20.A	0.61%	0.36	0.03	-0.02
S40.A	0.61%	0.36	0.03	-0.02
S50.A	0.61%	0.36	0.03	-0.02
S29.A	0.61%	0.36	0.03	-0.02
S21.A	0.61%	0.36	0.03	-0.02

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S19.A	0.61%	0.36	0.03	-0.02
S37.A	0.61%	0.36	0.03	-0.02
S250.A	0.61%	0.36	0.03	-0.02
S49.A	0.61%	0.36	0.03	-0.02
S160r.A	1.16%	0.38	0.03	0.14
S100.C	0.96%	0.36	0.03	0.08
S102.C	0.96%	0.36	0.03	0.08
S104.C	0.96%	0.36	0.03	0.08
S105.C	0.96%	0.36	0.03	0.08
S108.C	0.96%	0.36	0.03	0.08
S197.C	0.96%	0.36	0.03	0.08
S67.C	0.96%	0.36	0.03	0.08
S97.C	0.96%	0.36	0.03	0.08
S101.C	0.96%	0.36	0.03	0.08
S103.C	0.96%	0.36	0.03	0.08
S300.C	0.96%	0.36	0.03	0.08
S98.C	0.96%	0.36	0.03	0.08
S99.C	0.96%	0.36	0.03	0.08
S450.C	0.96%	0.36	0.03	0.08
S9.A	0.46%	0.33	0.03	-0.02
S8.A	0.46%	0.33	0.03	-0.02
S9r.A	-0.46%	0.33	0.03	-0.02
S10.A	-0.46%	0.33	0.03	-0.02
S11.A	-0.46%	0.33	0.03	-0.02
S14.A	-0.46%	0.33	0.03	-0.02
S3.C	0.41%	0.32	0.02	-0.01
S4.C	0.41%	0.32	0.02	-0.01
S5.C	0.41%	0.32	0.02	-0.01
S1.C	0.41%	0.32	0.02	-0.01
S6.C	0.41%	0.32	0.02	-0.01
S7.A	0.36%	0.32	0.02	-0.01
S160r.C	0.91%	0.30	0.01	0.08
S1.A	0.21%	0.29	0.01	-0.01
S26.A	0.36%	0.27	0.00	0.05
S25r.A	0.36%	0.27	0.00	0.05
S27.A	0.36%	0.27	0.00	0.05
S33.A	0.36%	0.27	0.00	0.05
S149.C	0.00%	0.25	0.00	0.00
S149.A	0.00%	0.25	0.00	0.00
S149.B	0.00%	0.25	0.00	0.00
S25r.C	0.12%	0.25	0.00	0.02
S26.C	0.12%	0.25	0.00	0.02

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S27.C	0.12%	0.25	0.00	0.02
S31.C	0.12%	0.25	0.00	0.02
S32.C	0.12%	0.25	0.00	0.02
S1.B	0.16%	0.23	-0.01	0.01
S2.B	0.16%	0.23	-0.01	0.01
S7.B	0.29%	0.21	-0.02	0.01
S12.B	0.37%	0.19	-0.02	0.01
S8.B	0.37%	0.19	-0.02	0.01
S135.B	0.49%	0.17	-0.03	0.02
S13.B	0.49%	0.17	-0.03	0.02
S152.B	0.49%	0.17	-0.03	0.02
S18.B	0.49%	0.17	-0.03	0.02
S43.B	0.49%	0.17	-0.03	0.02
S47.B	0.49%	0.17	-0.03	0.02
S48.B	0.49%	0.17	-0.03	0.02
S51.B	0.49%	0.17	-0.03	0.02
S25.B	0.49%	0.17	-0.03	0.02
S35.B	0.49%	0.17	-0.03	0.02
S36.B	0.49%	0.17	-0.03	0.02
S38.B	0.49%	0.17	-0.03	0.02
S40.B	0.49%	0.17	-0.03	0.02
S21.B	0.49%	0.17	-0.03	0.02
S29.B	0.49%	0.17	-0.03	0.02
S250.B	0.49%	0.17	-0.03	0.02
S30.B	0.49%	0.17	-0.03	0.02
S22.B	0.49%	0.17	-0.03	0.02
S23.B	0.49%	0.17	-0.03	0.02
S42.B	0.49%	0.17	-0.03	0.02
S50.B	0.49%	0.17	-0.03	0.02
S49.B	0.49%	0.17	-0.03	0.02
S151.B	0.49%	0.17	-0.03	0.02
S28.B	0.49%	0.17	-0.03	0.02
S300 open.B	0.49%	0.17	-0.03	0.02
S39.B	0.49%	0.17	-0.03	0.02
S44.B	0.49%	0.17	-0.03	0.02
S52.B	0.66%	0.14	-0.04	0.02
S95.B	-0.90%	0.12	-0.04	-0.07
S96.B	-0.90%	0.12	-0.04	-0.07
S93.B	-0.90%	0.12	-0.04	-0.07
S53.B	0.74%	0.13	-0.04	0.02
S91.B	-0.93%	0.12	-0.04	-0.07
S89.B	-0.96%	0.11	-0.04	-0.07

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S90.B	-0.96%	0.11	-0.04	-0.07
S54.B	0.79%	0.12	-0.04	0.02
S55.B	0.79%	0.12	-0.04	0.02
S56.B	0.79%	0.12	-0.04	0.02
S87.B	-0.99%	0.10	-0.04	-0.07
S160r.B	-1.09%	0.10	-0.04	-0.09
S57.B	0.84%	0.11	-0.05	0.03
S58.B	0.84%	0.11	-0.05	0.03
S59.B	0.84%	0.11	-0.05	0.03
S86.B	-1.04%	0.10	-0.05	-0.08
S450.B	-1.11%	0.09	-0.05	-0.09
S67.B	-1.11%	0.09	-0.05	-0.09
S105.B	-1.11%	0.09	-0.05	-0.09
S107.B	-1.11%	0.09	-0.05	-0.09
S197.B	-1.11%	0.09	-0.05	-0.09
S97.B	-1.11%	0.09	-0.05	-0.09
S100.B	-1.11%	0.09	-0.05	-0.09
S108.B	-1.11%	0.09	-0.05	-0.09
S101.B	-1.11%	0.09	-0.05	-0.09
S98.B	-1.11%	0.09	-0.05	-0.09
S300.B	-1.11%	0.09	-0.05	-0.09
S106.B	-1.11%	0.09	-0.05	-0.09
S99.B	-1.11%	0.09	-0.05	-0.09
S72.B	-1.12%	0.09	-0.05	-0.08
S76.B	-1.12%	0.08	-0.05	-0.08
S160.B	0.93%	0.10	-0.05	0.04
S60.B	0.93%	0.10	-0.05	0.04
S61.B	0.93%	0.10	-0.05	0.04
S61s.B	0.93%	0.10	-0.05	0.04
S66.B	0.93%	0.10	-0.05	0.04
S62.B	0.93%	0.10	-0.05	0.04
S63.B	0.93%	0.10	-0.05	0.04
S64.B	0.93%	0.10	-0.05	0.04
S65.B	0.93%	0.10	-0.05	0.04
S77.B	-1.19%	0.06	-0.06	-0.08
S78.B	-1.21%	0.06	-0.06	-0.08
S79.B	-1.21%	0.06	-0.06	-0.08
S80.B	1.33%	0.03	-0.07	-0.07
S81.B	1.38%	0.02	-0.07	-0.07
S82.B	1.47%	0.01	-0.08	-0.07
S83.B	1.47%	0.01	-0.08	-0.07

Table I.17: Av. normalised covariance values and first two eigenvectors from PCA obtained for Scenario S5

Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S48.A	0.69%	0.95	0.11	-0.07
S10.A	-0.82%	0.85	0.11	0.16
S11.A	-0.82%	0.85	0.11	0.16
S14.A	-0.82%	0.85	0.11	0.16
S9r.A	-0.82%	0.85	0.11	0.16
S49.A	0.66%	0.91	0.11	-0.07
S47.A	0.66%	0.91	0.11	-0.07
S151.A	0.66%	0.91	0.11	-0.07
S300 open.A	0.66%	0.91	0.11	-0.07
S51.A	0.66%	0.91	0.11	-0.07
S50.A	0.66%	0.91	0.11	-0.07
S48.C	0.64%	0.87	0.10	-0.07
S49.C	0.61%	0.84	0.10	-0.07
S50.C	0.61%	0.84	0.10	-0.07
S47.C	0.61%	0.84	0.10	-0.07
S151.C	0.61%	0.84	0.10	-0.07
S300 open.C	0.61%	0.84	0.10	-0.07
S51.C	0.61%	0.84	0.10	-0.07
S160r.A	-0.73%	0.79	0.10	0.11
S45.A	0.61%	0.84	0.10	-0.06
S46.A	0.61%	0.84	0.10	-0.06
S44.A	0.61%	0.84	0.10	-0.06
S48.B	0.59%	0.81	0.10	-0.06
S100.A	-0.68%	0.75	0.09	0.09
S111.A	-0.68%	0.75	0.09	0.09
S112.A	-0.68%	0.75	0.09	0.09
S69.A	-0.68%	0.75	0.09	0.09
S450.A	-0.68%	0.75	0.09	0.09
S108.A	-0.68%	0.75	0.09	0.09
S101.A	-0.68%	0.75	0.09	0.09
S113.A	-0.68%	0.75	0.09	0.09
S70.A	-0.68%	0.75	0.09	0.09
S71.A	-0.68%	0.75	0.09	0.09
S67.A	-0.68%	0.75	0.09	0.09
S197.A	-0.68%	0.75	0.09	0.09
S97.A	-0.68%	0.75	0.09	0.09
S105.A	-0.68%	0.75	0.09	0.09
S109.A	-0.68%	0.75	0.09	0.09
S110.A	-0.68%	0.75	0.09	0.09
S114.A	-0.68%	0.75	0.09	0.09

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S68.A	-0.68%	0.75	0.09	0.09
S98.A	-0.68%	0.75	0.09	0.09
S99.A	-0.68%	0.75	0.09	0.09
S300.A	-0.68%	0.75	0.09	0.09
S44.C	0.57%	0.78	0.09	-0.06
S42.A	0.57%	0.78	0.09	-0.06
S151.B	0.56%	0.77	0.09	-0.06
S300 open.B	0.56%	0.77	0.09	-0.06
S47.B	0.56%	0.77	0.09	-0.06
S51.B	0.56%	0.77	0.09	-0.06
S49.B	0.56%	0.77	0.09	-0.06
S50.B	0.56%	0.77	0.09	-0.06
S72.A	-0.64%	0.71	0.09	0.08
S42.C	0.53%	0.73	0.09	-0.06
S81.A	-0.61%	0.68	0.09	0.07
S80.A	-0.61%	0.68	0.09	0.07
S82.A	-0.61%	0.68	0.09	0.07
S76.A	-0.61%	0.68	0.09	0.07
S77.A	-0.61%	0.68	0.09	0.07
S78.A	-0.61%	0.68	0.09	0.07
S79.A	-0.61%	0.68	0.09	0.07
S83.A	-0.61%	0.68	0.09	0.07
S44.B	0.52%	0.71	0.09	-0.06
S40.A	0.52%	0.71	0.08	-0.05
S41.C	0.49%	0.67	0.08	-0.05
S40.C	0.49%	0.67	0.08	-0.05
S42.B	0.49%	0.67	0.08	-0.05
S43.B	0.49%	0.67	0.08	-0.05
S36.A	0.46%	0.63	0.08	-0.05
S37.A	0.46%	0.63	0.08	-0.05
S35.A	0.46%	0.63	0.08	-0.05
S40.B	0.45%	0.62	0.07	-0.05
S35.C	0.45%	0.61	0.07	-0.05
S86.A	-0.50%	0.58	0.07	0.04
S39.B	0.41%	0.56	0.07	-0.04
S36.B	0.41%	0.56	0.07	-0.04
S38.B	0.41%	0.56	0.07	-0.04
S35.B	0.41%	0.56	0.07	-0.04
S88.A	0.44%	0.52	0.06	0.02
S87.A	0.44%	0.52	0.06	0.02
S135.C	0.39%	0.54	0.06	-0.04
S18.C	0.39%	0.54	0.06	-0.04

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S25.C	0.39%	0.54	0.06	-0.04
S21.C	0.39%	0.54	0.06	-0.04
S23.C	0.39%	0.54	0.06	-0.04
S28.C	0.39%	0.54	0.06	-0.04
S250.C	0.39%	0.54	0.06	-0.04
S30.C	0.39%	0.54	0.06	-0.04
S24.C	0.39%	0.54	0.06	-0.04
S29.C	0.39%	0.54	0.06	-0.04
S135.A	0.39%	0.53	0.06	-0.04
S29.A	0.39%	0.53	0.06	-0.04
S23.A	0.39%	0.53	0.06	-0.04
S28.A	0.39%	0.53	0.06	-0.04
S18.A	0.39%	0.53	0.06	-0.04
S19.A	0.39%	0.53	0.06	-0.04
S20.A	0.39%	0.53	0.06	-0.04
S250.A	0.39%	0.53	0.06	-0.04
S25.A	0.39%	0.53	0.06	-0.04
S30.A	0.39%	0.53	0.06	-0.04
S21.A	0.39%	0.53	0.06	-0.04
S89.A	0.39%	0.48	0.06	0.01
S135.B	0.33%	0.46	0.06	-0.04
S22.B	0.33%	0.46	0.06	-0.04
S23.B	0.33%	0.46	0.06	-0.04
S250.B	0.33%	0.46	0.06	-0.04
S30.B	0.33%	0.46	0.06	-0.04
S21.B	0.33%	0.46	0.06	-0.04
S29.B	0.33%	0.46	0.06	-0.04
S28.B	0.33%	0.46	0.06	-0.04
S25.B	0.33%	0.46	0.06	-0.04
S18.B	0.33%	0.46	0.06	-0.04
S91.A	0.36%	0.45	0.06	0.00
S93.A	0.33%	0.42	0.05	-0.01
S95.A	0.33%	0.42	0.05	-0.01
S93.C	-0.30%	0.38	0.05	0.00
S95.C	-0.30%	0.38	0.05	0.00
S91.C	-0.30%	0.38	0.05	0.00
S92.C	-0.30%	0.38	0.05	0.00
S89.C	-0.29%	0.37	0.04	0.00
S93.B	-0.30%	0.36	0.04	0.01
S95.B	-0.30%	0.36	0.04	0.01
S96.B	-0.30%	0.36	0.04	0.01
S87.C	-0.29%	0.36	0.04	0.00

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S91.B	-0.29%	0.36	0.04	0.01
S56.A	0.26%	0.36	0.04	-0.02
S55.A	0.26%	0.36	0.04	-0.02
S54.A	0.26%	0.36	0.04	-0.02
S94.A	0.26%	0.36	0.04	-0.02
S53.A	0.26%	0.36	0.04	-0.02
S52.A	0.26%	0.36	0.04	-0.03
S89.B	-0.28%	0.35	0.04	0.01
S90.B	-0.28%	0.35	0.04	0.01
S86.C	-0.27%	0.35	0.04	-0.01
S13.A	0.26%	0.36	0.04	-0.03
S152.A	0.26%	0.36	0.04	-0.03
S87.B	-0.28%	0.34	0.04	0.00
S76.C	-0.26%	0.34	0.04	-0.01
S78.C	-0.26%	0.34	0.04	-0.01
S79.C	-0.26%	0.34	0.04	-0.01
S82.C	-0.26%	0.34	0.04	-0.01
S83.C	-0.26%	0.34	0.04	-0.01
S85.C	-0.26%	0.34	0.04	-0.01
S77.C	-0.26%	0.34	0.04	-0.01
S81.C	-0.26%	0.34	0.04	-0.01
S84.C	-0.26%	0.34	0.04	-0.01
S80.C	-0.26%	0.34	0.04	-0.01
S86.B	-0.26%	0.33	0.04	0.00
S72.C	-0.25%	0.33	0.04	-0.01
S74.C	-0.25%	0.33	0.04	-0.01
S75.C	-0.25%	0.33	0.04	-0.01
S73.C	-0.25%	0.33	0.04	-0.01
S67.C	-0.25%	0.33	0.04	-0.01
S100.C	-0.25%	0.33	0.04	-0.01
S101.C	-0.25%	0.33	0.04	-0.01
S98.C	-0.25%	0.33	0.04	-0.01
S103.C	-0.25%	0.33	0.04	-0.01
S300.C	-0.25%	0.33	0.04	-0.01
S99.C	-0.25%	0.33	0.04	-0.01
S105.C	-0.25%	0.33	0.04	-0.01
S102.C	-0.25%	0.33	0.04	-0.01
S104.C	-0.25%	0.33	0.04	-0.01
S450.C	-0.25%	0.33	0.04	-0.01
S197.C	-0.25%	0.33	0.04	-0.01
S97.C	-0.25%	0.33	0.04	-0.01
S108.C	-0.25%	0.33	0.04	-0.01

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigenvector weights	Second eigenvector weights
S63.C	0.24%	0.32	0.04	-0.02
S160.C	0.24%	0.32	0.04	-0.02
S60.C	0.24%	0.32	0.04	-0.02
S62.C	0.24%	0.32	0.04	-0.02
S65.C	0.24%	0.32	0.04	-0.02
S66.C	0.24%	0.32	0.04	-0.02
S61.C	0.24%	0.32	0.04	-0.02
S61s.C	0.24%	0.32	0.04	-0.02
S64.C	0.24%	0.32	0.04	-0.02
S160r.C	-0.24%	0.32	0.04	-0.02
S78.B	-0.24%	0.31	0.04	-0.01
S79.B	-0.24%	0.31	0.04	-0.01
S76.B	-0.24%	0.31	0.04	-0.01
S80.B	-0.24%	0.31	0.04	-0.01
S81.B	-0.24%	0.31	0.04	-0.01
S82.B	-0.24%	0.31	0.04	-0.01
S83.B	-0.24%	0.31	0.04	-0.01
S77.B	-0.24%	0.31	0.04	-0.01
S72.B	-0.24%	0.31	0.04	-0.01
S57.A	0.24%	0.32	0.04	-0.04
S57.C	0.22%	0.31	0.04	-0.02
S101.B	-0.23%	0.30	0.04	-0.01
S105.B	-0.23%	0.30	0.04	-0.01
S106.B	-0.23%	0.30	0.04	-0.01
S300.B	-0.23%	0.30	0.04	-0.01
S450.B	-0.23%	0.30	0.04	-0.01
S67.B	-0.23%	0.30	0.04	-0.01
S98.B	-0.23%	0.30	0.04	-0.01
S99.B	-0.23%	0.30	0.04	-0.01
S108.B	-0.23%	0.30	0.04	-0.01
S107.B	-0.23%	0.30	0.04	-0.01
S197.B	-0.23%	0.30	0.04	-0.01
S97.B	-0.23%	0.30	0.04	-0.01
S100.B	-0.23%	0.30	0.04	-0.01
S15.C	0.21%	0.30	0.04	-0.02
S16.C	0.21%	0.30	0.04	-0.02
S17.C	0.21%	0.30	0.04	-0.02
S34.C	0.21%	0.30	0.04	-0.02
S13.C	0.21%	0.30	0.04	-0.02
S152.C	0.21%	0.30	0.04	-0.02
S52.C	0.21%	0.30	0.04	-0.02
S53.C	0.21%	0.30	0.04	-0.02

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S54.C	0.21%	0.30	0.04	-0.02
S55.C	0.21%	0.30	0.04	-0.02
S56.C	0.21%	0.30	0.04	-0.02
S65.B	0.22%	0.29	0.03	-0.01
S64.B	0.22%	0.29	0.03	-0.01
S160.B	0.22%	0.29	0.03	-0.01
S60.B	0.22%	0.29	0.03	-0.01
S63.B	0.22%	0.29	0.03	-0.01
S66.B	0.22%	0.29	0.03	-0.01
S61.B	0.22%	0.29	0.03	-0.01
S61s.B	0.22%	0.29	0.03	-0.01
S62.B	0.22%	0.29	0.03	-0.01
S160r.B	-0.22%	0.29	0.03	-0.01
S58.B	0.20%	0.27	0.03	-0.02
S59.B	0.20%	0.27	0.03	-0.02
S57.B	0.20%	0.27	0.03	-0.02
S8.A	0.20%	0.27	0.03	-0.02
S9.A	0.20%	0.27	0.03	-0.02
S13.B	0.19%	0.26	0.03	-0.02
S152.B	0.19%	0.26	0.03	-0.02
S52.B	0.19%	0.26	0.03	-0.02
S53.B	0.19%	0.26	0.03	-0.02
S55.B	0.19%	0.26	0.03	-0.02
S56.B	0.19%	0.26	0.03	-0.02
S54.B	0.19%	0.26	0.03	-0.02
S25r.C	-0.65%	0.20	0.03	0.21
S31.C	-0.65%	0.20	0.03	0.21
S32.C	-0.65%	0.20	0.03	0.21
S26.C	-0.65%	0.20	0.03	0.21
S27.C	-0.65%	0.20	0.03	0.21
S25r.A	-0.66%	0.20	0.03	0.21
S33.A	-0.66%	0.20	0.03	0.21
S27.A	-0.66%	0.20	0.03	0.21
S26.A	-0.66%	0.20	0.03	0.21
S8.C	0.16%	0.23	0.03	-0.02
S7.A	0.15%	0.21	0.02	-0.01
S65.A	0.24%	0.22	0.02	-0.07
S60.A	0.24%	0.22	0.02	-0.07
S61.A	0.24%	0.22	0.02	-0.07
S61s.A	0.24%	0.22	0.02	-0.07
S62.A	0.24%	0.22	0.02	-0.07
S63.A	0.24%	0.22	0.02	-0.07

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S66.A	0.24%	0.22	0.02	-0.07
S160.A	0.24%	0.22	0.02	-0.07
S64.A	0.24%	0.22	0.02	-0.07
S12.B	0.14%	0.20	0.02	-0.02
S8.B	0.14%	0.20	0.02	-0.02
S7.C	0.12%	0.18	0.02	-0.01
S7.B	0.11%	0.16	0.02	-0.01
S1.A	0.09%	0.13	0.01	-0.01
S1.C	0.07%	0.11	0.01	-0.01
S3.C	0.07%	0.11	0.01	-0.01
S4.C	0.07%	0.11	0.01	-0.01
S5.C	0.07%	0.11	0.01	-0.01
S6.C	0.07%	0.11	0.01	-0.01
S1.B	0.06%	0.09	0.01	-0.01
S2.B	0.06%	0.09	0.01	-0.01
S149.A	0.00%	0.01	0.00	0.00
S149.B	0.00%	0.01	0.00	0.00
S149.C	0.00%	0.01	0.00	0.00

Table I.18: Av. normalised covariance values and first two eigenvectors from PCA obtained for Scenario S6

Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S66.C	-8.35%	0.99	0.28	-0.07
S65.C	-7.80%	0.95	0.26	-0.07
S64.C	-7.08%	0.88	0.24	-0.06
S63.C	-6.48%	0.83	0.22	-0.05
S62.C	-6.18%	0.81	0.21	-0.05
S160.C	-5.76%	0.77	0.20	-0.05
S61.C	-5.76%	0.77	0.20	-0.05
S61s.C	-5.76%	0.77	0.20	-0.05
S60.C	-5.76%	0.77	0.20	-0.05
S57.C	-4.38%	0.65	0.15	-0.03
S85.C	-4.35%	0.63	0.13	0.11
S54.C	-3.73%	0.59	0.13	-0.02
S55.C	-3.73%	0.59	0.13	-0.02
S56.C	-3.73%	0.59	0.13	-0.02
S53.C	-3.49%	0.57	0.12	-0.02
S52.C	-3.11%	0.54	0.11	-0.02
S84.C	-3.48%	0.55	0.10	0.11

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S152.C	-2.34%	0.47	0.08	-0.02
S47.C	-2.34%	0.47	0.08	-0.02
S48.C	-2.34%	0.47	0.08	-0.02
S40.C	-2.34%	0.47	0.08	-0.02
S41.C	-2.34%	0.47	0.08	-0.02
S28.C	-2.34%	0.47	0.08	-0.02
S151.C	-2.34%	0.47	0.08	-0.02
S300 open.C	-2.34%	0.47	0.08	-0.02
S13.C	-2.34%	0.47	0.08	-0.02
S135.C	-2.34%	0.47	0.08	-0.02
S18.C	-2.34%	0.47	0.08	-0.02
S25.C	-2.34%	0.47	0.08	-0.02
S50.C	-2.34%	0.47	0.08	-0.02
S51.C	-2.34%	0.47	0.08	-0.02
S44.C	-2.34%	0.47	0.08	-0.02
S250.C	-2.34%	0.47	0.08	-0.02
S29.C	-2.34%	0.47	0.08	-0.02
S30.C	-2.34%	0.47	0.08	-0.02
S15.C	-2.34%	0.47	0.08	-0.02
S16.C	-2.34%	0.47	0.08	-0.02
S17.C	-2.34%	0.47	0.08	-0.02
S24.C	-2.34%	0.47	0.08	-0.02
S35.C	-2.34%	0.47	0.08	-0.02
S49.C	-2.34%	0.47	0.08	-0.02
S42.C	-2.34%	0.47	0.08	-0.02
S21.C	-2.34%	0.47	0.08	-0.02
S23.C	-2.34%	0.47	0.08	-0.02
S34.C	-2.34%	0.47	0.08	-0.02
S82.C	-2.23%	0.44	0.06	0.12
S83.C	-2.23%	0.44	0.06	0.12
S81.C	-2.23%	0.44	0.06	0.12
S8.C	-1.76%	0.42	0.06	-0.01
S80.C	-2.06%	0.43	0.06	0.12
S7.C	-1.37%	0.38	0.05	-0.01
S78.C	-1.63%	0.39	0.04	0.12
S79.C	-1.63%	0.39	0.04	0.12
S77.C	-1.56%	0.38	0.04	0.13
S76.C	-1.35%	0.35	0.03	0.13
S6.C	0.78%	0.33	0.03	-0.01
S5.C	0.78%	0.33	0.03	-0.01
S3.C	0.78%	0.33	0.03	-0.01
S4.C	0.78%	0.33	0.03	-0.01

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S1.C	0.78%	0.33	0.03	-0.01
S86.C	-1.31%	0.35	0.03	0.12
S93.B	-0.86%	0.33	0.03	-0.04
S95.B	-0.86%	0.33	0.03	-0.04
S96.B	-0.86%	0.33	0.03	-0.04
S87.C	-1.28%	0.35	0.03	0.12
S89.C	-1.26%	0.35	0.03	0.12
S91.B	-0.84%	0.32	0.03	-0.04
S91.C	-1.25%	0.35	0.03	0.12
S92.C	-1.25%	0.35	0.03	0.12
S89.B	-0.82%	0.32	0.02	-0.04
S90.B	-0.82%	0.32	0.02	-0.04
S93.C	-1.24%	0.34	0.02	0.12
S95.C	-1.24%	0.34	0.02	0.12
S87.B	-0.79%	0.32	0.02	-0.03
S82.B	-0.74%	0.32	0.02	-0.03
S83.B	-0.74%	0.32	0.02	-0.03
S81.B	-0.74%	0.32	0.02	-0.03
S80.B	-0.73%	0.32	0.02	-0.03
S86.B	-0.75%	0.32	0.02	-0.03
S78.B	-0.71%	0.32	0.02	-0.03
S79.B	-0.71%	0.32	0.02	-0.03
S77.B	-0.71%	0.32	0.02	-0.03
S76.B	-0.69%	0.32	0.02	-0.03
S72.B	-0.65%	0.32	0.02	-0.02
S73.C	-1.25%	0.34	0.02	0.13
S72.C	-1.25%	0.34	0.02	0.13
S75.C	-1.25%	0.34	0.02	0.13
S74.C	-1.25%	0.34	0.02	0.13
S101.B	-0.60%	0.31	0.02	-0.02
S106.B	-0.60%	0.31	0.02	-0.02
S300.B	-0.60%	0.31	0.02	-0.02
S98.B	-0.60%	0.31	0.02	-0.02
S99.B	-0.60%	0.31	0.02	-0.02
S107.B	-0.60%	0.31	0.02	-0.02
S197.B	-0.60%	0.31	0.02	-0.02
S97.B	-0.60%	0.31	0.02	-0.02
S100.B	-0.60%	0.31	0.02	-0.02
S108.B	-0.60%	0.31	0.02	-0.02
S105.B	-0.60%	0.31	0.02	-0.02
S450.B	-0.60%	0.31	0.02	-0.02
S67.B	-0.60%	0.31	0.02	-0.02

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S160.B	0.56%	0.31	0.02	-0.02
S60.B	0.56%	0.31	0.02	-0.02
S61.B	0.56%	0.31	0.02	-0.02
S61s.B	0.56%	0.31	0.02	-0.02
S160r.B	-0.56%	0.31	0.02	-0.02
S62.B	0.48%	0.30	0.02	-0.02
S63.B	0.43%	0.30	0.01	-0.02
S102.C	1.12%	0.32	0.01	0.13
S450.C	1.12%	0.32	0.01	0.13
S104.C	1.12%	0.32	0.01	0.13
S197.C	1.12%	0.32	0.01	0.13
S97.C	1.12%	0.32	0.01	0.13
S101.C	1.12%	0.32	0.01	0.13
S105.C	1.12%	0.32	0.01	0.13
S108.C	1.12%	0.32	0.01	0.13
S67.C	1.12%	0.32	0.01	0.13
S100.C	1.12%	0.32	0.01	0.13
S103.C	1.12%	0.32	0.01	0.13
S300.C	1.12%	0.32	0.01	0.13
S98.C	1.12%	0.32	0.01	0.13
S99.C	1.12%	0.32	0.01	0.13
S33.A	-0.41%	0.29	0.01	-0.02
S25r.A	-0.41%	0.29	0.01	-0.02
S27.A	-0.41%	0.29	0.01	-0.02
S26.A	-0.41%	0.29	0.01	-0.02
S57.B	0.36%	0.29	0.01	-0.01
S58.B	0.36%	0.29	0.01	-0.01
S59.B	0.36%	0.29	0.01	-0.01
S64.B	0.32%	0.29	0.01	-0.02
S54.B	0.27%	0.29	0.01	0.00
S55.B	0.27%	0.29	0.01	0.00
S56.B	0.27%	0.29	0.01	0.00
S53.B	0.25%	0.29	0.01	0.00
S52.B	0.23%	0.28	0.01	0.00
S13.B	0.17%	0.28	0.01	0.00
S151.B	0.17%	0.28	0.01	0.00
S152.B	0.17%	0.28	0.01	0.00
S21.B	0.17%	0.28	0.01	0.00
S28.B	0.17%	0.28	0.01	0.00
S29.B	0.17%	0.28	0.01	0.00
S300 open.B	0.17%	0.28	0.01	0.00
S39.B	0.17%	0.28	0.01	0.00

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S44.B	0.17%	0.28	0.01	0.00
S49.B	0.17%	0.28	0.01	0.00
S135.B	0.17%	0.28	0.01	0.00
S18.B	0.17%	0.28	0.01	0.00
S36.B	0.17%	0.28	0.01	0.00
S40.B	0.17%	0.28	0.01	0.00
S47.B	0.17%	0.28	0.01	0.00
S48.B	0.17%	0.28	0.01	0.00
S51.B	0.17%	0.28	0.01	0.00
S25.B	0.17%	0.28	0.01	0.00
S35.B	0.17%	0.28	0.01	0.00
S38.B	0.17%	0.28	0.01	0.00
S43.B	0.17%	0.28	0.01	0.00
S22.B	0.17%	0.28	0.01	0.00
S23.B	0.17%	0.28	0.01	0.00
S250.B	0.17%	0.28	0.01	0.00
S30.B	0.17%	0.28	0.01	0.00
S42.B	0.17%	0.28	0.01	0.00
S50.B	0.17%	0.28	0.01	0.00
S65.B	0.19%	0.28	0.01	-0.01
S12.B	0.13%	0.27	0.00	0.00
S8.B	0.13%	0.27	0.00	0.00
S7.B	0.10%	0.27	0.00	0.00
S160r.C	0.97%	0.29	0.00	0.14
S1.B	0.06%	0.27	0.00	0.00
S2.B	0.06%	0.27	0.00	0.00
S66.B	0.10%	0.27	0.00	-0.01
S149.C	0.00%	0.26	0.00	0.00
S149.A	0.00%	0.26	0.00	0.00
S149.B	0.00%	0.26	0.00	0.00
S25r.C	0.32%	0.25	-0.01	0.03
S26.C	0.32%	0.25	-0.01	0.03
S27.C	0.32%	0.25	-0.01	0.03
S31.C	0.32%	0.25	-0.01	0.03
S32.C	0.32%	0.25	-0.01	0.03
S1.A	0.32%	0.24	-0.01	0.00
S7.A	0.56%	0.22	-0.02	0.00
S10.A	-0.71%	0.20	-0.02	0.00
S11.A	-0.71%	0.20	-0.02	0.00
S14.A	-0.71%	0.20	-0.02	0.00
S9r.A	-0.71%	0.20	-0.02	0.00
S160r.A	-1.19%	0.18	-0.02	-0.12

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S8.A	0.72%	0.20	-0.02	0.00
S9.A	0.72%	0.20	-0.02	0.00
S70.A	1.34%	0.17	-0.03	-0.10
S67.A	1.34%	0.17	-0.03	-0.10
S112.A	1.34%	0.17	-0.03	-0.10
S110.A	1.34%	0.17	-0.03	-0.10
S109.A	1.34%	0.17	-0.03	-0.10
S111.A	1.34%	0.17	-0.03	-0.10
S197.A	1.34%	0.17	-0.03	-0.10
S300.A	1.34%	0.17	-0.03	-0.10
S69.A	1.34%	0.17	-0.03	-0.10
S97.A	1.34%	0.17	-0.03	-0.10
S98.A	1.34%	0.17	-0.03	-0.10
S100.A	1.34%	0.17	-0.03	-0.10
S108.A	1.34%	0.17	-0.03	-0.10
S114.A	1.34%	0.17	-0.03	-0.10
S105.A	1.34%	0.17	-0.03	-0.10
S113.A	1.34%	0.17	-0.03	-0.10
S68.A	1.34%	0.17	-0.03	-0.10
S99.A	1.34%	0.17	-0.03	-0.10
S101.A	1.34%	0.17	-0.03	-0.10
S450.A	1.34%	0.17	-0.03	-0.10
S71.A	1.34%	0.17	-0.03	-0.10
S25.A	0.96%	0.18	-0.03	0.01
S50.A	0.96%	0.18	-0.03	0.01
S19.A	0.96%	0.18	-0.03	0.01
S40.A	0.96%	0.18	-0.03	0.01
S49.A	0.96%	0.18	-0.03	0.01
S20.A	0.96%	0.18	-0.03	0.01
S35.A	0.96%	0.18	-0.03	0.01
S13.A	0.96%	0.18	-0.03	0.01
S151.A	0.96%	0.18	-0.03	0.01
S152.A	0.96%	0.18	-0.03	0.01
S21.A	0.96%	0.18	-0.03	0.01
S23.A	0.96%	0.18	-0.03	0.01
S28.A	0.96%	0.18	-0.03	0.01
S29.A	0.96%	0.18	-0.03	0.01
S300 open.A	0.96%	0.18	-0.03	0.01
S44.A	0.96%	0.18	-0.03	0.01
S45.A	0.96%	0.18	-0.03	0.01
S46.A	0.96%	0.18	-0.03	0.01
S51.A	0.96%	0.18	-0.03	0.01

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Nodes	Voltage variation (%)	Average norm. $\Sigma_{i,j}$	First eigen-vector weights	Second eigen-vector weights
S250.A	0.96%	0.18	-0.03	0.01
S37.A	0.96%	0.18	-0.03	0.01
S135.A	0.96%	0.18	-0.03	0.01
S18.A	0.96%	0.18	-0.03	0.01
S30.A	0.96%	0.18	-0.03	0.01
S36.A	0.96%	0.18	-0.03	0.01
S42.A	0.96%	0.18	-0.03	0.01
S47.A	0.96%	0.18	-0.03	0.01
S48.A	0.96%	0.18	-0.03	0.01
S72.A	1.46%	0.15	-0.04	-0.09
S76.A	1.54%	0.15	-0.04	-0.08
S52.A	1.28%	0.15	-0.04	0.01
S86.A	1.54%	0.14	-0.04	-0.06
S87.A	1.53%	0.14	-0.05	-0.04
S88.A	1.53%	0.14	-0.05	-0.04
S89.A	1.53%	0.14	-0.05	-0.03
S77.A	1.75%	0.13	-0.05	-0.08
S91.A	1.53%	0.14	-0.05	-0.02
S53.A	1.44%	0.14	-0.05	0.01
S93.A	1.53%	0.13	-0.05	-0.01
S95.A	1.53%	0.13	-0.05	-0.01
S79.A	1.80%	0.12	-0.05	-0.08
S78.A	1.80%	0.12	-0.05	-0.08
S56.A	1.54%	0.13	-0.05	0.01
S55.A	1.54%	0.13	-0.05	0.01
S94.A	1.54%	0.13	-0.05	0.01
S54.A	1.54%	0.13	-0.05	0.01
S80.A	2.05%	0.10	-0.06	-0.08
S83.A	2.14%	0.09	-0.06	-0.08
S81.A	2.14%	0.09	-0.06	-0.08
S82.A	2.14%	0.09	-0.06	-0.08
S57.A	1.85%	0.10	-0.06	0.02
S160.A	2.64%	0.04	-0.09	0.06
S60.A	2.64%	0.04	-0.09	0.06
S61.A	2.64%	0.04	-0.09	0.06
S61s.A	2.64%	0.04	-0.09	0.06
S62.A	2.69%	0.03	-0.09	0.06
S63.A	2.73%	0.03	-0.09	0.06
S64.A	2.80%	0.02	-0.09	0.06
S65.A	2.89%	0.02	-0.10	0.06
S66.A	2.96%	0.01	-0.10	0.06

Appendix J

Results of simulations presented on Chapter 4

J.0.1 Obtained models - Phase A and B

J.0.1.1 ARX (State-Space representation)

Sparse matrix A:

A(1,1)=	-0.2310	A(36,2)=	-0.2530	A(23,4)=	-0.0070	A(10,6)=	0.3160
A(2,1)=	-0.0420	A(37,2)=	-0.4230	A(24,4)=	-0.0070	A(11,6)=	0.4340
A(3,1)=	-0.0350	A(38,2)=	-0.4580	A(25,4)=	0.0400	A(12,6)=	0.3160
A(4,1)=	0.0210	A(39,2)=	-0.3450	A(26,4)=	0.0050	A(13,6)=	-0.0610
A(5,1)=	-0.0050	A(40,2)=	-0.3750	A(27,4)=	0.0030	A(14,6)=	0.0120
A(6,1)=	0.0000	A(41,2)=	-0.2290	A(28,4)=	-0.0460	A(15,6)=	0.0500
A(7,1)=	-0.1730	A(42,2)=	-0.1580	A(29,4)=	0.0030	A(16,6)=	0.3140
A(8,1)=	-0.0130	A(43,2)=	-0.3350	A(30,4)=	0.0000	A(17,6)=	0.3640
A(9,1)=	-0.0100	A(44,2)=	-0.3350	A(31,4)=	0.0130	A(18,6)=	0.2830
A(10,1)=	0.0050	A(45,2)=	-0.2520	A(32,4)=	-0.0080	A(19,6)=	-0.0240
A(11,1)=	-0.0060	A(46,2)=	-0.2460	A(33,4)=	-0.0060	A(20,6)=	-0.0220
A(12,1)=	-0.0010	A(47,2)=	-0.1510	A(34,4)=	-0.0300	A(21,6)=	0.0090
A(13,1)=	-0.1270	A(48,2)=	-0.0980	A(35,4)=	0.0090	A(22,6)=	0.1610
A(14,1)=	-0.0080	A(1,3)=	1.3690	A(36,4)=	0.0060	A(23,6)=	0.2350
A(15,1)=	-0.0060	A(2,3)=	1.6100	A(37,4)=	0.0190	A(24,6)=	0.1900
A(16,1)=	0.0120	A(3,3)=	1.2150	A(38,4)=	0.0030	A(25,6)=	0.0060
A(17,1)=	-0.0060	A(4,3)=	1.4500	A(39,4)=	0.0030	A(26,6)=	-0.0760
A(18,1)=	-0.0010	A(5,3)=	1.1900	A(40,4)=	-0.0170	A(27,6)=	-0.0380
A(19,1)=	-0.1050	A(6,3)=	0.8980	A(41,4)=	0.0170	A(28,6)=	0.2030
A(20,1)=	0.0000	A(7,3)=	1.5210	A(42,4)=	0.0120	A(29,6)=	0.2110
A(21,1)=	0.0000	A(8,3)=	1.7710	A(43,4)=	0.0090	A(30,6)=	0.1780
A(22,1)=	0.0120	A(9,3)=	1.3490	A(44,4)=	-0.0020	A(31,6)=	-0.0490
A(23,1)=	-0.0020	A(10,3)=	1.5700	A(45,4)=	-0.0010	A(32,6)=	-0.0870
A(24,1)=	0.0000	A(11,3)=	1.3160	A(46,4)=	-0.0030	A(33,6)=	-0.0510

A(25,1)=	-0.0950	A(12,3)=	0.9840	A(47,4)=	0.0170	A(34,6)=	0.2300
A(26,1)=	-0.0070	A(13,3)=	1.2570	A(48,4)=	0.0130	A(35,6)=	0.2300
A(27,1)=	-0.0050	A(14,3)=	1.4420	A(1,5)=	0.0280	A(36,6)=	0.1840
A(28,1)=	0.0120	A(15,3)=	1.1220	A(2,5)=	-0.0170	A(37,6)=	0.0720
A(29,1)=	-0.0020	A(16,3)=	1.2350	A(3,5)=	-0.0550	A(38,6)=	0.0310
A(30,1)=	0.0010	A(17,3)=	1.0630	A(4,5)=	-0.6860	A(39,6)=	0.0460
A(31,1)=	-0.0690	A(18,3)=	0.8060	A(5,5)=	-0.6810	A(40,6)=	0.1570
A(32,1)=	0.0040	A(19,3)=	0.8820	A(6,5)=	-0.5090	A(41,6)=	0.1940
A(33,1)=	0.0030	A(20,3)=	0.8440	A(7,5)=	0.0270	A(42,6)=	0.1620
A(34,1)=	0.0090	A(21,3)=	0.6280	A(8,5)=	-0.0370	A(43,6)=	-0.0040
A(35,1)=	-0.0030	A(22,3)=	0.8320	A(9,5)=	-0.0690	A(44,6)=	-0.0190
A(36,1)=	-0.0010	A(23,3)=	0.5740	A(10,5)=	-0.6890	A(45,6)=	-0.0050
A(37,1)=	-0.0330	A(24,3)=	0.4020	A(11,5)=	-0.7220	A(46,6)=	0.1050
A(38,1)=	0.0070	A(25,3)=	0.7530	A(12,5)=	-0.5420	A(47,6)=	0.1060
A(39,1)=	0.0060	A(26,3)=	0.7110	A(13,5)=	0.0060	A(48,6)=	0.0880
A(40,1)=	0.0160	A(27,3)=	0.5340	A(14,5)=	0.0200	A(1,7)=	1.0000
A(41,1)=	-0.0040	A(28,3)=	0.6980	A(15,5)=	-0.0150	A(2,8)=	1.0000
A(42,1)=	-0.0020	A(29,3)=	0.4740	A(16,5)=	-0.6010	A(3,9)=	1.0000
A(43,1)=	-0.0140	A(30,3)=	0.3350	A(17,5)=	-0.5770	A(4,10)=	1.0000
A(44,1)=	0.0140	A(31,3)=	0.6990	A(18,5)=	-0.4460	A(5,11)=	1.0000
A(45,1)=	0.0110	A(32,3)=	0.7160	A(19,5)=	-0.0170	A(6,12)=	1.0000
A(46,1)=	0.0100	A(33,3)=	0.5310	A(20,5)=	0.0400	A(7,13)=	1.0000
A(47,1)=	-0.0060	A(34,3)=	0.6850	A(21,5)=	0.0140	A(8,14)=	1.0000
A(48,1)=	-0.0040	A(35,3)=	0.4700	A(22,5)=	-0.3540	A(9,15)=	1.0000
A(1,2)=	-1.4030	A(36,3)=	0.3310	A(23,5)=	-0.3670	A(10,16)=	1.0000
A(2,2)=	-1.5850	A(37,3)=	0.4070	A(24,5)=	-0.2890	A(11,17)=	1.0000
A(3,2)=	-1.2150	A(38,3)=	0.4720	A(25,5)=	-0.0510	A(12,18)=	1.0000
A(4,2)=	-1.2230	A(39,3)=	0.3500	A(26,5)=	0.0640	A(13,19)=	1.0000
A(5,2)=	-0.9610	A(40,3)=	0.4400	A(27,5)=	0.0350	A(14,20)=	1.0000
A(6,2)=	-0.7300	A(41,3)=	0.3070	A(28,5)=	-0.3490	A(15,21)=	1.0000
A(7,2)=	-1.5350	A(42,3)=	0.2130	A(29,5)=	-0.3260	A(16,22)=	1.0000
A(8,2)=	-1.7430	A(43,3)=	0.3210	A(30,5)=	-0.2630	A(17,23)=	1.0000
A(9,2)=	-1.3440	A(44,3)=	0.3370	A(31,5)=	0.0110	A(18,24)=	1.0000
A(10,2)=	-1.2990	A(45,3)=	0.2480	A(32,5)=	0.0860	A(19,25)=	1.0000
A(11,2)=	-1.0520	A(46,3)=	0.2850	A(33,5)=	0.0550	A(20,26)=	1.0000
A(12,2)=	-0.7870	A(47,3)=	0.2000	A(34,5)=	-0.3790	A(21,27)=	1.0000
A(13,2)=	-1.2740	A(48,3)=	0.1320	A(35,5)=	-0.3520	A(22,28)=	1.0000
A(14,2)=	-1.4150	A(1,4)=	0.0690	A(36,5)=	-0.2760	A(23,29)=	1.0000
A(15,2)=	-1.1120	A(2,4)=	0.0240	A(37,5)=	-0.0800	A(24,30)=	1.0000
A(16,2)=	-1.0300	A(3,4)=	0.0210	A(38,5)=	-0.0270	A(25,31)=	1.0000
A(17,2)=	-0.8420	A(4,4)=	-0.1200	A(39,5)=	-0.0380	A(26,32)=	1.0000
A(18,2)=	-0.6410	A(5,4)=	0.0000	A(40,5)=	-0.2440	A(27,33)=	1.0000
A(19,2)=	-0.9070	A(6,4)=	-0.0030	A(41,5)=	-0.2670	A(28,34)=	1.0000
A(20,2)=	-0.8530	A(7,4)=	0.0480	A(42,5)=	-0.2160	A(29,35)=	1.0000
A(21,2)=	-0.6460	A(8,4)=	0.0090	A(43,5)=	-0.0050	A(30,36)=	1.0000
A(22,2)=	-0.7100	A(9,4)=	0.0090	A(44,5)=	0.0250	A(31,37)=	1.0000
A(23,2)=	-0.4540	A(10,4)=	-0.0810	A(45,5)=	0.0120	A(32,38)=	1.0000

A(24,2)=	-0.3160	A(11,4)=	0.0150	A(46,5)=	-0.1740	A(33,39)=	1.0000
A(25,2)=	-0.7590	A(12,4)=	0.0080	A(47,5)=	-0.1650	A(34,40)=	1.0000
A(26,2)=	-0.7100	A(13,4)=	0.0320	A(48,5)=	-0.1320	A(35,41)=	1.0000
A(27,2)=	-0.5430	A(14,4)=	-0.0200	A(1,6)=	-0.1630	A(36,42)=	1.0000
A(28,2)=	-0.5970	A(15,4)=	-0.0170	A(2,6)=	-0.0050	A(37,43)=	1.0000
A(29,2)=	-0.3700	A(16,4)=	-0.0570	A(3,6)=	0.0450	A(38,44)=	1.0000
A(30,2)=	-0.2590	A(17,4)=	-0.0070	A(4,6)=	0.3220	A(39,45)=	1.0000
A(31,2)=	-0.7040	A(18,4)=	-0.0100	A(5,6)=	0.4120	A(40,46)=	1.0000
A(32,2)=	-0.7250	A(19,4)=	0.0290	A(6,6)=	0.2970	A(41,47)=	1.0000
A(33,2)=	-0.5470	A(20,4)=	-0.0130	A(7,6)=	-0.1330	A(42,48)=	1.0000
A(34,2)=	-0.5730	A(21,4)=	-0.0110	A(8,6)=	0.0330		
A(35,2)=	-0.3630	A(22,4)=	-0.0570	A(9,6)=	0.0750		

Sparse matrix B:

B(1,1)=	0.00029	B(1,4)=	0.00059	B(1,7)=	0.00020	B(1,10)=	-0.00049
B(2,1)=	-0.00028	B(2,4)=	-0.00022	B(2,7)=	-0.00001	B(2,10)=	0.00052
B(3,1)=	-0.00025	B(3,4)=	0.00005	B(3,7)=	-0.00003	B(3,10)=	0.00036
B(4,1)=	0.00005	B(4,4)=	0.00072	B(4,7)=	0.00009	B(4,10)=	-0.00039
B(5,1)=	-0.00043	B(5,4)=	0.00006	B(5,7)=	-0.00038	B(5,10)=	-0.00005
B(6,1)=	-0.00029	B(6,4)=	0.00007	B(6,7)=	-0.00026	B(6,10)=	-0.00009
B(7,1)=	0.00015	B(7,4)=	-0.00007	B(7,7)=	0.00030	B(7,10)=	0.00002
B(8,1)=	-0.00028	B(8,4)=	-0.00002	B(8,7)=	0.00011	B(8,10)=	0.00037
B(9,1)=	-0.00028	B(9,4)=	0.00015	B(9,7)=	0.00005	B(9,10)=	0.00028
B(10,1)=	0.00005	B(10,4)=	0.00037	B(10,7)=	0.00015	B(10,10)=	-0.00039
B(11,1)=	-0.00051	B(11,4)=	-0.00040	B(11,7)=	-0.00033	B(11,10)=	0.00018
B(12,1)=	-0.00036	B(12,4)=	-0.00033	B(12,7)=	-0.00022	B(12,10)=	0.00017
B(13,1)=	-0.00037	B(13,4)=	-0.00227	B(13,7)=	0.00047	B(13,10)=	0.00448
B(14,1)=	-0.00151	B(14,4)=	-0.00303	B(14,7)=	0.00076	B(14,10)=	0.00298
B(15,1)=	-0.00134	B(15,4)=	-0.00231	B(15,7)=	0.00045	B(15,10)=	0.00256
B(16,1)=	-0.00139	B(16,4)=	-0.00007	B(16,7)=	-0.00105	B(16,10)=	0.00138
B(17,1)=	-0.00213	B(17,4)=	-0.00190	B(17,7)=	-0.00133	B(17,10)=	0.00042
B(18,1)=	-0.00157	B(18,4)=	-0.00166	B(18,7)=	-0.00102	B(18,10)=	0.00057
B(19,1)=	0.00046	B(19,4)=	0.00103	B(19,7)=	-0.00001	B(19,10)=	-0.00034
B(20,1)=	0.00023	B(20,4)=	0.00077	B(20,7)=	-0.00006	B(20,10)=	-0.00046
B(21,1)=	0.00020	B(21,4)=	0.00061	B(21,7)=	-0.00004	B(21,10)=	-0.00037
B(22,1)=	0.00054	B(22,4)=	0.00068	B(22,7)=	0.00028	B(22,10)=	0.00004
B(23,1)=	0.00032	B(23,4)=	0.00035	B(23,7)=	0.00017	B(23,10)=	0.00006
B(24,1)=	0.00025	B(24,4)=	0.00026	B(24,7)=	0.00014	B(24,10)=	0.00005
B(25,1)=	0.00037	B(25,4)=	0.00083	B(25,7)=	-0.00001	B(25,10)=	-0.00027
B(26,1)=	0.00019	B(26,4)=	0.00062	B(26,7)=	-0.00006	B(26,10)=	-0.00037
B(27,1)=	0.00016	B(27,4)=	0.00049	B(27,7)=	-0.00004	B(27,10)=	-0.00030
B(28,1)=	0.00045	B(28,4)=	0.00057	B(28,7)=	0.00023	B(28,10)=	0.00001
B(29,1)=	0.00026	B(29,4)=	0.00027	B(29,7)=	0.00014	B(29,10)=	0.00004
B(30,1)=	0.00020	B(30,4)=	0.00020	B(30,7)=	0.00012	B(30,10)=	0.00004
B(31,1)=	0.00032	B(31,4)=	0.00076	B(31,7)=	-0.00001	B(31,10)=	-0.00024
B(32,1)=	0.00019	B(32,4)=	0.00064	B(32,7)=	-0.00006	B(32,10)=	-0.00040

B(33,1)=	0.00016	B(33,4)=	0.00050	B(33,7)=	-0.00004	B(33,10)=	-0.00032
B(34,1)=	0.00042	B(34,4)=	0.00051	B(34,7)=	0.00022	B(34,10)=	0.00002
B(35,1)=	0.00027	B(35,4)=	0.00026	B(35,7)=	0.00015	B(35,10)=	0.00005
B(36,1)=	0.00021	B(36,4)=	0.00019	B(36,7)=	0.00012	B(36,10)=	0.00004
B(37,1)=	0.00022	B(37,4)=	0.00046	B(37,7)=	0.00000	B(37,10)=	-0.00021
B(38,1)=	0.00010	B(38,4)=	0.00036	B(38,7)=	-0.00004	B(38,10)=	-0.00025
B(39,1)=	0.00009	B(39,4)=	0.00028	B(39,7)=	-0.00002	B(39,10)=	-0.00020
B(40,1)=	0.00026	B(40,4)=	0.00032	B(40,7)=	0.00013	B(40,10)=	-0.00004
B(41,1)=	0.00015	B(41,4)=	0.00014	B(41,7)=	0.00009	B(41,10)=	0.00002
B(42,1)=	0.00012	B(42,4)=	0.00010	B(42,7)=	0.00007	B(42,10)=	0.00002
B(43,1)=	0.00014	B(43,4)=	0.00034	B(43,7)=	-0.00001	B(43,10)=	-0.00018
B(44,1)=	0.00006	B(44,4)=	0.00026	B(44,7)=	-0.00004	B(44,10)=	-0.00021
B(45,1)=	0.00005	B(45,4)=	0.00020	B(45,7)=	-0.00003	B(45,10)=	-0.00017
B(46,1)=	0.00019	B(46,4)=	0.00021	B(46,7)=	0.00009	B(46,10)=	-0.00004
B(47,1)=	0.00011	B(47,4)=	0.00009	B(47,7)=	0.00006	B(47,10)=	0.00001
B(48,1)=	0.00009	B(48,4)=	0.00006	B(48,7)=	0.00005	B(48,10)=	0.00002
B(1,2)=	-0.00008	B(1,5)=	-0.00032	B(1,8)=	-0.00006	B(1,11)=	0.00045
B(2,2)=	0.00008	B(2,5)=	0.00045	B(2,8)=	0.00010	B(2,11)=	-0.00060
B(3,2)=	0.00008	B(3,5)=	0.00011	B(3,8)=	0.00010	B(3,11)=	-0.00039
B(4,2)=	0.00000	B(4,5)=	-0.00067	B(4,8)=	0.00006	B(4,11)=	0.00051
B(5,2)=	0.00017	B(5,5)=	0.00009	B(5,8)=	0.00026	B(5,11)=	0.00006
B(6,2)=	0.00012	B(6,5)=	0.00005	B(6,8)=	0.00019	B(6,11)=	0.00011
B(7,2)=	-0.00004	B(7,5)=	0.00030	B(7,8)=	-0.00020	B(7,11)=	-0.00016
B(8,2)=	0.00010	B(8,5)=	0.00055	B(8,8)=	-0.00009	B(8,11)=	-0.00075
B(9,2)=	0.00011	B(9,5)=	0.00026	B(9,8)=	-0.00004	B(9,11)=	-0.00059
B(10,2)=	0.00002	B(10,5)=	-0.00018	B(10,8)=	-0.00009	B(10,11)=	0.00017
B(11,2)=	0.00021	B(11,5)=	0.00068	B(11,8)=	0.00017	B(11,11)=	-0.00035
B(12,2)=	0.00014	B(12,5)=	0.00054	B(12,8)=	0.00011	B(12,11)=	-0.00030
B(13,2)=	0.00008	B(13,5)=	0.00200	B(13,8)=	-0.00052	B(13,11)=	-0.00485
B(14,2)=	0.00042	B(14,5)=	0.00270	B(14,8)=	-0.00054	B(14,11)=	-0.00468
B(15,2)=	0.00039	B(15,5)=	0.00197	B(15,8)=	-0.00035	B(15,11)=	-0.00406
B(16,2)=	0.00056	B(16,5)=	0.00062	B(16,8)=	0.00027	B(16,11)=	-0.00184
B(17,2)=	0.00087	B(17,5)=	0.00211	B(17,8)=	0.00040	B(17,11)=	-0.00220
B(18,2)=	0.00064	B(18,5)=	0.00181	B(18,8)=	0.00031	B(18,11)=	-0.00208
B(19,2)=	-0.00011	B(19,5)=	-0.00108	B(19,8)=	-0.00003	B(19,11)=	0.00047
B(20,2)=	-0.00004	B(20,5)=	-0.00080	B(20,8)=	0.00000	B(20,11)=	0.00056
B(21,2)=	-0.00004	B(21,5)=	-0.00063	B(21,8)=	0.00000	B(21,11)=	0.00045
B(22,2)=	-0.00021	B(22,5)=	-0.00081	B(22,8)=	-0.00009	B(22,11)=	0.00013
B(23,2)=	-0.00013	B(23,5)=	-0.00045	B(23,8)=	-0.00005	B(23,11)=	0.00006
B(24,2)=	-0.00010	B(24,5)=	-0.00033	B(24,8)=	-0.00004	B(24,11)=	0.00004
B(25,2)=	-0.00009	B(25,5)=	-0.00088	B(25,8)=	-0.00002	B(25,11)=	0.00038
B(26,2)=	-0.00003	B(26,5)=	-0.00065	B(26,8)=	0.00001	B(26,11)=	0.00044
B(27,2)=	-0.00003	B(27,5)=	-0.00051	B(27,8)=	0.00000	B(27,11)=	0.00036
B(28,2)=	-0.00017	B(28,5)=	-0.00068	B(28,8)=	-0.00008	B(28,11)=	0.00014
B(29,2)=	-0.00010	B(29,5)=	-0.00036	B(29,8)=	-0.00004	B(29,11)=	0.00005
B(30,2)=	-0.00008	B(30,5)=	-0.00026	B(30,8)=	-0.00003	B(30,11)=	0.00004
B(31,2)=	-0.00008	B(31,5)=	-0.00080	B(31,8)=	-0.00002	B(31,11)=	0.00034

B(32,2)=	-0.00003	B(32,5)=	-0.00066	B(32,8)=	0.00001	B(32,11)=	0.00047
B(33,2)=	-0.00003	B(33,5)=	-0.00052	B(33,8)=	0.00000	B(33,11)=	0.00037
B(34,2)=	-0.00016	B(34,5)=	-0.00062	B(34,8)=	-0.00007	B(34,11)=	0.00013
B(35,2)=	-0.00011	B(35,5)=	-0.00035	B(35,8)=	-0.00004	B(35,11)=	0.00005
B(36,2)=	-0.00008	B(36,5)=	-0.00025	B(36,8)=	-0.00003	B(36,11)=	0.00003
B(37,2)=	-0.00005	B(37,5)=	-0.00048	B(37,8)=	-0.00002	B(37,11)=	0.00028
B(38,2)=	-0.00002	B(38,5)=	-0.00038	B(38,8)=	0.00001	B(38,11)=	0.00031
B(39,2)=	-0.00001	B(39,5)=	-0.00030	B(39,8)=	0.00000	B(39,11)=	0.00024
B(40,2)=	-0.00010	B(40,5)=	-0.00038	B(40,8)=	-0.00004	B(40,11)=	0.00012
B(41,2)=	-0.00006	B(41,5)=	-0.00019	B(41,8)=	-0.00002	B(41,11)=	0.00004
B(42,2)=	-0.00005	B(42,5)=	-0.00014	B(42,8)=	-0.00002	B(42,11)=	0.00003
B(43,2)=	-0.00003	B(43,5)=	-0.00035	B(43,8)=	-0.00001	B(43,11)=	0.00022
B(44,2)=	0.00000	B(44,5)=	-0.00027	B(44,8)=	0.00001	B(44,11)=	0.00024
B(45,2)=	0.00000	B(45,5)=	-0.00020	B(45,8)=	0.00001	B(45,11)=	0.00019
B(46,2)=	-0.00007	B(46,5)=	-0.00025	B(46,8)=	-0.00003	B(46,11)=	0.00009
B(47,2)=	-0.00004	B(47,5)=	-0.00013	B(47,8)=	-0.00001	B(47,11)=	0.00002
B(48,2)=	-0.00003	B(48,5)=	-0.00009	B(48,8)=	-0.00001	B(48,11)=	0.00001
B(1,3)=	-0.00024	B(1,6)=	0.00063	B(1,9)=	0.00021	B(1,12)=	-0.00050
B(2,3)=	-0.00042	B(2,6)=	0.00072	B(2,9)=	-0.00002	B(2,12)=	-0.00032
B(3,3)=	-0.00036	B(3,6)=	0.00056	B(3,9)=	-0.00002	B(3,12)=	-0.00033
B(4,3)=	-0.00003	B(4,6)=	0.00015	B(4,9)=	-0.00004	B(4,12)=	-0.00027
B(5,3)=	-0.00012	B(5,6)=	0.00008	B(5,9)=	-0.00023	B(5,12)=	-0.00029
B(6,3)=	-0.00009	B(6,6)=	0.00003	B(6,9)=	-0.00018	B(6,12)=	-0.00026
B(7,3)=	-0.00024	B(7,6)=	0.00119	B(7,9)=	0.00014	B(7,12)=	-0.00058
B(8,3)=	-0.00065	B(8,6)=	0.00116	B(8,9)=	0.00013	B(8,12)=	-0.00030
B(9,3)=	-0.00054	B(9,6)=	0.00089	B(9,9)=	0.00010	B(9,12)=	-0.00033
B(10,3)=	-0.00015	B(10,6)=	0.00041	B(10,9)=	0.00009	B(10,12)=	-0.00041
B(11,3)=	-0.00013	B(11,6)=	0.00020	B(11,9)=	-0.00022	B(11,12)=	-0.00028
B(12,3)=	-0.00008	B(12,6)=	0.00007	B(12,9)=	-0.00019	B(12,12)=	-0.00024
B(13,3)=	-0.00005	B(13,6)=	-0.00862	B(13,9)=	-0.00067	B(13,12)=	0.00664
B(14,3)=	0.00022	B(14,6)=	-0.01280	B(14,9)=	0.00063	B(14,12)=	0.01101
B(15,3)=	0.00020	B(15,6)=	-0.01068	B(15,9)=	0.00057	B(15,12)=	0.01026
B(16,3)=	-0.00049	B(16,6)=	-0.00362	B(16,9)=	-0.00052	B(16,12)=	0.00748
B(17,3)=	0.00013	B(17,6)=	-0.00436	B(17,9)=	0.00053	B(17,12)=	0.00568
B(18,3)=	0.00011	B(18,6)=	-0.00295	B(18,9)=	0.00044	B(18,12)=	0.00308
B(19,3)=	0.00001	B(19,6)=	-0.00026	B(19,9)=	-0.00004	B(19,12)=	0.00000
B(20,3)=	-0.00002	B(20,6)=	-0.00016	B(20,9)=	0.00001	B(20,12)=	-0.00003
B(21,3)=	-0.00001	B(21,6)=	-0.00012	B(21,9)=	0.00001	B(21,12)=	-0.00002
B(22,3)=	-0.00003	B(22,6)=	-0.00008	B(22,9)=	0.00004	B(22,12)=	0.00000
B(23,3)=	0.00000	B(23,6)=	-0.00003	B(23,9)=	0.00002	B(23,12)=	-0.00001
B(24,3)=	0.00000	B(24,6)=	-0.00002	B(24,9)=	0.00002	B(24,12)=	0.00000
B(25,3)=	0.00001	B(25,6)=	-0.00021	B(25,9)=	-0.00004	B(25,12)=	0.00000
B(26,3)=	-0.00001	B(26,6)=	-0.00013	B(26,9)=	0.00001	B(26,12)=	-0.00002
B(27,3)=	-0.00001	B(27,6)=	-0.00010	B(27,9)=	0.00001	B(27,12)=	-0.00002
B(28,3)=	-0.00002	B(28,6)=	-0.00007	B(28,9)=	0.00003	B(28,12)=	0.00000
B(29,3)=	0.00000	B(29,6)=	-0.00002	B(29,9)=	0.00002	B(29,12)=	-0.00001
B(30,3)=	0.00000	B(30,6)=	-0.00001	B(30,9)=	0.00002	B(30,12)=	-0.00001

B(31,3)=	0.00000	B(31,6)=	-0.00018	B(31,9)=	-0.00003	B(31,12)=	0.00000
B(32,3)=	-0.00001	B(32,6)=	-0.00013	B(32,9)=	0.00002	B(32,12)=	-0.00002
B(33,3)=	-0.00001	B(33,6)=	-0.00010	B(33,9)=	0.00002	B(33,12)=	-0.00002
B(34,3)=	-0.00001	B(34,6)=	-0.00006	B(34,9)=	0.00003	B(34,12)=	-0.00001
B(35,3)=	0.00001	B(35,6)=	-0.00002	B(35,9)=	0.00002	B(35,12)=	-0.00001
B(36,3)=	0.00000	B(36,6)=	-0.00001	B(36,9)=	0.00002	B(36,12)=	-0.00001
B(37,3)=	0.00001	B(37,6)=	-0.00011	B(37,9)=	0.00000	B(37,12)=	-0.00001
B(38,3)=	0.00000	B(38,6)=	-0.00007	B(38,9)=	0.00002	B(38,12)=	-0.00002
B(39,3)=	0.00000	B(39,6)=	-0.00005	B(39,9)=	0.00001	B(39,12)=	-0.00002
B(40,3)=	-0.00001	B(40,6)=	-0.00003	B(40,9)=	0.00003	B(40,12)=	-0.00001
B(41,3)=	0.00001	B(41,6)=	-0.00001	B(41,9)=	0.00001	B(41,12)=	-0.00001
B(42,3)=	0.00001	B(42,6)=	0.00000	B(42,9)=	0.00001	B(42,12)=	-0.00001
B(43,3)=	0.00000	B(43,6)=	-0.00008	B(43,9)=	0.00001	B(43,12)=	-0.00001
B(44,3)=	-0.00001	B(44,6)=	-0.00004	B(44,9)=	0.00002	B(44,12)=	-0.00002
B(45,3)=	0.00000	B(45,6)=	-0.00003	B(45,9)=	0.00002	B(45,12)=	-0.00001
B(46,3)=	0.00000	B(46,6)=	-0.00002	B(46,9)=	0.00003	B(46,12)=	-0.00001
B(47,3)=	0.00001	B(47,6)=	-0.00001	B(47,9)=	0.00001	B(47,12)=	0.00000
B(48,3)=	0.00001	B(48,6)=	0.00000	B(48,9)=	0.00001	B(48,12)=	0.00000

Sparse matrix C:

C(1,1)=	1	C(2,2)=	1	C(3,3)=	1	C(4,4)=	1
C(5,5)=	1	C(6,6)=	1				

Sparse matrix D:

D(1,1)=	-0.0012	D(1,4)=	-0.0021	D(1,7)=	-0.0002	D(1,10)=	-0.0021
D(2,1)=	-0.0022	D(2,4)=	-0.0027	D(2,7)=	-0.0006	D(2,10)=	0.0020
D(3,1)=	-0.0019	D(3,4)=	-0.0018	D(3,7)=	-0.0006	D(3,10)=	0.0015
D(4,1)=	-0.0017	D(4,4)=	-0.0020	D(4,7)=	-0.0013	D(4,10)=	-0.0021
D(5,1)=	-0.0021	D(5,4)=	-0.0008	D(5,7)=	-0.0014	D(5,10)=	-0.0008
D(6,1)=	-0.0015	D(6,4)=	-0.0005	D(6,7)=	-0.0010	D(6,10)=	-0.0007
D(1,2)=	0.0004	D(1,5)=	0.0022	D(1,8)=	0.0002	D(1,11)=	0.0017
D(2,2)=	0.0006	D(2,5)=	0.0026	D(2,8)=	0.0004	D(2,11)=	-0.0020
D(3,2)=	0.0005	D(3,5)=	0.0017	D(3,8)=	0.0004	D(3,11)=	-0.0014
D(4,2)=	0.0008	D(4,5)=	0.0022	D(4,8)=	0.0005	D(4,11)=	0.0015
D(5,2)=	0.0008	D(5,5)=	0.0011	D(5,8)=	0.0005	D(5,11)=	0.0006
D(6,2)=	0.0006	D(6,5)=	0.0008	D(6,8)=	0.0003	D(6,11)=	0.0008
D(1,3)=	-0.0001	D(1,6)=	0.0009	D(1,9)=	0.0009	D(1,12)=	-0.0003
D(2,3)=	0.0000	D(2,6)=	0.0007	D(2,9)=	-0.0003	D(2,12)=	-0.0001
D(3,3)=	0.0000	D(3,6)=	0.0005	D(3,9)=	-0.0003	D(3,12)=	-0.0001
D(4,3)=	0.0004	D(4,6)=	0.0003	D(4,9)=	0.0004	D(4,12)=	-0.0002
D(5,3)=	0.0000	D(5,6)=	0.0001	D(5,9)=	-0.0003	D(5,12)=	-0.0002
D(6,3)=	0.0000	D(6,6)=	0.0000	D(6,9)=	-0.0003	D(6,12)=	-0.0002

J.0.1.2 ARMAX (State-Space representation)

Sparse matrix A:

A(1,1)=	0.1717	A(36,2)=	0.0627	A(23,4)=	-0.0142	A(10,6)=	0.7897
A(2,1)=	-0.0387	A(37,2)=	0.1731	A(24,4)=	-0.0101	A(11,6)=	0.7131
A(3,1)=	-0.0320	A(38,2)=	0.2687	A(25,4)=	0.0088	A(12,6)=	0.6593
A(4,1)=	0.0185	A(39,2)=	0.2184	A(26,4)=	0.0062	A(13,6)=	0.2467
A(5,1)=	-0.0031	A(40,2)=	0.0369	A(27,4)=	0.0050	A(14,6)=	0.4145
A(6,1)=	-0.0002	A(41,2)=	0.1176	A(28,4)=	0.0071	A(15,6)=	0.4084
A(7,1)=	0.2288	A(42,2)=	0.0902	A(29,4)=	-0.0022	A(16,6)=	0.4742
A(8,1)=	-0.0017	A(43,2)=	0.1232	A(30,4)=	-0.0019	A(17,6)=	0.4715
A(9,1)=	-0.0006	A(44,2)=	0.3102	A(31,4)=	-0.0226	A(18,6)=	0.5279
A(10,1)=	-0.0073	A(45,2)=	0.2484	A(32,4)=	-0.0082	A(19,6)=	0.1423
A(11,1)=	-0.0036	A(46,2)=	0.0609	A(33,4)=	-0.0064	A(20,6)=	0.1366
A(12,1)=	-0.0019	A(47,2)=	0.1457	A(34,4)=	0.0231	A(21,6)=	0.1286
A(13,1)=	0.1171	A(48,2)=	0.1033	A(35,4)=	0.0018	A(22,6)=	0.0519
A(14,1)=	0.0010	A(1,3)=	0.8325	A(36,4)=	0.0024	A(23,6)=	0.0958
A(15,1)=	0.0012	A(2,3)=	0.6042	A(37,4)=	-0.0088	A(24,6)=	0.1051
A(16,1)=	0.0004	A(3,3)=	0.5866	A(38,4)=	0.0068	A(25,6)=	0.0891
A(17,1)=	-0.0022	A(4,3)=	0.6829	A(39,4)=	0.0060	A(26,6)=	0.0335
A(18,1)=	-0.0006	A(5,3)=	0.7063	A(40,4)=	0.0377	A(27,6)=	0.0368
A(19,1)=	0.0478	A(6,3)=	0.6997	A(41,4)=	0.0069	A(28,6)=	0.1013
A(20,1)=	0.0040	A(7,3)=	0.5809	A(42,4)=	0.0059	A(29,6)=	0.0570
A(21,1)=	0.0027	A(8,3)=	0.4814	A(43,4)=	-0.0118	A(30,6)=	0.0586
A(22,1)=	-0.0009	A(9,3)=	0.4639	A(44,4)=	0.0045	A(31,6)=	0.0651
A(23,1)=	0.0008	A(10,3)=	0.5457	A(45,4)=	0.0038	A(32,6)=	0.1399
A(24,1)=	-0.0004	A(11,3)=	0.6128	A(46,4)=	0.0255	A(33,6)=	0.1360
A(25,1)=	0.0005	A(12,3)=	0.5748	A(47,4)=	-0.0012	A(34,6)=	0.1472
A(26,1)=	-0.0113	A(13,3)=	0.2140	A(48,4)=	-0.0002	A(35,6)=	0.1543
A(27,1)=	-0.0093	A(14,3)=	0.1239	A(1,5)=	-0.3819	A(36,6)=	0.1188
A(28,1)=	-0.0019	A(15,3)=	0.1516	A(2,5)=	-0.7366	A(37,6)=	0.1425
A(29,1)=	-0.0009	A(16,3)=	0.1271	A(3,5)=	-0.7427	A(38,6)=	0.1958
A(30,1)=	-0.0002	A(17,3)=	0.1770	A(4,5)=	-1.3972	A(39,6)=	0.1781
A(31,1)=	0.0544	A(18,3)=	0.2179	A(5,5)=	-0.8214	A(40,6)=	0.1055
A(32,1)=	-0.0016	A(19,3)=	-0.0608	A(6,5)=	-0.8100	A(41,6)=	0.0829
A(33,1)=	-0.0022	A(20,3)=	-0.2665	A(7,5)=	-0.3492	A(42,6)=	0.0622
A(34,1)=	-0.0060	A(21,3)=	-0.2236	A(8,5)=	-0.6025	A(43,6)=	0.0209
A(35,1)=	-0.0013	A(22,3)=	-0.0545	A(9,5)=	-0.5927	A(44,6)=	0.1385
A(36,1)=	-0.0021	A(23,3)=	-0.1848	A(10,5)=	-0.9309	A(45,6)=	0.1254
A(37,1)=	0.0332	A(24,3)=	-0.1536	A(11,5)=	-0.6190	A(46,6)=	0.0372
A(38,1)=	-0.0045	A(25,3)=	-0.0573	A(12,5)=	-0.5727	A(47,6)=	0.0470
A(39,1)=	-0.0046	A(26,3)=	-0.1955	A(13,5)=	-0.1737	A(48,6)=	0.0373
A(40,1)=	0.0000	A(27,3)=	-0.1632	A(14,5)=	-0.2738	A(1,7)=	1.0000
A(41,1)=	-0.0028	A(28,3)=	-0.0130	A(15,5)=	-0.2770	A(2,8)=	1.0000
A(42,1)=	-0.0028	A(29,3)=	-0.1513	A(16,5)=	-0.5000	A(3,9)=	1.0000
A(43,1)=	0.0095	A(30,3)=	-0.1349	A(17,5)=	-0.3240	A(4,10)=	1.0000
A(44,1)=	-0.0070	A(31,3)=	-0.0512	A(18,5)=	-0.3613	A(5,11)=	1.0000
A(45,1)=	-0.0063	A(32,3)=	-0.1474	A(19,5)=	-0.0960	A(6,12)=	1.0000
A(46,1)=	-0.0107	A(33,3)=	-0.1157	A(20,5)=	-0.0811	A(7,13)=	1.0000
A(47,1)=	-0.0047	A(34,3)=	0.1205	A(21,5)=	-0.0777	A(8,14)=	1.0000

A(48,1)=	-0.0050	A(35,3)=	-0.0727	A(22,5)=	-0.0342	A(9,15)=	1.0000
A(1,2)=	-1.0198	A(36,3)=	-0.0614	A(23,5)=	-0.0314	A(10,16)=	1.0000
A(2,2)=	-0.4663	A(37,3)=	-0.1815	A(24,5)=	-0.0423	A(11,17)=	1.0000
A(3,2)=	-0.4548	A(38,3)=	-0.2637	A(25,5)=	-0.0790	A(12,18)=	1.0000
A(4,2)=	-0.5860	A(39,3)=	-0.2119	A(26,5)=	-0.0269	A(13,19)=	1.0000
A(5,2)=	-0.5615	A(40,3)=	-0.0420	A(27,5)=	-0.0287	A(14,20)=	1.0000
A(6,2)=	-0.5644	A(41,3)=	-0.1247	A(28,5)=	-0.0766	A(15,21)=	1.0000
A(7,2)=	-0.7027	A(42,3)=	-0.0964	A(29,5)=	-0.0320	A(16,22)=	1.0000
A(8,2)=	-0.3759	A(43,3)=	-0.1185	A(30,5)=	-0.0277	A(17,23)=	1.0000
A(9,2)=	-0.3624	A(44,3)=	-0.3162	A(31,5)=	-0.0360	A(18,24)=	1.0000
A(10,2)=	-0.4365	A(45,3)=	-0.2504	A(32,5)=	-0.0914	A(19,25)=	1.0000
A(11,2)=	-0.4717	A(46,3)=	-0.0685	A(33,5)=	-0.0914	A(20,26)=	1.0000
A(12,2)=	-0.4465	A(47,3)=	-0.1729	A(34,5)=	-0.1637	A(21,27)=	1.0000
A(13,2)=	-0.2517	A(48,3)=	-0.1219	A(35,5)=	-0.1223	A(22,28)=	1.0000
A(14,2)=	-0.0741	A(1,4)=	0.0384	A(36,5)=	-0.0942	A(23,29)=	1.0000
A(15,2)=	-0.0992	A(2,4)=	-0.0037	A(37,5)=	-0.1008	A(24,30)=	1.0000
A(16,2)=	-0.0982	A(3,4)=	-0.0034	A(38,5)=	-0.1602	A(25,31)=	1.0000
A(17,2)=	-0.1183	A(4,4)=	0.2624	A(39,5)=	-0.1456	A(26,32)=	1.0000
A(18,2)=	-0.1597	A(5,4)=	-0.0167	A(40,5)=	-0.0757	A(27,33)=	1.0000
A(19,2)=	0.0493	A(6,4)=	-0.0125	A(41,5)=	-0.0546	A(28,34)=	1.0000
A(20,2)=	0.2503	A(7,4)=	0.0028	A(42,5)=	-0.0409	A(29,35)=	1.0000
A(21,2)=	0.2116	A(8,4)=	-0.0146	A(43,5)=	-0.0016	A(30,36)=	1.0000
A(22,2)=	0.0434	A(9,4)=	-0.0127	A(44,5)=	-0.1018	A(31,37)=	1.0000
A(23,2)=	0.1648	A(10,4)=	0.2167	A(45,5)=	-0.0923	A(32,38)=	1.0000
A(24,2)=	0.1384	A(11,4)=	0.0035	A(46,5)=	-0.0158	A(33,39)=	1.0000
A(25,2)=	0.0751	A(12,4)=	0.0026	A(47,5)=	0.0059	A(34,40)=	1.0000
A(26,2)=	0.1868	A(13,4)=	-0.0133	A(48,5)=	0.0003	A(35,41)=	1.0000
A(27,2)=	0.1560	A(14,4)=	-0.0369	A(1,6)=	0.4016	A(36,42)=	1.0000
A(28,2)=	0.0112	A(15,4)=	-0.0326	A(2,6)=	0.9639	A(37,43)=	1.0000
A(29,2)=	0.1383	A(16,4)=	0.1315	A(3,6)=	0.9679	A(38,44)=	1.0000
A(30,2)=	0.1216	A(17,4)=	-0.0217	A(4,6)=	1.1910	A(39,45)=	1.0000
A(31,2)=	0.0350	A(18,4)=	-0.0181	A(5,6)=	1.0183	A(40,46)=	1.0000
A(32,2)=	0.1377	A(19,4)=	-0.0105	A(6,6)=	1.0136	A(41,47)=	1.0000
A(33,2)=	0.1097	A(20,4)=	-0.0169	A(7,6)=	0.4182	A(42,48)=	1.0000
A(34,2)=	-0.0880	A(21,4)=	-0.0144	A(8,6)=	0.7928		
A(35,2)=	0.0739	A(22,4)=	0.0198	A(9,6)=	0.7776		

Sparse matrix B:

B(1,1)=	0.0004	B(1,4)=	0.0003	B(1,7)=	0.0004	B(1,10)=	0.0005
B(2,1)=	-0.0004	B(2,4)=	-0.0003	B(2,7)=	0.0001	B(2,10)=	0.0010
B(3,1)=	-0.0004	B(3,4)=	0.0001	B(3,7)=	0.0001	B(3,10)=	0.0008
B(4,1)=	0.0000	B(4,4)=	0.0007	B(4,7)=	0.0001	B(4,10)=	0.0000
B(5,1)=	-0.0007	B(5,4)=	0.0002	B(5,7)=	-0.0005	B(5,10)=	-0.0002
B(6,1)=	-0.0005	B(6,4)=	0.0002	B(6,7)=	-0.0003	B(6,10)=	-0.0002
B(7,1)=	0.0001	B(7,4)=	-0.0004	B(7,7)=	0.0002	B(7,10)=	0.0013
B(8,1)=	-0.0004	B(8,4)=	0.0001	B(8,7)=	0.0000	B(8,10)=	0.0008

B(9,1)=	-0.0004	B(9,4)=	0.0003	B(9,7)=	-0.0001	B(9,10)=	0.0006
B(10,1)=	-0.0001	B(10,4)=	0.0002	B(10,7)=	0.0000	B(10,10)=	0.0001
B(11,1)=	-0.0006	B(11,4)=	-0.0003	B(11,7)=	-0.0004	B(11,10)=	0.0001
B(12,1)=	-0.0004	B(12,4)=	-0.0003	B(12,7)=	-0.0002	B(12,10)=	0.0002
B(13,1)=	-0.0005	B(13,4)=	-0.0026	B(13,7)=	0.0002	B(13,10)=	0.0058
B(14,1)=	-0.0016	B(14,4)=	-0.0031	B(14,7)=	0.0004	B(14,10)=	0.0035
B(15,1)=	-0.0014	B(15,4)=	-0.0023	B(15,7)=	0.0002	B(15,10)=	0.0030
B(16,1)=	-0.0016	B(16,4)=	-0.0003	B(16,7)=	-0.0014	B(16,10)=	0.0019
B(17,1)=	-0.0021	B(17,4)=	-0.0017	B(17,7)=	-0.0014	B(17,10)=	0.0002
B(18,1)=	-0.0015	B(18,4)=	-0.0016	B(18,7)=	-0.0010	B(18,10)=	0.0004
B(19,1)=	0.0000	B(19,4)=	-0.0001	B(19,7)=	0.0000	B(19,10)=	-0.0001
B(20,1)=	-0.0001	B(20,4)=	-0.0002	B(20,7)=	0.0000	B(20,10)=	0.0001
B(21,1)=	-0.0001	B(21,4)=	-0.0002	B(21,7)=	0.0000	B(21,10)=	0.0001
B(22,1)=	0.0000	B(22,4)=	-0.0001	B(22,7)=	0.0000	B(22,10)=	0.0000
B(23,1)=	-0.0001	B(23,4)=	-0.0001	B(23,7)=	0.0000	B(23,10)=	0.0000
B(24,1)=	-0.0001	B(24,4)=	-0.0001	B(24,7)=	0.0000	B(24,10)=	0.0000
B(25,1)=	0.0000	B(25,4)=	-0.0001	B(25,7)=	0.0000	B(25,10)=	0.0001
B(26,1)=	0.0000	B(26,4)=	-0.0001	B(26,7)=	0.0000	B(26,10)=	0.0001
B(27,1)=	0.0000	B(27,4)=	-0.0001	B(27,7)=	0.0000	B(27,10)=	0.0001
B(28,1)=	0.0000	B(28,4)=	0.0000	B(28,7)=	0.0000	B(28,10)=	0.0000
B(29,1)=	0.0000	B(29,4)=	-0.0001	B(29,7)=	0.0000	B(29,10)=	0.0000
B(30,1)=	0.0000	B(30,4)=	-0.0001	B(30,7)=	0.0000	B(30,10)=	0.0000
B(31,1)=	0.0000	B(31,4)=	-0.0001	B(31,7)=	0.0000	B(31,10)=	-0.0001
B(32,1)=	0.0000	B(32,4)=	-0.0001	B(32,7)=	0.0000	B(32,10)=	0.0000
B(33,1)=	0.0000	B(33,4)=	-0.0001	B(33,7)=	0.0000	B(33,10)=	0.0000
B(34,1)=	0.0001	B(34,4)=	0.0000	B(34,7)=	0.0000	B(34,10)=	0.0000
B(35,1)=	0.0000	B(35,4)=	-0.0001	B(35,7)=	0.0000	B(35,10)=	0.0000
B(36,1)=	0.0000	B(36,4)=	0.0000	B(36,7)=	0.0000	B(36,10)=	0.0000
B(37,1)=	-0.0001	B(37,4)=	-0.0002	B(37,7)=	0.0000	B(37,10)=	0.0000
B(38,1)=	-0.0001	B(38,4)=	-0.0002	B(38,7)=	0.0000	B(38,10)=	0.0001
B(39,1)=	-0.0001	B(39,4)=	-0.0002	B(39,7)=	0.0000	B(39,10)=	0.0001
B(40,1)=	-0.0001	B(40,4)=	-0.0001	B(40,7)=	0.0000	B(40,10)=	-0.0001
B(41,1)=	0.0000	B(41,4)=	-0.0001	B(41,7)=	0.0000	B(41,10)=	0.0000
B(42,1)=	0.0000	B(42,4)=	-0.0001	B(42,7)=	0.0000	B(42,10)=	0.0000
B(43,1)=	-0.0001	B(43,4)=	-0.0001	B(43,7)=	0.0000	B(43,10)=	0.0001
B(44,1)=	-0.0001	B(44,4)=	-0.0003	B(44,7)=	0.0000	B(44,10)=	0.0002
B(45,1)=	-0.0001	B(45,4)=	-0.0002	B(45,7)=	0.0000	B(45,10)=	0.0001
B(46,1)=	-0.0001	B(46,4)=	-0.0001	B(46,7)=	0.0000	B(46,10)=	0.0000
B(47,1)=	-0.0001	B(47,4)=	-0.0001	B(47,7)=	0.0000	B(47,10)=	0.0000
B(48,1)=	-0.0001	B(48,4)=	-0.0001	B(48,7)=	0.0000	B(48,10)=	0.0000
B(1,2)=	-0.0001	B(1,5)=	-0.0001	B(1,8)=	-0.0002	B(1,11)=	-0.0006
B(2,2)=	0.0001	B(2,5)=	0.0004	B(2,8)=	0.0000	B(2,11)=	-0.0016
B(3,2)=	0.0001	B(3,5)=	0.0000	B(3,8)=	0.0000	B(3,11)=	-0.0012
B(4,2)=	0.0000	B(4,5)=	-0.0005	B(4,8)=	0.0001	B(4,11)=	0.0001
B(5,2)=	0.0003	B(5,5)=	0.0000	B(5,8)=	0.0003	B(5,11)=	-0.0003
B(6,2)=	0.0002	B(6,5)=	-0.0001	B(6,8)=	0.0002	B(6,11)=	-0.0002
B(7,2)=	0.0000	B(7,5)=	0.0005	B(7,8)=	-0.0001	B(7,11)=	-0.0015

B(8,2)=	0.0001	B(8,5)=	0.0003	B(8,8)=	0.0000	B(8,11)=	-0.0017
B(9,2)=	0.0001	B(9,5)=	-0.0001	B(9,8)=	0.0000	B(9,11)=	-0.0014
B(10,2)=	0.0001	B(10,5)=	0.0001	B(10,8)=	0.0000	B(10,11)=	-0.0004
B(11,2)=	0.0003	B(11,5)=	0.0005	B(11,8)=	0.0002	B(11,11)=	-0.0008
B(12,2)=	0.0002	B(12,5)=	0.0004	B(12,8)=	0.0001	B(12,11)=	-0.0007
B(13,2)=	0.0001	B(13,5)=	0.0022	B(13,8)=	-0.0003	B(13,11)=	-0.0063
B(14,2)=	0.0004	B(14,5)=	0.0025	B(14,8)=	-0.0003	B(14,11)=	-0.0057
B(15,2)=	0.0004	B(15,5)=	0.0017	B(15,8)=	-0.0002	B(15,11)=	-0.0049
B(16,2)=	0.0006	B(16,5)=	0.0009	B(16,8)=	0.0005	B(16,11)=	-0.0025
B(17,2)=	0.0009	B(17,5)=	0.0019	B(17,8)=	0.0004	B(17,11)=	-0.0025
B(18,2)=	0.0007	B(18,5)=	0.0016	B(18,8)=	0.0003	B(18,11)=	-0.0024
B(19,2)=	0.0000	B(19,5)=	0.0001	B(19,8)=	0.0000	B(19,11)=	0.0000
B(20,2)=	0.0000	B(20,5)=	0.0002	B(20,8)=	0.0000	B(20,11)=	-0.0001
B(21,2)=	0.0000	B(21,5)=	0.0002	B(21,8)=	0.0000	B(21,11)=	-0.0001
B(22,2)=	0.0000	B(22,5)=	0.0001	B(22,8)=	0.0000	B(22,11)=	0.0000
B(23,2)=	0.0000	B(23,5)=	0.0001	B(23,8)=	0.0000	B(23,11)=	-0.0001
B(24,2)=	0.0000	B(24,5)=	0.0001	B(24,8)=	0.0000	B(24,11)=	-0.0001
B(25,2)=	0.0000	B(25,5)=	0.0001	B(25,8)=	0.0000	B(25,11)=	-0.0001
B(26,2)=	0.0000	B(26,5)=	0.0002	B(26,8)=	0.0000	B(26,11)=	-0.0001
B(27,2)=	0.0000	B(27,5)=	0.0001	B(27,8)=	0.0000	B(27,11)=	-0.0001
B(28,2)=	0.0000	B(28,5)=	0.0000	B(28,8)=	0.0000	B(28,11)=	0.0000
B(29,2)=	0.0000	B(29,5)=	0.0001	B(29,8)=	0.0000	B(29,11)=	-0.0001
B(30,2)=	0.0000	B(30,5)=	0.0001	B(30,8)=	0.0000	B(30,11)=	-0.0001
B(31,2)=	0.0000	B(31,5)=	0.0001	B(31,8)=	0.0000	B(31,11)=	0.0000
B(32,2)=	0.0000	B(32,5)=	0.0001	B(32,8)=	0.0000	B(32,11)=	-0.0001
B(33,2)=	0.0000	B(33,5)=	0.0001	B(33,8)=	0.0000	B(33,11)=	0.0000
B(34,2)=	0.0000	B(34,5)=	-0.0001	B(34,8)=	0.0000	B(34,11)=	0.0000
B(35,2)=	0.0000	B(35,5)=	0.0001	B(35,8)=	0.0000	B(35,11)=	0.0000
B(36,2)=	0.0000	B(36,5)=	0.0001	B(36,8)=	0.0000	B(36,11)=	0.0000
B(37,2)=	0.0000	B(37,5)=	0.0002	B(37,8)=	0.0000	B(37,11)=	-0.0001
B(38,2)=	0.0000	B(38,5)=	0.0003	B(38,8)=	0.0000	B(38,11)=	-0.0002
B(39,2)=	0.0000	B(39,5)=	0.0002	B(39,8)=	0.0000	B(39,11)=	-0.0001
B(40,2)=	0.0000	B(40,5)=	0.0001	B(40,8)=	0.0000	B(40,11)=	0.0001
B(41,2)=	0.0000	B(41,5)=	0.0001	B(41,8)=	0.0000	B(41,11)=	0.0000
B(42,2)=	0.0000	B(42,5)=	0.0001	B(42,8)=	0.0000	B(42,11)=	0.0000
B(43,2)=	0.0000	B(43,5)=	0.0001	B(43,8)=	0.0000	B(43,11)=	-0.0001
B(44,2)=	0.0000	B(44,5)=	0.0003	B(44,8)=	0.0000	B(44,11)=	-0.0002
B(45,2)=	0.0000	B(45,5)=	0.0002	B(45,8)=	0.0000	B(45,11)=	-0.0002
B(46,2)=	0.0000	B(46,5)=	0.0001	B(46,8)=	0.0000	B(46,11)=	0.0000
B(47,2)=	0.0000	B(47,5)=	0.0001	B(47,8)=	0.0000	B(47,11)=	0.0000
B(48,2)=	0.0000	B(48,5)=	0.0001	B(48,8)=	0.0000	B(48,11)=	0.0000
B(1,3)=	-0.0004	B(1,6)=	0.0003	B(1,9)=	-0.0001	B(1,12)=	-0.0003
B(2,3)=	-0.0005	B(2,6)=	-0.0007	B(2,9)=	0.0002	B(2,12)=	-0.0002
B(3,3)=	-0.0004	B(3,6)=	-0.0006	B(3,9)=	0.0002	B(3,12)=	-0.0002
B(4,3)=	-0.0002	B(4,6)=	0.0001	B(4,9)=	-0.0002	B(4,12)=	-0.0001
B(5,3)=	-0.0001	B(5,6)=	-0.0004	B(5,9)=	-0.0001	B(5,12)=	-0.0003
B(6,3)=	-0.0001	B(6,6)=	-0.0003	B(6,9)=	0.0000	B(6,12)=	-0.0003

B(7,3)=	-0.0003	B(7,6)=	0.0003	B(7,9)=	-0.0002	B(7,12)=	-0.0002
B(8,3)=	-0.0006	B(8,6)=	-0.0008	B(8,9)=	0.0004	B(8,12)=	-0.0001
B(9,3)=	-0.0005	B(9,6)=	-0.0007	B(9,9)=	0.0003	B(9,12)=	-0.0001
B(10,3)=	-0.0004	B(10,6)=	0.0002	B(10,9)=	0.0000	B(10,12)=	-0.0001
B(11,3)=	-0.0001	B(11,6)=	-0.0004	B(11,9)=	0.0000	B(11,12)=	-0.0001
B(12,3)=	0.0000	B(12,6)=	-0.0004	B(12,9)=	0.0000	B(12,12)=	-0.0002
B(13,3)=	-0.0001	B(13,6)=	-0.0100	B(13,9)=	-0.0010	B(13,12)=	0.0071
B(14,3)=	0.0004	B(14,6)=	-0.0151	B(14,9)=	0.0009	B(14,12)=	0.0113
B(15,3)=	0.0004	B(15,6)=	-0.0125	B(15,9)=	0.0008	B(15,12)=	0.0105
B(16,3)=	-0.0006	B(16,6)=	-0.0040	B(16,9)=	-0.0007	B(16,12)=	0.0078
B(17,3)=	0.0002	B(17,6)=	-0.0051	B(17,9)=	0.0008	B(17,12)=	0.0059
B(18,3)=	0.0002	B(18,6)=	-0.0034	B(18,9)=	0.0007	B(18,12)=	0.0032
B(19,3)=	0.0000	B(19,6)=	0.0000	B(19,9)=	0.0000	B(19,12)=	0.0000
B(20,3)=	0.0000	B(20,6)=	0.0000	B(20,9)=	0.0000	B(20,12)=	0.0000
B(21,3)=	0.0000	B(21,6)=	0.0000	B(21,9)=	0.0000	B(21,12)=	0.0000
B(22,3)=	0.0000	B(22,6)=	0.0000	B(22,9)=	0.0000	B(22,12)=	0.0000
B(23,3)=	0.0000	B(23,6)=	0.0000	B(23,9)=	0.0000	B(23,12)=	0.0000
B(24,3)=	0.0000	B(24,6)=	0.0000	B(24,9)=	0.0000	B(24,12)=	0.0000
B(25,3)=	0.0000	B(25,6)=	0.0000	B(25,9)=	0.0000	B(25,12)=	0.0000
B(26,3)=	0.0000	B(26,6)=	0.0000	B(26,9)=	0.0000	B(26,12)=	0.0000
B(27,3)=	0.0000	B(27,6)=	0.0000	B(27,9)=	0.0000	B(27,12)=	0.0000
B(28,3)=	0.0000	B(28,6)=	0.0000	B(28,9)=	0.0000	B(28,12)=	0.0000
B(29,3)=	0.0000	B(29,6)=	0.0000	B(29,9)=	0.0000	B(29,12)=	0.0000
B(30,3)=	0.0000	B(30,6)=	0.0000	B(30,9)=	0.0000	B(30,12)=	0.0000
B(31,3)=	0.0000	B(31,6)=	0.0000	B(31,9)=	0.0000	B(31,12)=	0.0000
B(32,3)=	0.0000	B(32,6)=	0.0000	B(32,9)=	0.0000	B(32,12)=	0.0000
B(33,3)=	0.0000	B(33,6)=	0.0000	B(33,9)=	0.0000	B(33,12)=	0.0000
B(34,3)=	0.0000	B(34,6)=	0.0000	B(34,9)=	0.0000	B(34,12)=	0.0000
B(35,3)=	0.0000	B(35,6)=	0.0000	B(35,9)=	0.0000	B(35,12)=	0.0000
B(36,3)=	0.0000	B(36,6)=	0.0000	B(36,9)=	0.0000	B(36,12)=	0.0000
B(37,3)=	0.0000	B(37,6)=	0.0000	B(37,9)=	0.0000	B(37,12)=	0.0000
B(38,3)=	0.0000	B(38,6)=	0.0000	B(38,9)=	0.0000	B(38,12)=	0.0000
B(39,3)=	0.0000	B(39,6)=	0.0000	B(39,9)=	0.0000	B(39,12)=	0.0000
B(40,3)=	0.0000	B(40,6)=	0.0000	B(40,9)=	0.0000	B(40,12)=	0.0000
B(41,3)=	0.0000	B(41,6)=	0.0000	B(41,9)=	0.0000	B(41,12)=	0.0000
B(42,3)=	0.0000	B(42,6)=	0.0000	B(42,9)=	0.0000	B(42,12)=	0.0000
B(43,3)=	0.0000	B(43,6)=	0.0000	B(43,9)=	0.0000	B(43,12)=	0.0000
B(44,3)=	0.0000	B(44,6)=	0.0000	B(44,9)=	0.0000	B(44,12)=	0.0000
B(45,3)=	0.0000	B(45,6)=	0.0000	B(45,9)=	0.0000	B(45,12)=	0.0000
B(46,3)=	0.0000	B(46,6)=	0.0000	B(46,9)=	0.0000	B(46,12)=	0.0000
B(47,3)=	0.0000	B(47,6)=	0.0000	B(47,9)=	0.0000	B(47,12)=	0.0000
B(48,3)=	0.0000	B(48,6)=	0.0000	B(48,9)=	0.0000	B(48,12)=	0.0000

Sparse matrix C:

C(1,1)=	1	C(2,2)=	1	C(3,3)=	1	C(4,4)=	1
C(5,5)=	1	C(6,6)=	1				

Sparse matrix D:

D(1,1)=	-0.0012	D(1,4)=	-0.0025	D(1,7)=	0.0000	D(1,10)=	-0.0012
D(2,1)=	-0.0023	D(2,4)=	-0.0029	D(2,7)=	-0.0003	D(2,10)=	0.0025
D(3,1)=	-0.0020	D(3,4)=	-0.0019	D(3,7)=	-0.0004	D(3,10)=	0.0019
D(4,1)=	-0.0019	D(4,4)=	-0.0022	D(4,7)=	-0.0013	D(4,10)=	-0.0018
D(5,1)=	-0.0024	D(5,4)=	-0.0008	D(5,7)=	-0.0015	D(5,10)=	-0.0009
D(6,1)=	-0.0018	D(6,4)=	-0.0005	D(6,7)=	-0.0011	D(6,10)=	-0.0008
D(1,2)=	0.0004	D(1,5)=	0.0026	D(1,8)=	0.0000	D(1,11)=	0.0006
D(2,2)=	0.0006	D(2,5)=	0.0027	D(2,8)=	0.0003	D(2,11)=	-0.0029
D(3,2)=	0.0006	D(3,5)=	0.0017	D(3,8)=	0.0003	D(3,11)=	-0.0021
D(4,2)=	0.0008	D(4,5)=	0.0025	D(4,8)=	0.0005	D(4,11)=	0.0011
D(5,2)=	0.0010	D(5,5)=	0.0012	D(5,8)=	0.0005	D(5,11)=	0.0003
D(6,2)=	0.0008	D(6,5)=	0.0008	D(6,8)=	0.0004	D(6,11)=	0.0005
D(1,3)=	-0.0002	D(1,6)=	0.0003	D(1,9)=	0.0008	D(1,12)=	-0.0002
D(2,3)=	0.0000	D(2,6)=	-0.0005	D(2,9)=	-0.0001	D(2,12)=	0.0000
D(3,3)=	0.0000	D(3,6)=	-0.0005	D(3,9)=	-0.0001	D(3,12)=	-0.0001
D(4,3)=	0.0003	D(4,6)=	0.0001	D(4,9)=	0.0003	D(4,12)=	-0.0001
D(5,3)=	0.0000	D(5,6)=	-0.0004	D(5,9)=	-0.0002	D(5,12)=	-0.0001
D(6,3)=	0.0000	D(6,6)=	-0.0003	D(6,9)=	-0.0002	D(6,12)=	-0.0002

J.0.1.3 DMDc

Matrix A:

A(1,1)=	-0.2302	A(4,2)=	0.0366	A(1,4)=	0.1349	A(4,5)=	0.0779
A(2,1)=	-0.0302	A(5,2)=	-0.0023	A(2,4)=	-0.1503	A(5,5)=	-0.0693
A(3,1)=	0.0571	A(6,2)=	-0.0014	A(3,4)=	-0.0018	A(6,5)=	0.0191
A(4,1)=	-0.0114	A(1,3)=	-0.2031	A(4,4)=	-0.0991	A(1,6)=	-1.6048
A(5,1)=	0.0008	A(2,3)=	-0.1122	A(5,4)=	-0.0057	A(2,6)=	-0.0597
A(6,1)=	0.0008	A(3,3)=	-0.0641	A(6,4)=	-0.0059	A(3,6)=	0.1297
A(1,2)=	0.1692	A(4,3)=	0.0274	A(1,5)=	-2.4816	A(4,6)=	-0.2521
A(2,2)=	-0.1709	A(5,3)=	0.0030	A(2,5)=	-0.6138	A(5,6)=	0.0849
A(3,2)=	-0.0668	A(6,3)=	-0.0014	A(3,5)=	-0.5833	A(6,6)=	-0.1927

Matrix B:

B(1,1)=	0.001112	B(1,4)=	0.001165	B(1,7)=	-0.001166	B(1,10)=	-0.000342
B(2,1)=	0.000859	B(2,4)=	-0.000321	B(2,7)=	0.000840	B(2,10)=	0.000472
B(3,1)=	0.000250	B(3,4)=	-0.000039	B(3,7)=	0.000380	B(3,10)=	-0.000010
B(4,1)=	0.000171	B(4,4)=	0.000116	B(4,7)=	0.000218	B(4,10)=	0.000028
B(5,1)=	0.000018	B(5,4)=	-0.000004	B(5,7)=	0.000030	B(5,10)=	-0.000002
B(6,1)=	0.000047	B(6,4)=	0.000147	B(6,7)=	0.000013	B(6,10)=	-0.000059
B(1,2)=	-0.000427	B(1,5)=	-0.001781	B(1,8)=	0.000278	B(1,11)=	0.000014
B(2,2)=	-0.000404	B(2,5)=	0.000305	B(2,8)=	-0.000382	B(2,11)=	-0.000586
B(3,2)=	-0.000129	B(3,5)=	0.000063	B(3,8)=	-0.000215	B(3,11)=	-0.000138
B(4,2)=	-0.000041	B(4,5)=	-0.000242	B(4,8)=	-0.000077	B(4,11)=	-0.000003
B(5,2)=	-0.000015	B(5,5)=	0.000006	B(5,8)=	-0.000017	B(5,11)=	0.000004

B(6,2)=	-0.000011	B(6,5)=	-0.000176	B(6,8)=	0.000003	B(6,11)=	0.000070
B(1,3)=	0.000551	B(1,6)=	-0.004004	B(1,9)=	0.000526	B(1,12)=	0.002237
B(2,3)=	-0.000157	B(2,6)=	0.001148	B(2,9)=	0.000270	B(2,12)=	-0.000027
B(3,3)=	0.000044	B(3,6)=	-0.000224	B(3,9)=	0.000246	B(3,12)=	0.000247
B(4,3)=	0.000048	B(4,6)=	0.000112	B(4,9)=	0.000043	B(4,12)=	-0.000132
B(5,3)=	-0.000007	B(5,6)=	0.000012	B(5,9)=	0.000007	B(5,12)=	0.000055
B(6,3)=	0.000005	B(6,6)=	-0.000082	B(6,9)=	0.000013	B(6,12)=	-0.000058

Matrix C:

C(1,1)=	-0.5000	C(4,2)=	-0.7403	C(1,4)=	-0.394	C(4,5)=	0.0422
C(2,1)=	-0.5363	C(5,2)=	-0.3165	C(2,4)=	0.2445	C(5,5)=	-0.6619
C(3,1)=	-0.4716	C(6,2)=	-0.2663	C(3,4)=	0.1988	C(6,5)=	0.7468
C(4,1)=	-0.3464	C(1,3)=	0.7696	C(4,4)=	0.5641	C(1,6)=	0.0125
C(5,1)=	-0.2814	C(2,3)=	-0.2368	C(5,4)=	-0.4589	C(2,6)=	-0.6512
C(6,1)=	-0.2022	C(3,3)=	-0.2352	C(6,4)=	-0.4656	C(3,6)=	0.7579
C(1,2)=	0.0455	C(4,3)=	0.1088	C(1,5)=	-0.0183	C(4,6)=	-0.0128
C(2,2)=	0.4148	C(5,3)=	-0.4145	C(2,5)=	0.02	C(5,6)=	-0.0117
C(3,2)=	0.3267	C(6,3)=	-0.3356	C(3,5)=	0.0404	C(6,6)=	-0.0329

Matrix D: All zero sparse 6×12

J.0.1.4 OKID-ERA

Matrix A:

A(1,1)=	0.8876	A(1,13)=	-0.0167	A(1,25)=	-0.0229	A(1,37)=	-0.0022
A(2,1)=	0.1236	A(2,13)=	0.0072	A(2,25)=	-0.0025	A(2,37)=	-0.0014
A(3,1)=	-0.1948	A(3,13)=	-0.0281	A(3,25)=	-0.0240	A(3,37)=	0.0011
A(4,1)=	-0.1454	A(4,13)=	-0.0394	A(4,25)=	-0.0421	A(4,37)=	0.0000
A(5,1)=	-0.1914	A(5,13)=	-0.0354	A(5,25)=	-0.0320	A(5,37)=	0.0033
A(6,1)=	0.0094	A(6,13)=	-0.0003	A(6,25)=	-0.0119	A(6,37)=	-0.0076
A(7,1)=	-0.0071	A(7,13)=	-0.0047	A(7,25)=	0.0055	A(7,37)=	-0.0003
A(8,1)=	0.0077	A(8,13)=	-0.0300	A(8,25)=	0.0007	A(8,37)=	-0.0019
A(9,1)=	0.0078	A(9,13)=	0.0068	A(9,25)=	0.0252	A(9,37)=	0.0031
A(10,1)=	0.0094	A(10,13)=	-0.0723	A(10,25)=	0.0060	A(10,37)=	0.0057
A(11,1)=	0.0131	A(11,13)=	-0.0094	A(11,25)=	-0.0024	A(11,37)=	-0.0096
A(12,1)=	0.0225	A(12,13)=	-0.2536	A(12,25)=	-0.0157	A(12,37)=	0.0054
A(13,1)=	-0.0046	A(13,13)=	-0.4576	A(13,25)=	0.0038	A(13,37)=	-0.0033
A(14,1)=	0.0099	A(14,13)=	0.5227	A(14,25)=	-0.0114	A(14,37)=	0.0044
A(15,1)=	0.0127	A(15,13)=	-0.6126	A(15,25)=	-0.0390	A(15,37)=	-0.0125
A(16,1)=	0.0124	A(16,13)=	-0.0586	A(16,25)=	0.0094	A(16,37)=	0.0018
A(17,1)=	-0.0017	A(17,13)=	0.0618	A(17,25)=	-0.0443	A(17,37)=	-0.0130
A(18,1)=	0.0050	A(18,13)=	0.0474	A(18,25)=	0.0107	A(18,37)=	-0.0138
A(19,1)=	0.0067	A(19,13)=	-0.0864	A(19,25)=	0.1086	A(19,37)=	-0.0242
A(20,1)=	-0.0120	A(20,13)=	0.0956	A(20,25)=	-0.0968	A(20,37)=	-0.0389
A(21,1)=	0.0006	A(21,13)=	0.0832	A(21,25)=	-0.2028	A(21,37)=	0.0045

A(22,1)=	-0.0219	A(22,13)=	0.0628	A(22,25)=	-0.2223	A(22,37)=	-0.0014
A(23,1)=	0.0066	A(23,13)=	-0.0275	A(23,25)=	0.5003	A(23,37)=	0.0052
A(24,1)=	-0.0057	A(24,13)=	0.0174	A(24,25)=	0.2784	A(24,37)=	0.0120
A(25,1)=	0.0053	A(25,13)=	0.0185	A(25,25)=	0.5328	A(25,37)=	0.0023
A(26,1)=	-0.0186	A(26,13)=	-0.0027	A(26,25)=	0.3284	A(26,37)=	0.0091
A(27,1)=	-0.0072	A(27,13)=	0.0694	A(27,25)=	0.2182	A(27,37)=	0.0101
A(28,1)=	-0.0120	A(28,13)=	0.0344	A(28,25)=	0.2516	A(28,37)=	0.0197
A(29,1)=	-0.0033	A(29,13)=	0.0099	A(29,25)=	-0.0818	A(29,37)=	0.0186
A(30,1)=	-0.0014	A(30,13)=	0.0236	A(30,25)=	0.0515	A(30,37)=	-0.0397
A(31,1)=	0.0011	A(31,13)=	-0.0009	A(31,25)=	-0.0236	A(31,37)=	0.0414
A(32,1)=	0.0096	A(32,13)=	-0.0341	A(32,25)=	0.0214	A(32,37)=	0.0036
A(33,1)=	0.0216	A(33,13)=	0.0026	A(33,25)=	0.0433	A(33,37)=	-0.0241
A(34,1)=	0.0033	A(34,13)=	-0.0288	A(34,25)=	-0.1046	A(34,37)=	0.1003
A(35,1)=	-0.0138	A(35,13)=	0.0419	A(35,25)=	-0.0171	A(35,37)=	0.0995
A(36,1)=	-0.0063	A(36,13)=	-0.0086	A(36,25)=	0.0181	A(36,37)=	0.2942
A(37,1)=	0.0083	A(37,13)=	-0.0166	A(37,25)=	0.0037	A(37,37)=	-0.7453
A(38,1)=	0.0017	A(38,13)=	0.0196	A(38,25)=	-0.0210	A(38,37)=	0.0560
A(39,1)=	0.0017	A(39,13)=	-0.0112	A(39,25)=	0.0301	A(39,37)=	0.1914
A(40,1)=	-0.0115	A(40,13)=	0.0110	A(40,25)=	-0.0183	A(40,37)=	-0.4610
A(41,1)=	0.0029	A(41,13)=	0.0021	A(41,25)=	0.0448	A(41,37)=	-0.2134
A(42,1)=	0.0078	A(42,13)=	-0.0287	A(42,25)=	0.0043	A(42,37)=	0.0085
A(43,1)=	0.0084	A(43,13)=	0.0040	A(43,25)=	-0.0098	A(43,37)=	0.0406
A(44,1)=	0.0045	A(44,13)=	0.0027	A(44,25)=	-0.0032	A(44,37)=	0.0069
A(45,1)=	0.0122	A(45,13)=	-0.0447	A(45,25)=	0.0020	A(45,37)=	-0.0376
A(46,1)=	0.0031	A(46,13)=	-0.0067	A(46,25)=	-0.0485	A(46,37)=	0.0464
A(47,1)=	0.0022	A(47,13)=	-0.0496	A(47,25)=	0.0274	A(47,37)=	0.0259
A(48,1)=	-0.0085	A(48,13)=	-0.0305	A(48,25)=	-0.0513	A(48,37)=	0.0958
A(1,2)=	-0.1204	A(1,14)=	-0.0498	A(1,26)=	-0.0205	A(1,38)=	0.0169
A(2,2)=	0.9634	A(2,14)=	0.0033	A(2,26)=	0.0107	A(2,38)=	-0.0040
A(3,2)=	0.0151	A(3,14)=	-0.0528	A(3,26)=	-0.0301	A(3,38)=	0.0305
A(4,2)=	0.2030	A(4,14)=	-0.0880	A(4,26)=	-0.0477	A(4,38)=	0.0466
A(5,2)=	-0.0573	A(5,14)=	-0.0642	A(5,26)=	-0.0366	A(5,38)=	0.0391
A(6,2)=	-0.0228	A(6,14)=	-0.0321	A(6,26)=	-0.0232	A(6,38)=	0.0063
A(7,2)=	-0.0035	A(7,14)=	0.0091	A(7,26)=	-0.0047	A(7,38)=	0.0008
A(8,2)=	-0.0004	A(8,14)=	-0.0219	A(8,26)=	-0.0118	A(8,38)=	0.0073
A(9,2)=	-0.0074	A(9,14)=	0.0635	A(9,26)=	0.0257	A(9,38)=	-0.0074
A(10,2)=	0.0115	A(10,14)=	-0.0557	A(10,26)=	0.0085	A(10,38)=	0.0241
A(11,2)=	-0.0033	A(11,14)=	-0.0084	A(11,26)=	0.0089	A(11,38)=	-0.0029
A(12,2)=	-0.0143	A(12,14)=	-0.1426	A(12,26)=	0.0593	A(12,38)=	-0.0156
A(13,2)=	0.0005	A(13,14)=	-0.7031	A(13,26)=	-0.0450	A(13,38)=	-0.0054
A(14,2)=	0.0074	A(14,14)=	-0.2012	A(14,26)=	-0.0155	A(14,38)=	0.0472
A(15,2)=	0.0069	A(15,14)=	0.5437	A(15,26)=	-0.0723	A(15,38)=	0.0198
A(16,2)=	-0.0018	A(16,14)=	-0.1164	A(16,26)=	-0.0385	A(16,38)=	0.0229
A(17,2)=	-0.0046	A(17,14)=	0.1271	A(17,26)=	-0.0430	A(17,38)=	0.0079
A(18,2)=	-0.0021	A(18,14)=	0.0860	A(18,26)=	-0.0737	A(18,38)=	0.0106
A(19,2)=	0.0119	A(19,14)=	-0.0630	A(19,26)=	-0.0090	A(19,38)=	-0.0565
A(20,2)=	-0.0198	A(20,14)=	0.1085	A(20,26)=	-0.1196	A(20,38)=	-0.0100

A(21,2)=	-0.0099	A(21,14)=	0.1249	A(21,26)=	-0.1752	A(21,38)=	0.0921
A(22,2)=	0.0026	A(22,14)=	0.0598	A(22,26)=	-0.1273	A(22,38)=	0.0378
A(23,2)=	0.0002	A(23,14)=	-0.0293	A(23,26)=	0.0519	A(23,38)=	-0.0034
A(24,2)=	0.0061	A(24,14)=	0.0132	A(24,26)=	0.0958	A(24,38)=	0.0052
A(25,2)=	-0.0003	A(25,14)=	0.0261	A(25,26)=	-0.6859	A(25,38)=	0.0787
A(26,2)=	-0.0018	A(26,14)=	0.0213	A(26,26)=	0.3188	A(26,38)=	-0.0214
A(27,2)=	-0.0052	A(27,14)=	0.0404	A(27,26)=	0.0018	A(27,38)=	0.0568
A(28,2)=	-0.0054	A(28,14)=	0.0646	A(28,26)=	0.2227	A(28,38)=	0.0206
A(29,2)=	-0.0105	A(29,14)=	-0.0327	A(29,26)=	-0.1535	A(29,38)=	-0.0695
A(30,2)=	-0.0059	A(30,14)=	0.0161	A(30,26)=	-0.0779	A(30,38)=	0.0013
A(31,2)=	0.0018	A(31,14)=	-0.0332	A(31,26)=	-0.2032	A(31,38)=	0.0280
A(32,2)=	0.0082	A(32,14)=	-0.0089	A(32,26)=	-0.1235	A(32,38)=	-0.0959
A(33,2)=	0.0117	A(33,14)=	0.0545	A(33,26)=	0.1010	A(33,38)=	0.0510
A(34,2)=	0.0171	A(34,14)=	-0.0418	A(34,26)=	-0.3400	A(34,38)=	-0.2155
A(35,2)=	-0.0012	A(35,14)=	0.0083	A(35,26)=	-0.1377	A(35,38)=	0.1490
A(36,2)=	-0.0075	A(36,14)=	-0.0068	A(36,26)=	0.0008	A(36,38)=	-0.2511
A(37,2)=	0.0037	A(37,14)=	-0.0151	A(37,26)=	0.0149	A(37,38)=	0.1879
A(38,2)=	0.0061	A(38,14)=	0.0053	A(38,26)=	-0.0440	A(38,38)=	-0.1128
A(39,2)=	0.0023	A(39,14)=	0.0174	A(39,26)=	0.0622	A(39,38)=	-0.5410
A(40,2)=	0.0064	A(40,14)=	-0.0175	A(40,26)=	-0.0732	A(40,38)=	-0.5154
A(41,2)=	-0.0115	A(41,14)=	0.0065	A(41,26)=	-0.0099	A(41,38)=	-0.1767
A(42,2)=	-0.0089	A(42,14)=	-0.0217	A(42,26)=	0.0221	A(42,38)=	0.1123
A(43,2)=	-0.0028	A(43,14)=	-0.0058	A(43,26)=	-0.0257	A(43,38)=	0.0947
A(44,2)=	-0.0036	A(44,14)=	-0.0104	A(44,26)=	0.0203	A(44,38)=	-0.0506
A(45,2)=	0.0044	A(45,14)=	-0.0207	A(45,26)=	0.0257	A(45,38)=	0.0530
A(46,2)=	-0.0068	A(46,14)=	-0.0552	A(46,26)=	-0.0520	A(46,38)=	0.1186
A(47,2)=	0.0115	A(47,14)=	0.0160	A(47,26)=	0.0464	A(47,38)=	0.1030
A(48,2)=	-0.0059	A(48,14)=	-0.0293	A(48,26)=	0.0202	A(48,38)=	0.2044
A(1,3)=	-0.1829	A(1,15)=	-0.0406	A(1,27)=	0.0222	A(1,39)=	0.0001
A(2,3)=	-0.1378	A(2,15)=	0.0051	A(2,27)=	0.0016	A(2,39)=	-0.0006
A(3,3)=	-0.6783	A(3,15)=	-0.0501	A(3,27)=	0.0277	A(3,39)=	-0.0014
A(4,3)=	0.5633	A(4,15)=	-0.0846	A(4,27)=	0.0468	A(4,39)=	-0.0004
A(5,3)=	-0.0476	A(5,15)=	-0.0690	A(5,27)=	0.0367	A(5,39)=	-0.0035
A(6,3)=	-0.0137	A(6,15)=	-0.0299	A(6,27)=	0.0184	A(6,39)=	-0.0035
A(7,3)=	0.0033	A(7,15)=	0.0176	A(7,27)=	-0.0137	A(7,39)=	0.0010
A(8,3)=	0.0259	A(8,15)=	0.0101	A(8,27)=	-0.0051	A(8,39)=	-0.0030
A(9,3)=	0.0045	A(9,15)=	0.0567	A(9,27)=	-0.0226	A(9,39)=	-0.0034
A(10,3)=	0.0246	A(10,15)=	-0.0530	A(10,27)=	-0.0080	A(10,39)=	0.0033
A(11,3)=	0.0121	A(11,15)=	0.0106	A(11,27)=	-0.0040	A(11,39)=	0.0021
A(12,3)=	0.0507	A(12,15)=	0.0341	A(12,27)=	-0.0477	A(12,39)=	-0.0135
A(13,3)=	0.0006	A(13,15)=	0.3101	A(13,27)=	-0.0090	A(13,39)=	0.0038
A(14,3)=	0.0039	A(14,15)=	0.7140	A(14,27)=	0.0023	A(14,39)=	0.0202
A(15,3)=	-0.0005	A(15,15)=	0.4624	A(15,27)=	0.0404	A(15,39)=	0.0217
A(16,3)=	0.0095	A(16,15)=	-0.1865	A(16,27)=	-0.0147	A(16,39)=	0.0063
A(17,3)=	0.0028	A(17,15)=	0.0000	A(17,27)=	0.0061	A(17,39)=	0.0004
A(18,3)=	0.0059	A(18,15)=	0.0369	A(18,27)=	0.0046	A(18,39)=	-0.0087
A(19,3)=	0.0003	A(19,15)=	-0.2536	A(19,27)=	-0.0852	A(19,39)=	0.0299

A(20,3)=	-0.0073	A(20,15)=	0.0407	A(20,27)=	0.0568	A(20,39)=	-0.0376
A(21,3)=	0.0047	A(21,15)=	0.0585	A(21,27)=	0.0553	A(21,39)=	-0.0218
A(22,3)=	-0.0217	A(22,15)=	0.0057	A(22,27)=	0.1688	A(22,39)=	-0.0079
A(23,3)=	0.0009	A(23,15)=	0.0202	A(23,27)=	0.1756	A(23,39)=	0.0077
A(24,3)=	-0.0026	A(24,15)=	0.0160	A(24,27)=	-0.3073	A(24,39)=	0.0267
A(25,3)=	0.0026	A(25,15)=	-0.0102	A(25,27)=	-0.0819	A(25,39)=	0.0058
A(26,3)=	-0.0220	A(26,15)=	0.0220	A(26,27)=	0.7198	A(26,39)=	0.0100
A(27,3)=	0.0005	A(27,15)=	0.0034	A(27,27)=	0.1412	A(27,39)=	-0.0446
A(28,3)=	-0.0077	A(28,15)=	0.0663	A(28,27)=	-0.3948	A(28,39)=	-0.0334
A(29,3)=	0.0071	A(29,15)=	0.0234	A(29,27)=	0.1667	A(29,39)=	-0.0698
A(30,3)=	-0.0015	A(30,15)=	-0.0266	A(30,27)=	-0.1257	A(30,39)=	-0.0525
A(31,3)=	0.0002	A(31,15)=	-0.0292	A(31,27)=	0.1217	A(31,39)=	-0.0203
A(32,3)=	0.0137	A(32,15)=	0.0114	A(32,27)=	0.1102	A(32,39)=	0.0120
A(33,3)=	0.0266	A(33,15)=	0.0011	A(33,27)=	-0.0118	A(33,39)=	0.1204
A(34,3)=	0.0075	A(34,15)=	0.0044	A(34,27)=	0.1243	A(34,39)=	0.0610
A(35,3)=	-0.0116	A(35,15)=	-0.0168	A(35,27)=	0.0638	A(35,39)=	-0.1094
A(36,3)=	-0.0019	A(36,15)=	0.0242	A(36,27)=	-0.0275	A(36,39)=	-0.2602
A(37,3)=	0.0088	A(37,15)=	0.0027	A(37,27)=	0.0028	A(37,39)=	0.0155
A(38,3)=	0.0009	A(38,15)=	-0.0189	A(38,27)=	0.0109	A(38,39)=	0.8518
A(39,3)=	-0.0018	A(39,15)=	0.0290	A(39,27)=	-0.0650	A(39,39)=	0.0257
A(40,3)=	-0.0141	A(40,15)=	-0.0090	A(40,27)=	0.0255	A(40,39)=	-0.2184
A(41,3)=	0.0140	A(41,15)=	0.0512	A(41,27)=	-0.0279	A(41,39)=	0.2294
A(42,3)=	0.0074	A(42,15)=	-0.0005	A(42,27)=	-0.0251	A(42,39)=	0.1326
A(43,3)=	0.0131	A(43,15)=	-0.0135	A(43,27)=	0.0297	A(43,39)=	-0.0338
A(44,3)=	0.0071	A(44,15)=	-0.0259	A(44,27)=	0.0317	A(44,39)=	0.0269
A(45,3)=	0.0116	A(45,15)=	0.0127	A(45,27)=	0.0061	A(45,39)=	-0.0344
A(46,3)=	-0.0030	A(46,15)=	-0.0418	A(46,27)=	0.0368	A(46,39)=	0.0590
A(47,3)=	-0.0021	A(47,15)=	0.0562	A(47,27)=	-0.0410	A(47,39)=	-0.0435
A(48,3)=	-0.0262	A(48,15)=	-0.0354	A(48,27)=	0.0046	A(48,39)=	0.0080
A(1,4)=	0.1827	A(1,16)=	0.0064	A(1,28)=	0.0184	A(1,40)=	0.0163
A(2,4)=	0.0637	A(2,16)=	0.0046	A(2,28)=	-0.0149	A(2,40)=	-0.0004
A(3,4)=	-0.5505	A(3,16)=	0.0053	A(3,28)=	0.0364	A(3,40)=	0.0180
A(4,4)=	-0.0211	A(4,16)=	0.0109	A(4,28)=	0.0554	A(4,40)=	0.0283
A(5,4)=	0.3333	A(5,16)=	0.0021	A(5,28)=	0.0503	A(5,40)=	0.0203
A(6,4)=	0.0393	A(6,16)=	0.0174	A(6,28)=	0.0178	A(6,40)=	0.0139
A(7,4)=	-0.0024	A(7,16)=	-0.0134	A(7,28)=	-0.0047	A(7,40)=	0.0022
A(8,4)=	-0.0463	A(8,16)=	0.0071	A(8,28)=	-0.0090	A(8,40)=	0.0036
A(9,4)=	-0.0157	A(9,16)=	0.0085	A(9,28)=	-0.0221	A(9,40)=	-0.0132
A(10,4)=	-0.0481	A(10,16)=	0.0137	A(10,28)=	0.0214	A(10,40)=	0.0100
A(11,4)=	-0.0213	A(11,16)=	0.0197	A(11,28)=	-0.0118	A(11,40)=	0.0065
A(12,4)=	-0.0974	A(12,16)=	-0.0439	A(12,28)=	-0.0885	A(12,40)=	0.0152
A(13,4)=	0.0071	A(13,16)=	-0.1171	A(13,28)=	-0.0411	A(13,40)=	0.0230
A(14,4)=	-0.0073	A(14,16)=	0.1746	A(14,28)=	0.0008	A(14,40)=	0.0111
A(15,4)=	0.0077	A(15,16)=	0.1402	A(15,28)=	0.0063	A(15,40)=	0.0198
A(16,4)=	-0.0154	A(16,16)=	0.8649	A(16,28)=	-0.0276	A(16,40)=	-0.0066
A(17,4)=	-0.0019	A(17,16)=	0.0632	A(17,28)=	-0.0216	A(17,40)=	0.0378
A(18,4)=	-0.0097	A(18,16)=	-0.3583	A(18,28)=	0.0106	A(18,40)=	0.0172

A(19,4)=	0.0022	A(19,16)=	-0.0399	A(19,28)=	-0.1207	A(19,40)=	-0.0126
A(20,4)=	0.0133	A(20,16)=	-0.0777	A(20,28)=	0.0537	A(20,40)=	0.0665
A(21,4)=	-0.0043	A(21,16)=	0.0162	A(21,28)=	-0.0085	A(21,40)=	0.0955
A(22,4)=	0.0408	A(22,16)=	-0.0063	A(22,28)=	0.0891	A(22,40)=	0.0501
A(23,4)=	-0.0041	A(23,16)=	-0.0604	A(23,28)=	0.3616	A(23,40)=	-0.0356
A(24,4)=	0.0060	A(24,16)=	0.0864	A(24,28)=	0.0371	A(24,40)=	0.0234
A(25,4)=	-0.0020	A(25,16)=	-0.0095	A(25,28)=	-0.0847	A(25,40)=	0.0450
A(26,4)=	0.0431	A(26,16)=	0.0562	A(26,28)=	0.0776	A(26,40)=	0.0562
A(27,4)=	-0.0020	A(27,16)=	-0.0298	A(27,28)=	-0.7748	A(27,40)=	0.0322
A(28,4)=	0.0166	A(28,16)=	0.0421	A(28,28)=	0.2757	A(28,40)=	0.0988
A(29,4)=	-0.0163	A(29,16)=	0.0473	A(29,28)=	-0.0308	A(29,40)=	-0.0583
A(30,4)=	0.0002	A(30,16)=	-0.0572	A(30,28)=	0.1267	A(30,40)=	0.0180
A(31,4)=	-0.0042	A(31,16)=	-0.0082	A(31,28)=	0.1723	A(31,40)=	-0.0585
A(32,4)=	-0.0270	A(32,16)=	0.0319	A(32,28)=	0.0551	A(32,40)=	-0.0939
A(33,4)=	-0.0450	A(33,16)=	0.0128	A(33,28)=	0.0107	A(33,40)=	0.0333
A(34,4)=	-0.0183	A(34,16)=	0.0579	A(34,28)=	0.1494	A(34,40)=	-0.2173
A(35,4)=	0.0196	A(35,16)=	0.0149	A(35,28)=	0.1327	A(35,40)=	0.0676
A(36,4)=	0.0029	A(36,16)=	0.0321	A(36,28)=	-0.0069	A(36,40)=	-0.0848
A(37,4)=	-0.0161	A(37,16)=	-0.0081	A(37,28)=	0.0164	A(37,40)=	-0.4161
A(38,4)=	-0.0040	A(38,16)=	-0.0246	A(38,28)=	-0.0005	A(38,40)=	0.1602
A(39,4)=	0.0051	A(39,16)=	-0.0174	A(39,28)=	-0.0663	A(39,40)=	-0.2437
A(40,4)=	0.0250	A(40,16)=	0.0255	A(40,28)=	0.0318	A(40,40)=	0.5907
A(41,4)=	-0.0257	A(41,16)=	0.0489	A(41,28)=	-0.0547	A(41,40)=	-0.1117
A(42,4)=	-0.0135	A(42,16)=	0.0045	A(42,28)=	-0.0134	A(42,40)=	0.3323
A(43,4)=	-0.0268	A(43,16)=	-0.0125	A(43,28)=	0.0074	A(43,40)=	0.0782
A(44,4)=	-0.0116	A(44,16)=	-0.0028	A(44,28)=	0.0638	A(44,40)=	-0.0872
A(45,4)=	-0.0178	A(45,16)=	0.0372	A(45,28)=	-0.0008	A(45,40)=	0.1988
A(46,4)=	-0.0005	A(46,16)=	-0.0356	A(46,28)=	0.0132	A(46,40)=	0.2229
A(47,4)=	0.0089	A(47,16)=	0.0406	A(47,28)=	-0.0610	A(47,40)=	0.0846
A(48,4)=	0.0484	A(48,16)=	-0.0258	A(48,28)=	-0.0078	A(48,40)=	-0.0089
A(1,5)=	-0.0978	A(1,17)=	-0.0321	A(1,29)=	0.0069	A(1,41)=	-0.0091
A(2,5)=	0.1162	A(2,17)=	0.0086	A(2,29)=	-0.0043	A(2,41)=	0.0032
A(3,5)=	-0.1320	A(3,17)=	-0.0436	A(3,29)=	0.0069	A(3,41)=	-0.0075
A(4,5)=	-0.4185	A(4,17)=	-0.0700	A(4,29)=	0.0062	A(4,41)=	-0.0128
A(5,5)=	0.7622	A(5,17)=	-0.0546	A(5,29)=	0.0086	A(5,41)=	-0.0056
A(6,5)=	-0.0397	A(6,17)=	-0.0187	A(6,29)=	-0.0060	A(6,41)=	-0.0066
A(7,5)=	0.0139	A(7,17)=	0.0091	A(7,29)=	0.0156	A(7,41)=	-0.0076
A(8,5)=	0.0417	A(8,17)=	-0.0060	A(8,29)=	0.0073	A(8,41)=	0.0003
A(9,5)=	0.0095	A(9,17)=	0.0388	A(9,29)=	-0.0196	A(9,41)=	0.0176
A(10,5)=	0.0387	A(10,17)=	-0.0354	A(10,29)=	-0.0133	A(10,41)=	0.0283
A(11,5)=	0.0033	A(11,17)=	0.0066	A(11,29)=	0.0054	A(11,41)=	0.0077
A(12,5)=	0.0345	A(12,17)=	0.1446	A(12,29)=	0.0512	A(12,41)=	0.0143
A(13,5)=	-0.0030	A(13,17)=	0.0649	A(13,29)=	0.0878	A(13,41)=	-0.0455
A(14,5)=	0.0212	A(14,17)=	-0.1099	A(14,29)=	-0.0517	A(14,41)=	-0.0226
A(15,5)=	0.0053	A(15,17)=	-0.0888	A(15,29)=	-0.0392	A(15,41)=	-0.0688
A(16,5)=	0.0173	A(16,17)=	0.3822	A(16,29)=	-0.0260	A(16,41)=	-0.0403
A(17,5)=	-0.0027	A(17,17)=	-0.1450	A(17,29)=	0.0857	A(17,41)=	-0.0240

A(18,5)=	0.0100	A(18,17)=	0.7495	A(18,29)=	-0.0329	A(18,41)=	0.0061
A(19,5)=	0.0113	A(19,17)=	-0.3716	A(19,29)=	0.0458	A(19,41)=	-0.0512
A(20,5)=	-0.0237	A(20,17)=	0.0867	A(20,29)=	0.1395	A(20,41)=	0.0238
A(21,5)=	-0.0033	A(21,17)=	-0.0169	A(21,29)=	0.1602	A(21,41)=	-0.0510
A(22,5)=	-0.0174	A(22,17)=	0.1494	A(22,29)=	0.2448	A(22,41)=	0.0123
A(23,5)=	0.0019	A(23,17)=	0.0228	A(23,29)=	-0.3514	A(23,41)=	0.0280
A(24,5)=	-0.0011	A(24,17)=	0.0254	A(24,29)=	0.1358	A(24,41)=	-0.0135
A(25,5)=	0.0076	A(25,17)=	-0.0114	A(25,29)=	0.0004	A(25,41)=	-0.0463
A(26,5)=	-0.0305	A(26,17)=	0.0136	A(26,29)=	0.2674	A(26,41)=	-0.0342
A(27,5)=	0.0033	A(27,17)=	0.0205	A(27,29)=	0.1793	A(27,41)=	0.0559
A(28,5)=	-0.0196	A(28,17)=	0.0040	A(28,29)=	0.5470	A(28,41)=	-0.0066
A(29,5)=	-0.0022	A(29,17)=	-0.0698	A(29,29)=	-0.0841	A(29,41)=	0.1264
A(30,5)=	-0.0022	A(30,17)=	0.0155	A(30,29)=	0.0529	A(30,41)=	0.0498
A(31,5)=	0.0057	A(31,17)=	-0.0271	A(31,29)=	0.3348	A(31,41)=	0.0485
A(32,5)=	0.0139	A(32,17)=	-0.0239	A(32,29)=	0.1083	A(32,41)=	0.0043
A(33,5)=	0.0352	A(33,17)=	0.0256	A(33,29)=	-0.1988	A(33,41)=	-0.1765
A(34,5)=	0.0117	A(34,17)=	-0.0330	A(34,29)=	0.2152	A(34,41)=	0.1732
A(35,5)=	-0.0102	A(35,17)=	-0.0234	A(35,29)=	-0.1995	A(35,41)=	0.1496
A(36,5)=	-0.0116	A(36,17)=	-0.0293	A(36,29)=	-0.0396	A(36,41)=	0.0315
A(37,5)=	0.0149	A(37,17)=	-0.0011	A(37,29)=	0.1169	A(37,41)=	0.0228
A(38,5)=	0.0071	A(38,17)=	0.0350	A(38,29)=	0.0198	A(38,41)=	0.0408
A(39,5)=	0.0022	A(39,17)=	0.0358	A(39,29)=	0.0869	A(39,41)=	-0.0769
A(40,5)=	-0.0107	A(40,17)=	-0.0063	A(40,29)=	-0.0608	A(40,41)=	-0.0402
A(41,5)=	-0.0020	A(41,17)=	-0.0315	A(41,29)=	-0.0551	A(41,41)=	0.0728
A(42,5)=	0.0012	A(42,17)=	-0.0338	A(42,29)=	0.0431	A(42,41)=	0.4070
A(43,5)=	0.0127	A(43,17)=	-0.0100	A(43,29)=	0.0246	A(43,41)=	-0.3823
A(44,5)=	0.0089	A(44,17)=	-0.0251	A(44,29)=	-0.0058	A(44,41)=	0.2060
A(45,5)=	0.0104	A(45,17)=	-0.0322	A(45,29)=	0.0117	A(45,41)=	0.3792
A(46,5)=	-0.0022	A(46,17)=	-0.0248	A(46,29)=	0.1020	A(46,41)=	-0.4932
A(47,5)=	-0.0062	A(47,17)=	0.0167	A(47,29)=	0.0050	A(47,41)=	0.1697
A(48,5)=	-0.0336	A(48,17)=	-0.0087	A(48,29)=	-0.0008	A(48,41)=	0.0163
A(1,6)=	-0.0714	A(1,18)=	-0.0054	A(1,30)=	-0.0040	A(1,42)=	0.0155
A(2,6)=	0.0093	A(2,18)=	0.0000	A(2,30)=	0.0053	A(2,42)=	-0.0029
A(3,6)=	-0.0513	A(3,18)=	-0.0043	A(3,30)=	-0.0064	A(3,42)=	0.0323
A(4,6)=	-0.1003	A(4,18)=	-0.0053	A(4,30)=	-0.0092	A(4,42)=	0.0520
A(5,6)=	-0.0563	A(5,18)=	-0.0040	A(5,30)=	-0.0062	A(5,42)=	0.0432
A(6,6)=	0.9679	A(6,18)=	0.0048	A(6,30)=	-0.0101	A(6,42)=	0.0099
A(7,6)=	-0.0917	A(7,18)=	-0.0057	A(7,30)=	0.0007	A(7,42)=	-0.0093
A(8,6)=	0.0249	A(8,18)=	-0.0133	A(8,30)=	0.0021	A(8,42)=	0.0014
A(9,6)=	-0.0570	A(9,18)=	0.0034	A(9,30)=	0.0040	A(9,42)=	-0.0046
A(10,6)=	0.0064	A(10,18)=	-0.0110	A(10,30)=	-0.0317	A(10,42)=	0.0218
A(11,6)=	-0.0007	A(11,18)=	-0.0064	A(11,30)=	-0.0083	A(11,42)=	-0.0044
A(12,6)=	-0.0061	A(12,18)=	-0.1066	A(12,30)=	0.0281	A(12,42)=	-0.0650
A(13,6)=	0.0049	A(13,18)=	-0.0572	A(13,30)=	0.0243	A(13,42)=	-0.0366
A(14,6)=	-0.0013	A(14,18)=	-0.0214	A(14,30)=	0.0079	A(14,42)=	0.0449
A(15,6)=	0.0021	A(15,18)=	0.0416	A(15,30)=	0.0101	A(15,42)=	0.0192
A(16,6)=	-0.0153	A(16,18)=	-0.0179	A(16,30)=	0.0322	A(16,42)=	0.0141

A(17,6)=	0.0024	A(17,18)=	-0.9460	A(17,30)=	0.0142	A(17,42)=	-0.0207
A(18,6)=	0.0012	A(18,18)=	-0.1768	A(18,30)=	-0.0419	A(18,42)=	0.0159
A(19,6)=	0.0246	A(19,18)=	-0.0187	A(19,30)=	-0.0099	A(19,42)=	-0.0644
A(20,6)=	-0.0028	A(20,18)=	0.1209	A(20,30)=	-0.0375	A(20,42)=	-0.0282
A(21,6)=	-0.0255	A(21,18)=	0.1442	A(21,30)=	-0.0035	A(21,42)=	0.0184
A(22,6)=	0.0166	A(22,18)=	0.0404	A(22,30)=	-0.0139	A(22,42)=	0.0176
A(23,6)=	-0.0047	A(23,18)=	-0.0660	A(23,30)=	-0.0563	A(23,42)=	0.0462
A(24,6)=	0.0049	A(24,18)=	0.0196	A(24,30)=	-0.0490	A(24,42)=	-0.0178
A(25,6)=	-0.0175	A(25,18)=	0.0187	A(25,30)=	-0.0629	A(25,42)=	0.0422
A(26,6)=	-0.0023	A(26,18)=	0.0072	A(26,30)=	0.0940	A(26,42)=	-0.0392
A(27,6)=	0.0003	A(27,18)=	0.0496	A(27,30)=	0.0690	A(27,42)=	0.0269
A(28,6)=	-0.0084	A(28,18)=	0.0475	A(28,30)=	-0.0223	A(28,42)=	-0.0476
A(29,6)=	-0.0117	A(29,18)=	-0.0033	A(29,30)=	0.2353	A(29,42)=	-0.0344
A(30,6)=	0.0018	A(30,18)=	0.0153	A(30,30)=	0.9104	A(30,42)=	0.0134
A(31,6)=	-0.0058	A(31,18)=	-0.0011	A(31,30)=	-0.2053	A(31,42)=	0.0140
A(32,6)=	0.0125	A(32,18)=	-0.0119	A(32,30)=	0.0854	A(32,42)=	-0.0744
A(33,6)=	0.0190	A(33,18)=	0.0258	A(33,30)=	0.1086	A(33,42)=	-0.0041
A(34,6)=	0.0171	A(34,18)=	-0.0186	A(34,30)=	0.0301	A(34,42)=	-0.0811
A(35,6)=	-0.0115	A(35,18)=	0.0264	A(35,30)=	0.0029	A(35,42)=	-0.0054
A(36,6)=	-0.0081	A(36,18)=	-0.0020	A(36,30)=	-0.0842	A(36,42)=	-0.1071
A(37,6)=	0.0028	A(37,18)=	-0.0143	A(37,30)=	-0.0232	A(37,42)=	0.1746
A(38,6)=	0.0131	A(38,18)=	0.0131	A(38,30)=	0.0414	A(38,42)=	0.0062
A(39,6)=	0.0049	A(39,18)=	-0.0248	A(39,30)=	0.0266	A(39,42)=	0.5665
A(40,6)=	-0.0094	A(40,18)=	0.0135	A(40,30)=	-0.0308	A(40,42)=	0.0378
A(41,6)=	-0.0200	A(41,18)=	0.0112	A(41,30)=	-0.0526	A(41,42)=	-0.1668
A(42,6)=	-0.0123	A(42,18)=	-0.0160	A(42,30)=	-0.0423	A(42,42)=	0.2377
A(43,6)=	0.0027	A(43,18)=	0.0025	A(43,30)=	0.0165	A(43,42)=	0.5127
A(44,6)=	-0.0086	A(44,18)=	0.0141	A(44,30)=	-0.0399	A(44,42)=	0.1796
A(45,6)=	-0.0053	A(45,18)=	-0.0142	A(45,30)=	-0.0216	A(45,42)=	0.1658
A(46,6)=	-0.0108	A(46,18)=	-0.0210	A(46,30)=	0.0239	A(46,42)=	-0.1271
A(47,6)=	0.0177	A(47,18)=	-0.0318	A(47,30)=	0.0262	A(47,42)=	0.0327
A(48,6)=	-0.0008	A(48,18)=	-0.0223	A(48,30)=	0.0537	A(48,42)=	0.2196
A(1,7)=	0.0219	A(1,19)=	0.0156	A(1,31)=	0.0128	A(1,43)=	0.0212
A(2,7)=	0.0097	A(2,19)=	0.0004	A(2,31)=	-0.0060	A(2,43)=	-0.0094
A(3,7)=	0.0088	A(3,19)=	0.0246	A(3,31)=	0.0192	A(3,43)=	0.0338
A(4,7)=	0.0174	A(4,19)=	0.0403	A(4,31)=	0.0302	A(4,43)=	0.0505
A(5,7)=	-0.0030	A(5,19)=	0.0285	A(5,31)=	0.0224	A(5,43)=	0.0429
A(6,7)=	0.1045	A(6,19)=	-0.0001	A(6,31)=	0.0021	A(6,43)=	0.0152
A(7,7)=	0.9925	A(7,19)=	-0.0010	A(7,31)=	-0.0016	A(7,43)=	0.0005
A(8,7)=	-0.0105	A(8,19)=	0.0106	A(8,31)=	0.0051	A(8,43)=	0.0057
A(9,7)=	0.0083	A(9,19)=	-0.0091	A(9,31)=	-0.0153	A(9,43)=	-0.0136
A(10,7)=	-0.0284	A(10,19)=	0.0470	A(10,31)=	0.0021	A(10,43)=	0.0294
A(11,7)=	-0.0184	A(11,19)=	-0.0005	A(11,31)=	-0.0112	A(11,43)=	-0.0009
A(12,7)=	-0.0138	A(12,19)=	-0.1296	A(12,31)=	-0.0713	A(12,43)=	-0.0074
A(13,7)=	-0.0045	A(13,19)=	-0.0036	A(13,31)=	-0.0087	A(13,43)=	-0.0154
A(14,7)=	-0.0090	A(14,19)=	0.1923	A(14,31)=	0.0444	A(14,43)=	0.0146
A(15,7)=	-0.0054	A(15,19)=	0.1221	A(15,31)=	0.0274	A(15,43)=	0.0006

A(16,7)=	0.0047	A(16,19)=	0.1386	A(16,31)=	-0.0020	A(16,43)=	-0.0096
A(17,7)=	-0.0051	A(17,19)=	-0.0502	A(17,31)=	-0.0100	A(17,43)=	0.0101
A(18,7)=	-0.0075	A(18,19)=	0.3567	A(18,31)=	0.0055	A(18,43)=	0.0227
A(19,7)=	-0.0061	A(19,19)=	0.6967	A(19,31)=	0.0273	A(19,43)=	-0.0461
A(20,7)=	-0.0032	A(20,19)=	0.4271	A(20,31)=	-0.0349	A(20,43)=	0.0456
A(21,7)=	-0.0151	A(21,19)=	-0.1322	A(21,31)=	-0.0687	A(21,43)=	0.0618
A(22,7)=	-0.0044	A(22,19)=	-0.1125	A(22,31)=	0.1679	A(22,43)=	0.0327
A(23,7)=	0.0054	A(23,19)=	0.0168	A(23,31)=	0.0076	A(23,43)=	0.0022
A(24,7)=	-0.0009	A(24,19)=	-0.0500	A(24,31)=	0.0195	A(24,43)=	0.0074
A(25,7)=	-0.0084	A(25,19)=	-0.1278	A(25,31)=	-0.0290	A(25,43)=	0.0348
A(26,7)=	0.0024	A(26,19)=	0.0147	A(26,31)=	0.0092	A(26,43)=	-0.0089
A(27,7)=	-0.0064	A(27,19)=	-0.0416	A(27,31)=	0.0457	A(27,43)=	0.0400
A(28,7)=	-0.0085	A(28,19)=	0.0243	A(28,31)=	-0.1514	A(28,43)=	0.0377
A(29,7)=	0.0099	A(29,19)=	0.1134	A(29,31)=	-0.7356	A(29,43)=	-0.0112
A(30,7)=	-0.0018	A(30,19)=	0.0124	A(30,31)=	0.1338	A(30,43)=	0.0129
A(31,7)=	-0.0018	A(31,19)=	-0.0175	A(31,31)=	-0.2995	A(31,43)=	-0.0092
A(32,7)=	0.0019	A(32,19)=	0.0371	A(32,31)=	0.3690	A(32,43)=	-0.0447
A(33,7)=	-0.0052	A(33,19)=	-0.0581	A(33,31)=	-0.2320	A(33,43)=	0.0012
A(34,7)=	0.0042	A(34,19)=	0.0019	A(34,31)=	0.1478	A(34,43)=	-0.1426
A(35,7)=	-0.0102	A(35,19)=	-0.0459	A(35,31)=	0.0677	A(35,43)=	0.0472
A(36,7)=	0.0073	A(36,19)=	0.0559	A(36,31)=	0.0897	A(36,43)=	-0.0406
A(37,7)=	0.0022	A(37,19)=	-0.0142	A(37,31)=	-0.0222	A(37,43)=	-0.0532
A(38,7)=	-0.0044	A(38,19)=	-0.0238	A(38,31)=	-0.0738	A(38,43)=	0.0365
A(39,7)=	0.0028	A(39,19)=	-0.0287	A(39,31)=	-0.0582	A(39,43)=	0.1443
A(40,7)=	-0.0063	A(40,19)=	-0.0471	A(40,31)=	-0.0128	A(40,43)=	0.0097
A(41,7)=	0.0102	A(41,19)=	0.0465	A(41,31)=	0.1315	A(41,43)=	0.2798
A(42,7)=	0.0116	A(42,19)=	0.0463	A(42,31)=	0.0647	A(42,43)=	-0.5551
A(43,7)=	0.0026	A(43,19)=	0.0241	A(43,31)=	0.0282	A(43,43)=	-0.2684
A(44,7)=	-0.0035	A(44,19)=	-0.0007	A(44,31)=	0.0222	A(44,43)=	0.2946
A(45,7)=	0.0062	A(45,19)=	0.0127	A(45,31)=	0.0383	A(45,43)=	0.4404
A(46,7)=	0.0054	A(46,19)=	0.0274	A(46,31)=	0.0214	A(46,43)=	0.2488
A(47,7)=	0.0074	A(47,19)=	0.0098	A(47,31)=	-0.0118	A(47,43)=	0.0647
A(48,7)=	0.0000	A(48,19)=	0.0526	A(48,31)=	0.0044	A(48,43)=	0.1403
A(1,8)=	0.0310	A(1,20)=	-0.0182	A(1,32)=	0.0124	A(1,44)=	0.0108
A(2,8)=	-0.0068	A(2,20)=	0.0167	A(2,32)=	-0.0088	A(2,44)=	-0.0003
A(3,8)=	0.0495	A(3,20)=	-0.0343	A(3,32)=	0.0213	A(3,44)=	0.0188
A(4,8)=	0.0833	A(4,20)=	-0.0524	A(4,32)=	0.0305	A(4,44)=	0.0313
A(5,8)=	0.0680	A(5,20)=	-0.0402	A(5,32)=	0.0301	A(5,44)=	0.0230
A(6,8)=	0.0703	A(6,20)=	-0.0221	A(6,32)=	0.0113	A(6,44)=	0.0103
A(7,8)=	-0.0197	A(7,20)=	0.0026	A(7,32)=	-0.0001	A(7,44)=	-0.0077
A(8,8)=	0.0018	A(8,20)=	-0.0144	A(8,32)=	-0.0063	A(8,44)=	0.0014
A(9,8)=	0.9810	A(9,20)=	0.0155	A(9,32)=	-0.0131	A(9,44)=	-0.0052
A(10,8)=	0.0142	A(10,20)=	-0.0403	A(10,32)=	0.0168	A(10,44)=	-0.0095
A(11,8)=	0.0118	A(11,20)=	0.0173	A(11,32)=	-0.0070	A(11,44)=	-0.0144
A(12,8)=	0.0455	A(12,20)=	0.2030	A(12,32)=	0.0057	A(12,44)=	-0.0634
A(13,8)=	-0.0051	A(13,20)=	0.0326	A(13,32)=	-0.0044	A(13,44)=	-0.0082
A(14,8)=	-0.0027	A(14,20)=	-0.0615	A(14,32)=	-0.0362	A(14,44)=	0.0332

A(15,8)=	-0.0380	A(15,20)=	-0.0573	A(15,32)=	-0.0155	A(15,44)=	0.0472
A(16,8)=	-0.0155	A(16,20)=	0.0115	A(16,32)=	-0.0201	A(16,44)=	0.0227
A(17,8)=	-0.0061	A(17,20)=	0.0759	A(17,32)=	0.0093	A(17,44)=	-0.0126
A(18,8)=	-0.0155	A(18,20)=	-0.3315	A(18,32)=	0.0042	A(18,44)=	0.0101
A(19,8)=	0.0253	A(19,20)=	-0.1681	A(19,32)=	-0.0696	A(19,44)=	-0.0067
A(20,8)=	-0.0117	A(20,20)=	0.7401	A(20,32)=	0.0511	A(20,44)=	-0.0393
A(21,8)=	-0.0289	A(21,20)=	-0.3173	A(21,32)=	0.1073	A(21,44)=	-0.0059
A(22,8)=	0.0142	A(22,20)=	0.1953	A(22,32)=	-0.0426	A(22,44)=	0.0147
A(23,8)=	-0.0117	A(23,20)=	0.1332	A(23,32)=	0.0249	A(23,44)=	0.0277
A(24,8)=	0.0106	A(24,20)=	-0.0029	A(24,32)=	0.0231	A(24,44)=	-0.0308
A(25,8)=	-0.0156	A(25,20)=	0.0626	A(25,32)=	0.0642	A(25,44)=	0.0319
A(26,8)=	0.0032	A(26,20)=	-0.0811	A(26,32)=	0.0552	A(26,44)=	0.0023
A(27,8)=	0.0066	A(27,20)=	0.0139	A(27,32)=	-0.0402	A(27,44)=	0.0030
A(28,8)=	-0.0028	A(28,20)=	-0.1007	A(28,32)=	0.1876	A(28,44)=	-0.0364
A(29,8)=	0.0009	A(29,20)=	-0.0787	A(29,32)=	0.2733	A(29,44)=	-0.0735
A(30,8)=	-0.0009	A(30,20)=	0.0064	A(30,32)=	-0.2115	A(30,44)=	0.0158
A(31,8)=	0.0156	A(31,20)=	-0.0552	A(31,32)=	-0.7408	A(31,44)=	0.0022
A(32,8)=	0.0098	A(32,20)=	-0.0565	A(32,32)=	-0.0589	A(32,44)=	-0.0606
A(33,8)=	-0.0107	A(33,20)=	0.0416	A(33,32)=	-0.3315	A(33,44)=	0.0108
A(34,8)=	0.0341	A(34,20)=	-0.0762	A(34,32)=	0.2589	A(34,44)=	-0.0808
A(35,8)=	0.0189	A(35,20)=	-0.0481	A(35,32)=	-0.0478	A(35,44)=	-0.0439
A(36,8)=	-0.0047	A(36,20)=	-0.0585	A(36,32)=	-0.0949	A(36,44)=	-0.0353
A(37,8)=	-0.0033	A(37,20)=	0.0158	A(37,32)=	0.0581	A(37,44)=	0.1098
A(38,8)=	0.0147	A(38,20)=	0.0190	A(38,32)=	0.0478	A(38,44)=	-0.0340
A(39,8)=	-0.0182	A(39,20)=	0.0726	A(39,32)=	-0.0252	A(39,44)=	0.3030
A(40,8)=	0.0181	A(40,20)=	-0.0471	A(40,32)=	-0.0187	A(40,44)=	-0.0102
A(41,8)=	-0.0160	A(41,20)=	-0.0913	A(41,32)=	-0.1698	A(41,44)=	-0.3073
A(42,8)=	-0.0175	A(42,20)=	-0.0222	A(42,32)=	-0.0399	A(42,44)=	0.2270
A(43,8)=	0.0062	A(43,20)=	-0.0077	A(43,32)=	0.0127	A(43,44)=	-0.6699
A(44,8)=	0.0009	A(44,20)=	-0.0275	A(44,32)=	0.0581	A(44,44)=	-0.2668
A(45,8)=	-0.0113	A(45,20)=	-0.0276	A(45,32)=	-0.0306	A(45,44)=	-0.1002
A(46,8)=	0.0087	A(46,20)=	0.0091	A(46,32)=	0.0709	A(46,44)=	0.2141
A(47,8)=	-0.0174	A(47,20)=	0.0294	A(47,32)=	-0.0619	A(47,44)=	-0.0828
A(48,8)=	0.0007	A(48,20)=	0.0347	A(48,32)=	0.0241	A(48,44)=	0.0666
A(1,9)=	-0.0037	A(1,21)=	-0.0466	A(1,33)=	0.0088	A(1,45)=	0.0039
A(2,9)=	-0.0068	A(2,21)=	0.0069	A(2,33)=	-0.0052	A(2,45)=	-0.0043
A(3,9)=	0.0121	A(3,21)=	-0.0633	A(3,33)=	0.0149	A(3,45)=	0.0026
A(4,9)=	0.0139	A(4,21)=	-0.1068	A(4,33)=	0.0233	A(4,45)=	0.0050
A(5,9)=	0.0244	A(5,21)=	-0.0835	A(5,33)=	0.0223	A(5,45)=	0.0023
A(6,9)=	0.0187	A(6,21)=	-0.0394	A(6,33)=	0.0026	A(6,45)=	0.0048
A(7,9)=	-0.0118	A(7,21)=	0.0236	A(7,33)=	0.0028	A(7,45)=	-0.0012
A(8,9)=	-0.9909	A(8,21)=	0.0128	A(8,33)=	0.0019	A(8,45)=	-0.0020
A(9,9)=	-0.0029	A(9,21)=	0.0541	A(9,33)=	-0.0069	A(9,45)=	-0.0053
A(10,9)=	-0.0458	A(10,21)=	-0.0114	A(10,33)=	0.0435	A(10,45)=	0.0160
A(11,9)=	-0.0037	A(11,21)=	0.0119	A(11,33)=	0.0130	A(11,45)=	0.0015
A(12,9)=	0.0249	A(12,21)=	0.1998	A(12,33)=	0.0169	A(12,45)=	-0.0068
A(13,9)=	0.0343	A(13,21)=	0.0734	A(13,33)=	-0.0188	A(13,45)=	-0.0098

A(14,9)=	0.0091	A(14,21)=	-0.0208	A(14,33)=	-0.0127	A(14,45)=	-0.0080
A(15,9)=	0.0153	A(15,21)=	-0.1218	A(15,33)=	-0.0413	A(15,45)=	-0.0072
A(16,9)=	0.0138	A(16,21)=	0.0546	A(16,33)=	-0.0303	A(16,45)=	-0.0189
A(17,9)=	0.0071	A(17,21)=	0.0489	A(17,33)=	0.0030	A(17,45)=	-0.0058
A(18,9)=	0.0065	A(18,21)=	-0.0754	A(18,33)=	0.0054	A(18,45)=	0.0099
A(19,9)=	0.0358	A(19,21)=	0.2834	A(19,33)=	-0.0746	A(19,45)=	0.0070
A(20,9)=	-0.0224	A(20,21)=	0.0318	A(20,33)=	0.0365	A(20,45)=	0.0053
A(21,9)=	0.0052	A(21,21)=	0.7138	A(21,33)=	0.0402	A(21,45)=	-0.0220
A(22,9)=	-0.0061	A(22,21)=	0.1571	A(22,33)=	0.0168	A(22,45)=	-0.0001
A(23,9)=	-0.0120	A(23,21)=	0.2913	A(23,33)=	0.0046	A(23,45)=	0.0138
A(24,9)=	0.0038	A(24,21)=	-0.0841	A(24,33)=	0.0732	A(24,45)=	0.0165
A(25,9)=	0.0105	A(25,21)=	0.0048	A(25,33)=	-0.0163	A(25,45)=	-0.0199
A(26,9)=	-0.0089	A(26,21)=	-0.0068	A(26,33)=	-0.1032	A(26,45)=	-0.0057
A(27,9)=	0.0055	A(27,21)=	-0.1078	A(27,33)=	0.0168	A(27,45)=	-0.0156
A(28,9)=	-0.0078	A(28,21)=	-0.0904	A(28,33)=	0.0842	A(28,45)=	0.0071
A(29,9)=	-0.0107	A(29,21)=	-0.1146	A(29,33)=	0.2553	A(29,45)=	0.0074
A(30,9)=	-0.0032	A(30,21)=	0.0038	A(30,33)=	-0.1584	A(30,45)=	-0.0229
A(31,9)=	0.0021	A(31,21)=	-0.0892	A(31,33)=	-0.0594	A(31,45)=	-0.0175
A(32,9)=	0.0092	A(32,21)=	-0.0073	A(32,33)=	0.8423	A(32,45)=	0.0380
A(33,9)=	0.0259	A(33,21)=	0.0748	A(33,33)=	0.2229	A(33,45)=	0.0027
A(34,9)=	0.0105	A(34,21)=	-0.0702	A(34,33)=	-0.2706	A(34,45)=	0.0410
A(35,9)=	0.0060	A(35,21)=	-0.1015	A(35,33)=	-0.0386	A(35,45)=	-0.0476
A(36,9)=	-0.0050	A(36,21)=	-0.0061	A(36,33)=	0.0351	A(36,45)=	-0.0340
A(37,9)=	0.0090	A(37,21)=	0.0308	A(37,33)=	0.0201	A(37,45)=	-0.0049
A(38,9)=	-0.0029	A(38,21)=	-0.0184	A(38,33)=	0.0203	A(38,45)=	0.0423
A(39,9)=	0.0015	A(39,21)=	0.1306	A(39,33)=	0.0101	A(39,45)=	0.0108
A(40,9)=	0.0009	A(40,21)=	-0.0496	A(40,33)=	0.0121	A(40,45)=	-0.0988
A(41,9)=	-0.0154	A(41,21)=	0.0100	A(41,33)=	-0.0897	A(41,45)=	-0.1202
A(42,9)=	-0.0045	A(42,21)=	0.0202	A(42,33)=	0.0471	A(42,45)=	-0.1811
A(43,9)=	-0.0053	A(43,21)=	-0.0414	A(43,33)=	-0.0395	A(43,45)=	0.1287
A(44,9)=	0.0082	A(44,21)=	-0.0727	A(44,33)=	0.0321	A(44,45)=	-0.6475
A(45,9)=	0.0094	A(45,21)=	0.0160	A(45,33)=	-0.0038	A(45,45)=	0.6090
A(46,9)=	-0.0130	A(46,21)=	-0.0475	A(46,33)=	-0.0084	A(46,45)=	-0.1719
A(47,9)=	0.0076	A(47,21)=	0.1265	A(47,33)=	-0.0131	A(47,45)=	-0.2093
A(48,9)=	-0.0151	A(48,21)=	-0.0188	A(48,33)=	0.0556	A(48,45)=	-0.1424
A(1,10)=	-0.0255	A(1,22)=	-0.0002	A(1,34)=	0.0199	A(1,46)=	0.0078
A(2,10)=	-0.0213	A(2,22)=	0.0107	A(2,34)=	-0.0147	A(2,46)=	-0.0050
A(3,10)=	-0.0348	A(3,22)=	-0.0176	A(3,34)=	0.0255	A(3,46)=	0.0210
A(4,10)=	-0.0586	A(4,22)=	-0.0229	A(4,34)=	0.0373	A(4,46)=	0.0319
A(5,10)=	-0.0480	A(5,22)=	-0.0293	A(5,34)=	0.0286	A(5,46)=	0.0330
A(6,10)=	-0.0157	A(6,22)=	-0.0043	A(6,34)=	0.0047	A(6,46)=	0.0018
A(7,10)=	0.0427	A(7,22)=	-0.0100	A(7,34)=	0.0023	A(7,46)=	-0.0060
A(8,10)=	-0.0562	A(8,22)=	-0.0058	A(8,34)=	0.0168	A(8,46)=	-0.0073
A(9,10)=	0.0004	A(9,22)=	0.0014	A(9,34)=	-0.0174	A(9,46)=	-0.0021
A(10,10)=	0.9803	A(10,22)=	-0.0113	A(10,34)=	0.0343	A(10,46)=	0.0311
A(11,10)=	0.0788	A(11,22)=	-0.0045	A(11,34)=	-0.0123	A(11,46)=	-0.0073
A(12,10)=	-0.0077	A(12,22)=	0.0008	A(12,34)=	0.0102	A(12,46)=	-0.0069

A(13,10)=	-0.0393	A(13,22)=	-0.0096	A(13,34)=	0.0028	A(13,46)=	-0.0343
A(14,10)=	0.0388	A(14,22)=	0.0331	A(14,34)=	0.0091	A(14,46)=	-0.0013
A(15,10)=	-0.0037	A(15,22)=	0.0484	A(15,34)=	-0.0205	A(15,46)=	-0.0266
A(16,10)=	-0.0168	A(16,22)=	-0.0282	A(16,34)=	-0.0436	A(16,46)=	-0.0161
A(17,10)=	0.0025	A(17,22)=	-0.0386	A(17,34)=	0.0083	A(17,46)=	-0.0166
A(18,10)=	0.0005	A(18,22)=	0.0001	A(18,34)=	0.0420	A(18,46)=	-0.0060
A(19,10)=	-0.0489	A(19,22)=	0.1936	A(19,34)=	0.0189	A(19,46)=	-0.0875
A(20,10)=	0.0230	A(20,22)=	-0.2810	A(20,34)=	0.0323	A(20,46)=	-0.0028
A(21,10)=	0.0086	A(21,22)=	-0.2472	A(21,34)=	-0.0079	A(21,46)=	0.0128
A(22,10)=	0.0418	A(22,22)=	0.7956	A(22,34)=	0.0966	A(22,46)=	-0.0014
A(23,10)=	-0.0019	A(23,22)=	0.1029	A(23,34)=	-0.0143	A(23,46)=	0.0305
A(24,10)=	-0.0203	A(24,22)=	0.0745	A(24,34)=	0.0670	A(24,46)=	0.0234
A(25,10)=	-0.0019	A(25,22)=	0.0474	A(25,34)=	-0.0235	A(25,46)=	-0.0021
A(26,10)=	0.0059	A(26,22)=	-0.0825	A(26,34)=	0.0033	A(26,46)=	0.0157
A(27,10)=	0.0392	A(27,22)=	-0.0072	A(27,34)=	0.1114	A(27,46)=	0.0079
A(28,10)=	0.0060	A(28,22)=	0.0406	A(28,34)=	0.1039	A(28,46)=	0.0378
A(29,10)=	-0.0109	A(29,22)=	0.2335	A(29,34)=	-0.0532	A(29,46)=	0.0631
A(30,10)=	0.0350	A(30,22)=	-0.0244	A(30,34)=	-0.0958	A(30,46)=	-0.0309
A(31,10)=	0.0133	A(31,22)=	-0.0937	A(31,34)=	-0.1742	A(31,46)=	0.0018
A(32,10)=	-0.0318	A(32,22)=	-0.0877	A(32,34)=	-0.1002	A(32,46)=	-0.0152
A(33,10)=	-0.0286	A(33,22)=	-0.0455	A(33,34)=	0.7609	A(33,46)=	-0.0621
A(34,10)=	-0.0130	A(34,22)=	-0.1639	A(34,34)=	0.4713	A(34,46)=	0.0463
A(35,10)=	0.0281	A(35,22)=	-0.0486	A(35,34)=	0.0596	A(35,46)=	0.0164
A(36,10)=	-0.0010	A(36,22)=	0.0319	A(36,34)=	0.0674	A(36,46)=	0.0669
A(37,10)=	-0.0008	A(37,22)=	-0.0219	A(37,34)=	0.0368	A(37,46)=	-0.0102
A(38,10)=	0.0060	A(38,22)=	-0.0425	A(38,34)=	-0.1627	A(38,46)=	-0.0091
A(39,10)=	0.0098	A(39,22)=	0.0027	A(39,34)=	0.0071	A(39,46)=	0.0413
A(40,10)=	0.0090	A(40,22)=	-0.0429	A(40,34)=	0.0100	A(40,46)=	0.1006
A(41,10)=	-0.0108	A(41,22)=	0.1139	A(41,34)=	0.0768	A(41,46)=	0.4518
A(42,10)=	-0.0077	A(42,22)=	0.0461	A(42,34)=	0.1196	A(42,46)=	-0.0027
A(43,10)=	-0.0029	A(43,22)=	0.0218	A(43,34)=	-0.0189	A(43,46)=	0.0068
A(44,10)=	0.0024	A(44,22)=	0.0036	A(44,34)=	0.0238	A(44,46)=	-0.4867
A(45,10)=	-0.0399	A(45,22)=	0.0079	A(45,34)=	0.0819	A(45,46)=	-0.2687
A(46,10)=	0.0106	A(46,22)=	0.0158	A(46,34)=	0.0824	A(46,46)=	-0.1306
A(47,10)=	-0.0412	A(47,22)=	-0.0171	A(47,34)=	0.0141	A(47,46)=	-0.0181
A(48,10)=	-0.0193	A(48,22)=	-0.0107	A(48,34)=	0.0244	A(48,46)=	0.4356
A(1,11)=	-0.0014	A(1,23)=	-0.0247	A(1,35)=	0.0150	A(1,47)=	0.0130
A(2,11)=	-0.0077	A(2,23)=	0.0053	A(2,35)=	0.0004	A(2,47)=	-0.0151
A(3,11)=	0.0054	A(3,23)=	-0.0312	A(3,35)=	0.0291	A(3,47)=	0.0190
A(4,11)=	0.0031	A(4,23)=	-0.0526	A(4,35)=	0.0492	A(4,47)=	0.0249
A(5,11)=	0.0093	A(5,23)=	-0.0416	A(5,35)=	0.0418	A(5,47)=	0.0192
A(6,11)=	-0.0041	A(6,23)=	-0.0212	A(6,35)=	0.0113	A(6,47)=	-0.0045
A(7,11)=	0.0209	A(7,23)=	0.0029	A(7,35)=	-0.0149	A(7,47)=	0.0108
A(8,11)=	0.0044	A(8,23)=	0.0043	A(8,35)=	-0.0084	A(8,47)=	0.0121
A(9,11)=	-0.0149	A(9,23)=	0.0359	A(9,35)=	-0.0020	A(9,47)=	-0.0159
A(10,11)=	-0.0887	A(10,23)=	0.0127	A(10,35)=	0.0388	A(10,47)=	0.0331
A(11,11)=	0.9877	A(11,23)=	0.0033	A(11,35)=	0.0064	A(11,47)=	-0.0064

A(12,11)=	-0.0686	A(12,23)=	0.0621	A(12,35)=	-0.0565	A(12,47)=	-0.0239
A(13,11)=	0.0053	A(13,23)=	-0.0325	A(13,35)=	-0.0670	A(13,47)=	0.0117
A(14,11)=	-0.0120	A(14,23)=	0.0276	A(14,35)=	0.0332	A(14,47)=	0.0133
A(15,11)=	-0.0020	A(15,23)=	-0.0698	A(15,35)=	0.0059	A(15,47)=	-0.0123
A(16,11)=	-0.0135	A(16,23)=	-0.0043	A(16,35)=	-0.0072	A(16,47)=	-0.0239
A(17,11)=	-0.0088	A(17,23)=	-0.0416	A(17,35)=	-0.0242	A(17,47)=	0.0026
A(18,11)=	0.0097	A(18,23)=	-0.0058	A(18,35)=	0.0035	A(18,47)=	0.0109
A(19,11)=	0.0166	A(19,23)=	0.0508	A(19,35)=	-0.1166	A(19,47)=	0.0424
A(20,11)=	-0.0191	A(20,23)=	-0.0737	A(20,35)=	-0.0271	A(20,47)=	-0.0087
A(21,11)=	-0.0172	A(21,23)=	-0.1783	A(21,35)=	0.0127	A(21,47)=	-0.0195
A(22,11)=	0.0066	A(22,23)=	-0.0336	A(22,35)=	-0.0020	A(22,47)=	0.0776
A(23,11)=	0.0066	A(23,23)=	-0.4160	A(23,35)=	0.1211	A(23,47)=	-0.0301
A(24,11)=	-0.0061	A(24,23)=	-0.5187	A(24,35)=	-0.0284	A(24,47)=	0.0506
A(25,11)=	-0.0023	A(25,23)=	0.3815	A(25,35)=	0.0467	A(25,47)=	-0.0026
A(26,11)=	-0.0025	A(26,23)=	0.2316	A(26,35)=	-0.0716	A(26,47)=	0.0079
A(27,11)=	0.0004	A(27,23)=	-0.3640	A(27,35)=	-0.0105	A(27,47)=	0.0207
A(28,11)=	-0.0055	A(28,23)=	0.1050	A(28,35)=	-0.0994	A(28,47)=	0.0172
A(29,11)=	-0.0053	A(29,23)=	-0.0944	A(29,35)=	-0.0222	A(29,47)=	-0.0517
A(30,11)=	0.0029	A(30,23)=	-0.0479	A(30,35)=	0.0656	A(30,47)=	-0.0321
A(31,11)=	-0.0033	A(31,23)=	-0.1565	A(31,35)=	0.0433	A(31,47)=	-0.0096
A(32,11)=	0.0010	A(32,23)=	0.0187	A(32,35)=	-0.0567	A(32,47)=	-0.0041
A(33,11)=	0.0010	A(33,23)=	0.1367	A(33,35)=	0.0229	A(33,47)=	0.0491
A(34,11)=	0.0189	A(34,23)=	-0.1490	A(34,35)=	0.0759	A(34,47)=	0.0308
A(35,11)=	0.0034	A(35,23)=	-0.1073	A(35,35)=	-0.8505	A(35,47)=	0.0404
A(36,11)=	-0.0054	A(36,23)=	0.0182	A(36,35)=	0.2078	A(36,47)=	-0.1019
A(37,11)=	0.0031	A(37,23)=	-0.0041	A(37,35)=	-0.0655	A(37,47)=	-0.0435
A(38,11)=	-0.0026	A(38,23)=	-0.0537	A(38,35)=	-0.0200	A(38,47)=	0.1446
A(39,11)=	0.0093	A(39,23)=	0.0653	A(39,35)=	-0.2412	A(39,47)=	-0.0347
A(40,11)=	-0.0037	A(40,23)=	-0.0531	A(40,35)=	0.0294	A(40,47)=	0.1241
A(41,11)=	-0.0225	A(41,23)=	0.0513	A(41,35)=	-0.0907	A(41,47)=	-0.2439
A(42,11)=	-0.0053	A(42,23)=	0.0362	A(42,35)=	-0.0127	A(42,47)=	-0.3391
A(43,11)=	-0.0061	A(43,23)=	-0.0256	A(43,35)=	-0.0217	A(43,47)=	-0.0271
A(44,11)=	-0.0067	A(44,23)=	-0.0272	A(44,35)=	0.1135	A(44,47)=	-0.0875
A(45,11)=	-0.0022	A(45,23)=	0.0521	A(45,35)=	0.0565	A(45,47)=	-0.2344
A(46,11)=	0.0054	A(46,23)=	-0.0678	A(46,35)=	-0.0771	A(46,47)=	-0.3651
A(47,11)=	0.0108	A(47,23)=	0.1018	A(47,35)=	-0.0093	A(47,47)=	0.4390
A(48,11)=	0.0100	A(48,23)=	0.0020	A(48,35)=	0.1081	A(48,47)=	-0.1354
A(1,12)=	0.0386	A(1,24)=	0.0064	A(1,36)=	-0.0061	A(1,48)=	-0.0015
A(2,12)=	-0.0171	A(2,24)=	0.0009	A(2,36)=	-0.0067	A(2,48)=	0.0039
A(3,12)=	0.0643	A(3,24)=	-0.0010	A(3,36)=	-0.0080	A(3,48)=	-0.0118
A(4,12)=	0.1028	A(4,24)=	-0.0021	A(4,36)=	-0.0145	A(4,48)=	-0.0186
A(5,12)=	0.0923	A(5,24)=	-0.0056	A(5,36)=	-0.0122	A(5,48)=	-0.0209
A(6,12)=	0.0216	A(6,24)=	0.0032	A(6,36)=	-0.0032	A(6,48)=	-0.0050
A(7,12)=	0.0171	A(7,24)=	-0.0033	A(7,36)=	0.0004	A(7,48)=	0.0058
A(8,12)=	0.0203	A(8,24)=	0.0038	A(8,36)=	-0.0015	A(8,48)=	0.0008
A(9,12)=	-0.0911	A(9,24)=	-0.0008	A(9,36)=	0.0054	A(9,48)=	-0.0007
A(10,12)=	-0.0050	A(10,24)=	0.0368	A(10,36)=	0.0068	A(10,48)=	-0.0103

A(11,12)=	0.0396	A(11,24)=	0.0144	A(11,36)=	-0.0110	A(11,48)=	-0.0035
A(12,12)=	0.7988	A(12,24)=	0.0672	A(12,36)=	0.0024	A(12,48)=	0.0179
A(13,12)=	-0.3532	A(13,24)=	-0.0211	A(13,36)=	-0.0291	A(13,48)=	0.0296
A(14,12)=	0.2288	A(14,24)=	0.0114	A(14,36)=	0.0122	A(14,48)=	0.0101
A(15,12)=	0.0262	A(15,24)=	-0.0208	A(15,36)=	-0.0041	A(15,48)=	0.0224
A(16,12)=	-0.0285	A(16,24)=	-0.0823	A(16,36)=	-0.0024	A(16,48)=	0.0063
A(17,12)=	-0.1182	A(17,24)=	-0.0044	A(17,36)=	-0.0314	A(17,48)=	0.0183
A(18,12)=	0.0225	A(18,24)=	0.0445	A(18,36)=	0.0084	A(18,48)=	-0.0020
A(19,12)=	0.1096	A(19,24)=	0.0260	A(19,36)=	0.0224	A(19,48)=	0.0525
A(20,12)=	-0.1228	A(20,24)=	0.0537	A(20,36)=	-0.0386	A(20,48)=	-0.0152
A(21,12)=	-0.0836	A(21,24)=	0.0597	A(21,36)=	-0.0583	A(21,48)=	0.0327
A(22,12)=	-0.0250	A(22,24)=	-0.0175	A(22,36)=	-0.0470	A(22,48)=	0.0100
A(23,12)=	0.0292	A(23,24)=	-0.3360	A(23,36)=	0.0418	A(23,48)=	-0.0361
A(24,12)=	-0.0142	A(24,24)=	0.6906	A(24,36)=	0.0047	A(24,48)=	0.0224
A(25,12)=	-0.0013	A(25,24)=	0.1234	A(25,36)=	-0.0323	A(25,48)=	0.0358
A(26,12)=	-0.0047	A(26,24)=	0.2583	A(26,36)=	-0.0424	A(26,48)=	0.0369
A(27,12)=	0.0176	A(27,24)=	-0.3154	A(27,36)=	-0.0232	A(27,48)=	0.0034
A(28,12)=	-0.0069	A(28,24)=	-0.4069	A(28,36)=	-0.0327	A(28,48)=	0.0252
A(29,12)=	-0.0279	A(29,24)=	0.0623	A(29,36)=	0.0109	A(29,48)=	-0.0635
A(30,12)=	0.0053	A(30,24)=	0.0022	A(30,36)=	-0.0513	A(30,48)=	-0.0058
A(31,12)=	0.0673	A(31,24)=	-0.0481	A(31,36)=	0.0648	A(31,48)=	0.0097
A(32,12)=	0.0130	A(32,24)=	-0.0305	A(32,36)=	0.1087	A(32,48)=	-0.0027
A(33,12)=	-0.0675	A(33,24)=	0.0116	A(33,36)=	-0.0338	A(33,48)=	0.0601
A(34,12)=	0.0747	A(34,24)=	-0.0515	A(34,36)=	0.1365	A(34,48)=	0.0071
A(35,12)=	0.0457	A(35,24)=	-0.0568	A(35,36)=	-0.1996	A(35,48)=	0.0723
A(36,12)=	-0.0064	A(36,24)=	0.0259	A(36,36)=	-0.7861	A(36,48)=	-0.0315
A(37,12)=	0.0212	A(37,24)=	0.0177	A(37,36)=	-0.3460	A(37,48)=	-0.0380
A(38,12)=	0.0255	A(38,24)=	-0.0668	A(38,36)=	-0.3349	A(38,48)=	0.0435
A(39,12)=	-0.0150	A(39,24)=	0.0430	A(39,36)=	0.0931	A(39,48)=	-0.0586
A(40,12)=	0.0482	A(40,24)=	-0.0428	A(40,36)=	-0.0270	A(40,48)=	0.1108
A(41,12)=	-0.0791	A(41,24)=	0.0254	A(41,36)=	0.1425	A(41,48)=	-0.1338
A(42,12)=	-0.0258	A(42,24)=	0.0617	A(42,36)=	0.0355	A(42,48)=	-0.1112
A(43,12)=	-0.0054	A(43,24)=	-0.0187	A(43,36)=	-0.0470	A(43,48)=	-0.0778
A(44,12)=	0.0110	A(44,24)=	0.0001	A(44,36)=	0.0143	A(44,48)=	0.0872
A(45,12)=	-0.0188	A(45,24)=	0.0370	A(45,36)=	-0.0358	A(45,48)=	-0.0360
A(46,12)=	0.0381	A(46,24)=	0.0098	A(46,36)=	-0.0495	A(46,48)=	-0.3618
A(47,12)=	-0.0387	A(47,24)=	0.0416	A(47,36)=	-0.0149	A(47,48)=	-0.3690
A(48,12)=	0.0232	A(48,24)=	-0.0065	A(48,36)=	-0.0285	A(48,48)=	0.3979

Matrix B:

B(1,1)=	0.0127	B(1,4)=	0.0078	B(1,7)=	0.0060	B(1,10)=	-0.0229
B(2,1)=	0.0019	B(2,4)=	0.0151	B(2,7)=	0.0048	B(2,10)=	0.0029
B(3,1)=	0.0057	B(3,4)=	0.0148	B(3,7)=	0.0010	B(3,10)=	-0.0127
B(4,1)=	0.0102	B(4,4)=	0.0227	B(4,7)=	0.0018	B(4,10)=	-0.0183
B(5,1)=	0.0053	B(5,4)=	0.0256	B(5,7)=	-0.0032	B(5,10)=	-0.0211
B(6,1)=	0.0042	B(6,4)=	0.0183	B(6,7)=	0.0030	B(6,10)=	0.0100

B(7,1)=	-0.0001	B(7,4)=	-0.0022	B(7,7)=	0.0020	B(7,10)=	0.0031
B(8,1)=	0.0065	B(8,4)=	-0.0042	B(8,7)=	0.0080	B(8,10)=	0.0002
B(9,1)=	0.0027	B(9,4)=	0.0006	B(9,7)=	0.0017	B(9,10)=	0.0064
B(10,1)=	0.0033	B(10,4)=	0.0000	B(10,7)=	0.0003	B(10,10)=	-0.0048
B(11,1)=	-0.0043	B(11,4)=	0.0094	B(11,7)=	-0.0042	B(11,10)=	0.0014
B(12,1)=	-0.0025	B(12,4)=	0.0156	B(12,7)=	0.0013	B(12,10)=	-0.0075
B(13,1)=	0.0076	B(13,4)=	0.0008	B(13,7)=	0.0029	B(13,10)=	-0.0004
B(14,1)=	0.0011	B(14,4)=	-0.0065	B(14,7)=	-0.0052	B(14,10)=	0.0076
B(15,1)=	0.0023	B(15,4)=	-0.0017	B(15,7)=	-0.0034	B(15,10)=	0.0099
B(16,1)=	0.0011	B(16,4)=	0.0004	B(16,7)=	-0.0009	B(16,10)=	0.0057
B(17,1)=	0.0009	B(17,4)=	0.0043	B(17,7)=	-0.0002	B(17,10)=	-0.0006
B(18,1)=	0.0044	B(18,4)=	-0.0001	B(18,7)=	0.0060	B(18,10)=	0.0034
B(19,1)=	-0.0002	B(19,4)=	-0.0121	B(19,7)=	0.0006	B(19,10)=	0.0031
B(20,1)=	0.0003	B(20,4)=	0.0123	B(20,7)=	0.0004	B(20,10)=	-0.0026
B(21,1)=	0.0076	B(21,4)=	0.0128	B(21,7)=	0.0012	B(21,10)=	0.0058
B(22,1)=	0.0001	B(22,4)=	-0.0059	B(22,7)=	0.0003	B(22,10)=	-0.0029
B(23,1)=	-0.0009	B(23,4)=	0.0008	B(23,7)=	-0.0033	B(23,10)=	0.0017
B(24,1)=	-0.0001	B(24,4)=	-0.0020	B(24,7)=	-0.0002	B(24,10)=	-0.0024
B(25,1)=	0.0038	B(25,4)=	0.0023	B(25,7)=	0.0027	B(25,10)=	0.0079
B(26,1)=	-0.0002	B(26,4)=	0.0019	B(26,7)=	-0.0002	B(26,10)=	-0.0042
B(27,1)=	0.0047	B(27,4)=	0.0001	B(27,7)=	0.0069	B(27,10)=	-0.0006
B(28,1)=	0.0048	B(28,4)=	0.0084	B(28,7)=	0.0033	B(28,10)=	-0.0031
B(29,1)=	0.0002	B(29,4)=	0.0066	B(29,7)=	0.0050	B(29,10)=	-0.0061
B(30,1)=	0.0004	B(30,4)=	0.0009	B(30,7)=	-0.0010	B(30,10)=	0.0003
B(31,1)=	0.0005	B(31,4)=	-0.0030	B(31,7)=	-0.0002	B(31,10)=	0.0017
B(32,1)=	0.0011	B(32,4)=	-0.0037	B(32,7)=	-0.0033	B(32,10)=	-0.0047
B(33,1)=	-0.0024	B(33,4)=	-0.0032	B(33,7)=	-0.0047	B(33,10)=	0.0020
B(34,1)=	-0.0045	B(34,4)=	-0.0092	B(34,7)=	0.0008	B(34,10)=	-0.0075
B(35,1)=	0.0025	B(35,4)=	0.0003	B(35,7)=	0.0063	B(35,10)=	0.0003
B(36,1)=	0.0026	B(36,4)=	0.0055	B(36,7)=	0.0032	B(36,10)=	-0.0040
B(37,1)=	0.0017	B(37,4)=	-0.0040	B(37,7)=	0.0043	B(37,10)=	0.0023
B(38,1)=	-0.0063	B(38,4)=	-0.0056	B(38,7)=	-0.0059	B(38,10)=	-0.0030
B(39,1)=	0.0013	B(39,4)=	-0.0024	B(39,7)=	0.0033	B(39,10)=	0.0030
B(40,1)=	-0.0016	B(40,4)=	-0.0029	B(40,7)=	0.0000	B(40,10)=	-0.0002
B(41,1)=	-0.0039	B(41,4)=	0.0158	B(41,7)=	-0.0028	B(41,10)=	-0.0065
B(42,1)=	-0.0003	B(42,4)=	0.0067	B(42,7)=	-0.0002	B(42,10)=	0.0016
B(43,1)=	-0.0026	B(43,4)=	0.0017	B(43,7)=	-0.0041	B(43,10)=	-0.0018
B(44,1)=	0.0039	B(44,4)=	0.0010	B(44,7)=	0.0042	B(44,10)=	0.0053
B(45,1)=	0.0014	B(45,4)=	0.0020	B(45,7)=	0.0010	B(45,10)=	0.0011
B(46,1)=	-0.0020	B(46,4)=	0.0000	B(46,7)=	-0.0024	B(46,10)=	0.0042
B(47,1)=	-0.0017	B(47,4)=	-0.0034	B(47,7)=	0.0020	B(47,10)=	-0.0041
B(48,1)=	-0.0035	B(48,4)=	0.0003	B(48,7)=	-0.0022	B(48,10)=	0.0034
B(1,2)=	-0.0039	B(1,5)=	-0.0141	B(1,8)=	-0.0014	B(1,11)=	0.0342
B(2,2)=	0.0006	B(2,5)=	-0.0163	B(2,8)=	-0.0026	B(2,11)=	-0.0067
B(3,2)=	-0.0018	B(3,5)=	-0.0112	B(3,8)=	-0.0003	B(3,11)=	0.0181
B(4,2)=	-0.0032	B(4,5)=	-0.0185	B(4,8)=	0.0016	B(4,11)=	0.0290
B(5,2)=	-0.0018	B(5,5)=	-0.0235	B(5,8)=	0.0023	B(5,11)=	0.0329

B(6,2)=	-0.0016	B(6,5)=	-0.0201	B(6,8)=	-0.0013	B(6,11)=	-0.0083
B(7,2)=	0.0002	B(7,5)=	0.0021	B(7,8)=	-0.0009	B(7,11)=	-0.0023
B(8,2)=	-0.0025	B(8,5)=	0.0058	B(8,8)=	-0.0047	B(8,11)=	-0.0005
B(9,2)=	-0.0009	B(9,5)=	-0.0020	B(9,8)=	-0.0012	B(9,11)=	-0.0073
B(10,2)=	-0.0008	B(10,5)=	-0.0011	B(10,8)=	0.0010	B(10,11)=	-0.0007
B(11,2)=	0.0020	B(11,5)=	-0.0052	B(11,8)=	0.0015	B(11,11)=	0.0001
B(12,2)=	-0.0006	B(12,5)=	-0.0173	B(12,8)=	-0.0007	B(12,11)=	0.0108
B(13,2)=	-0.0027	B(13,5)=	-0.0007	B(13,8)=	-0.0017	B(13,11)=	-0.0007
B(14,2)=	-0.0002	B(14,5)=	0.0059	B(14,8)=	0.0033	B(14,11)=	-0.0110
B(15,2)=	-0.0007	B(15,5)=	0.0004	B(15,8)=	0.0013	B(15,11)=	-0.0115
B(16,2)=	0.0004	B(16,5)=	-0.0005	B(16,8)=	-0.0006	B(16,11)=	-0.0105
B(17,2)=	-0.0004	B(17,5)=	-0.0055	B(17,8)=	0.0011	B(17,11)=	0.0006
B(18,2)=	-0.0015	B(18,5)=	-0.0016	B(18,8)=	-0.0035	B(18,11)=	-0.0040
B(19,2)=	0.0003	B(19,5)=	0.0142	B(19,8)=	-0.0011	B(19,11)=	-0.0049
B(20,2)=	-0.0003	B(20,5)=	-0.0126	B(20,8)=	-0.0003	B(20,11)=	0.0056
B(21,2)=	-0.0024	B(21,5)=	-0.0179	B(21,8)=	-0.0008	B(21,11)=	-0.0041
B(22,2)=	0.0008	B(22,5)=	0.0071	B(22,8)=	0.0004	B(22,11)=	0.0033
B(23,2)=	-0.0002	B(23,5)=	-0.0002	B(23,8)=	0.0025	B(23,11)=	-0.0029
B(24,2)=	0.0003	B(24,5)=	0.0035	B(24,8)=	-0.0002	B(24,11)=	0.0029
B(25,2)=	-0.0016	B(25,5)=	-0.0049	B(25,8)=	-0.0015	B(25,11)=	-0.0077
B(26,2)=	0.0001	B(26,5)=	-0.0021	B(26,8)=	0.0000	B(26,11)=	0.0023
B(27,2)=	-0.0014	B(27,5)=	0.0000	B(27,8)=	-0.0040	B(27,11)=	0.0017
B(28,2)=	-0.0017	B(28,5)=	-0.0100	B(28,8)=	-0.0019	B(28,11)=	0.0044
B(29,2)=	0.0004	B(29,5)=	-0.0066	B(29,8)=	-0.0035	B(29,11)=	0.0065
B(30,2)=	-0.0001	B(30,5)=	-0.0018	B(30,8)=	0.0003	B(30,11)=	0.0001
B(31,2)=	-0.0001	B(31,5)=	0.0029	B(31,8)=	0.0001	B(31,11)=	-0.0011
B(32,2)=	-0.0004	B(32,5)=	0.0039	B(32,8)=	0.0024	B(32,11)=	0.0042
B(33,2)=	0.0008	B(33,5)=	0.0047	B(33,8)=	0.0024	B(33,11)=	-0.0009
B(34,2)=	0.0015	B(34,5)=	0.0128	B(34,8)=	-0.0004	B(34,11)=	0.0101
B(35,2)=	-0.0016	B(35,5)=	-0.0010	B(35,8)=	-0.0027	B(35,11)=	0.0009
B(36,2)=	-0.0012	B(36,5)=	-0.0060	B(36,8)=	-0.0018	B(36,11)=	0.0049
B(37,2)=	0.0001	B(37,5)=	0.0045	B(37,8)=	-0.0032	B(37,11)=	-0.0021
B(38,2)=	0.0027	B(38,5)=	0.0065	B(38,8)=	0.0023	B(38,11)=	0.0000
B(39,2)=	-0.0005	B(39,5)=	0.0019	B(39,8)=	-0.0017	B(39,11)=	-0.0027
B(40,2)=	0.0003	B(40,5)=	0.0035	B(40,8)=	-0.0011	B(40,11)=	0.0003
B(41,2)=	0.0016	B(41,5)=	-0.0169	B(41,8)=	0.0012	B(41,11)=	0.0063
B(42,2)=	0.0002	B(42,5)=	-0.0075	B(42,8)=	0.0001	B(42,11)=	-0.0020
B(43,2)=	0.0005	B(43,5)=	-0.0017	B(43,8)=	0.0027	B(43,11)=	0.0011
B(44,2)=	-0.0018	B(44,5)=	-0.0026	B(44,8)=	-0.0018	B(44,11)=	-0.0033
B(45,2)=	-0.0007	B(45,5)=	-0.0004	B(45,8)=	-0.0006	B(45,11)=	-0.0021
B(46,2)=	0.0001	B(46,5)=	0.0001	B(46,8)=	0.0014	B(46,11)=	-0.0023
B(47,2)=	0.0008	B(47,5)=	0.0044	B(47,8)=	-0.0019	B(47,11)=	0.0039
B(48,2)=	0.0014	B(48,5)=	0.0000	B(48,8)=	0.0013	B(48,11)=	-0.0038
B(1,3)=	0.0049	B(1,6)=	0.0406	B(1,9)=	-0.0019	B(1,12)=	-0.0347
B(2,3)=	-0.0028	B(2,6)=	-0.0162	B(2,9)=	0.0009	B(2,12)=	0.0119
B(3,3)=	-0.0031	B(3,6)=	0.0538	B(3,9)=	-0.0008	B(3,12)=	-0.0480
B(4,3)=	-0.0051	B(4,6)=	0.0805	B(4,9)=	-0.0031	B(4,12)=	-0.0730

B(5,3)=	0.0000	B(5,6)=	0.0525	B(5,9)=	-0.0021	B(5,12)=	-0.0454
B(6,3)=	-0.0034	B(6,6)=	0.0109	B(6,9)=	-0.0030	B(6,12)=	-0.0056
B(7,3)=	0.0001	B(7,6)=	-0.0019	B(7,9)=	-0.0021	B(7,12)=	-0.0005
B(8,3)=	0.0001	B(8,6)=	0.0016	B(8,9)=	-0.0003	B(8,12)=	-0.0032
B(9,3)=	0.0010	B(9,6)=	-0.0036	B(9,9)=	-0.0001	B(9,12)=	0.0052
B(10,3)=	0.0008	B(10,6)=	0.0062	B(10,9)=	0.0043	B(10,12)=	0.0003
B(11,3)=	-0.0016	B(11,6)=	0.0002	B(11,9)=	-0.0011	B(11,12)=	0.0051
B(12,3)=	-0.0019	B(12,6)=	-0.0163	B(12,9)=	0.0009	B(12,12)=	0.0112
B(13,3)=	-0.0005	B(13,6)=	-0.0022	B(13,9)=	0.0001	B(13,12)=	-0.0002
B(14,3)=	0.0011	B(14,6)=	0.0096	B(14,9)=	-0.0003	B(14,12)=	-0.0049
B(15,3)=	0.0018	B(15,6)=	0.0100	B(15,9)=	-0.0013	B(15,12)=	-0.0032
B(16,3)=	-0.0006	B(16,6)=	0.0019	B(16,9)=	0.0003	B(16,12)=	-0.0034
B(17,3)=	0.0005	B(17,6)=	-0.0006	B(17,9)=	0.0000	B(17,12)=	0.0009
B(18,3)=	0.0008	B(18,6)=	0.0030	B(18,9)=	-0.0003	B(18,12)=	-0.0022
B(19,3)=	0.0007	B(19,6)=	0.0036	B(19,9)=	0.0011	B(19,12)=	-0.0010
B(20,3)=	-0.0015	B(20,6)=	-0.0018	B(20,9)=	-0.0004	B(20,12)=	0.0046
B(21,3)=	0.0010	B(21,6)=	-0.0003	B(21,9)=	-0.0007	B(21,12)=	0.0001
B(22,3)=	0.0009	B(22,6)=	-0.0004	B(22,9)=	0.0004	B(22,12)=	-0.0079
B(23,3)=	-0.0004	B(23,6)=	0.0029	B(23,9)=	-0.0001	B(23,12)=	0.0004
B(24,3)=	-0.0002	B(24,6)=	0.0009	B(24,9)=	-0.0002	B(24,12)=	0.0018
B(25,3)=	-0.0010	B(25,6)=	0.0045	B(25,9)=	-0.0009	B(25,12)=	-0.0012
B(26,3)=	-0.0007	B(26,6)=	0.0002	B(26,9)=	0.0020	B(26,12)=	0.0032
B(27,3)=	0.0001	B(27,6)=	-0.0024	B(27,9)=	0.0005	B(27,12)=	-0.0031
B(28,3)=	0.0002	B(28,6)=	-0.0041	B(28,9)=	-0.0004	B(28,12)=	0.0030
B(29,3)=	0.0006	B(29,6)=	-0.0072	B(29,9)=	0.0009	B(29,12)=	0.0053
B(30,3)=	0.0016	B(30,6)=	-0.0005	B(30,9)=	-0.0012	B(30,12)=	-0.0009
B(31,3)=	-0.0001	B(31,6)=	-0.0028	B(31,9)=	-0.0010	B(31,12)=	-0.0019
B(32,3)=	0.0010	B(32,6)=	-0.0044	B(32,9)=	0.0001	B(32,12)=	0.0012
B(33,3)=	-0.0001	B(33,6)=	0.0047	B(33,9)=	-0.0018	B(33,12)=	-0.0017
B(34,3)=	0.0000	B(34,6)=	-0.0054	B(34,9)=	0.0003	B(34,12)=	0.0037
B(35,3)=	0.0006	B(35,6)=	-0.0041	B(35,9)=	0.0002	B(35,12)=	-0.0015
B(36,3)=	-0.0008	B(36,6)=	-0.0049	B(36,9)=	0.0003	B(36,12)=	0.0039
B(37,3)=	-0.0001	B(37,6)=	0.0021	B(37,9)=	-0.0007	B(37,12)=	-0.0010
B(38,3)=	0.0002	B(38,6)=	0.0057	B(38,9)=	0.0008	B(38,12)=	0.0021
B(39,3)=	0.0010	B(39,6)=	0.0050	B(39,9)=	-0.0008	B(39,12)=	-0.0040
B(40,3)=	-0.0004	B(40,6)=	0.0013	B(40,9)=	0.0004	B(40,12)=	0.0015
B(41,3)=	-0.0013	B(41,6)=	-0.0042	B(41,9)=	0.0027	B(41,12)=	0.0089
B(42,3)=	0.0001	B(42,6)=	-0.0018	B(42,9)=	0.0009	B(42,12)=	0.0020
B(43,3)=	0.0009	B(43,6)=	-0.0020	B(43,9)=	0.0005	B(43,12)=	0.0019
B(44,3)=	-0.0001	B(44,6)=	-0.0012	B(44,9)=	-0.0021	B(44,12)=	0.0003
B(45,3)=	-0.0007	B(45,6)=	-0.0018	B(45,9)=	0.0023	B(45,12)=	0.0005
B(46,3)=	-0.0004	B(46,6)=	-0.0026	B(46,9)=	-0.0006	B(46,12)=	0.0003
B(47,3)=	0.0007	B(47,6)=	0.0017	B(47,9)=	-0.0001	B(47,12)=	-0.0009
B(48,3)=	-0.0008	B(48,6)=	0.0010	B(48,9)=	-0.0004	B(48,12)=	0.0012

Matrix C:

C(1,1)=	-0.0135	C(1,13)=	-0.0050	C(1,25)=	0.0074	C(1,37)=	0.0018
C(2,1)=	-0.0461	C(2,13)=	-0.0019	C(2,25)=	-0.0036	C(2,37)=	-0.0018
C(3,1)=	-0.0403	C(3,13)=	-0.0015	C(3,25)=	-0.0027	C(3,37)=	-0.0016
C(4,1)=	-0.0021	C(4,13)=	-0.0016	C(4,25)=	-0.0011	C(4,37)=	0.0008
C(5,1)=	-0.0217	C(5,13)=	0.0028	C(5,25)=	-0.0008	C(5,37)=	0.0001
C(6,1)=	-0.0163	C(6,13)=	0.0037	C(6,25)=	0.0003	C(6,37)=	0.0009
C(1,2)=	0.0034	C(1,14)=	0.0073	C(1,26)=	0.0017	C(1,38)=	0.0029
C(2,2)=	-0.0128	C(2,14)=	-0.0061	C(2,26)=	0.0015	C(2,38)=	0.0000
C(3,2)=	-0.0078	C(3,14)=	-0.0058	C(3,26)=	0.0007	C(3,38)=	0.0006
C(4,2)=	0.0208	C(4,14)=	0.0028	C(4,26)=	-0.0071	C(4,38)=	0.0012
C(5,2)=	0.0017	C(5,14)=	-0.0010	C(5,26)=	-0.0033	C(5,38)=	-0.0013
C(6,2)=	0.0054	C(6,14)=	0.0001	C(6,26)=	-0.0020	C(6,38)=	-0.0011
C(1,3)=	-0.0360	C(1,15)=	0.0064	C(1,27)=	-0.0030	C(1,39)=	-0.0015
C(2,3)=	-0.0456	C(2,15)=	-0.0027	C(2,27)=	0.0000	C(2,39)=	0.0028
C(3,3)=	-0.0394	C(3,15)=	-0.0031	C(3,27)=	-0.0007	C(3,39)=	0.0027
C(4,3)=	-0.0233	C(4,15)=	0.0004	C(4,27)=	-0.0044	C(4,39)=	0.0010
C(5,3)=	-0.0185	C(5,15)=	-0.0002	C(5,27)=	0.0019	C(5,39)=	-0.0025
C(6,3)=	-0.0123	C(6,15)=	0.0009	C(6,27)=	0.0011	C(6,39)=	-0.0028
C(1,4)=	0.0651	C(1,16)=	-0.0025	C(1,28)=	0.0013	C(1,40)=	-0.0055
C(2,4)=	0.0773	C(2,16)=	0.0035	C(2,28)=	-0.0035	C(2,40)=	0.0027
C(3,4)=	0.0678	C(3,16)=	0.0032	C(3,28)=	-0.0024	C(3,40)=	0.0012
C(4,4)=	0.0434	C(4,16)=	-0.0061	C(4,28)=	0.0051	C(4,40)=	-0.0002
C(5,4)=	0.0359	C(5,16)=	0.0011	C(5,28)=	-0.0001	C(5,40)=	-0.0011
C(6,4)=	0.0254	C(6,16)=	0.0021	C(6,28)=	0.0000	C(6,40)=	-0.0019
C(1,5)=	-0.0438	C(1,17)=	0.0040	C(1,29)=	0.0039	C(1,41)=	0.0068
C(2,5)=	-0.0426	C(2,17)=	-0.0019	C(2,29)=	-0.0048	C(2,41)=	0.0015
C(3,5)=	-0.0357	C(3,17)=	-0.0008	C(3,29)=	-0.0047	C(3,41)=	0.0007
C(4,5)=	-0.0279	C(4,17)=	0.0018	C(4,29)=	0.0004	C(4,41)=	-0.0060
C(5,5)=	-0.0170	C(5,17)=	-0.0001	C(5,29)=	0.0022	C(5,41)=	-0.0054
C(6,5)=	-0.0125	C(6,17)=	0.0003	C(6,29)=	0.0026	C(6,41)=	-0.0042
C(1,6)=	0.0080	C(1,18)=	-0.0010	C(1,30)=	-0.0005	C(1,42)=	0.0038
C(2,6)=	-0.0104	C(2,18)=	-0.0005	C(2,30)=	-0.0013	C(2,42)=	0.0018
C(3,6)=	-0.0080	C(3,18)=	-0.0013	C(3,30)=	0.0002	C(3,42)=	0.0017
C(4,6)=	0.0090	C(4,18)=	-0.0007	C(4,30)=	0.0027	C(4,42)=	-0.0006
C(5,6)=	-0.0071	C(5,18)=	-0.0007	C(5,30)=	0.0004	C(5,42)=	-0.0049
C(6,6)=	-0.0052	C(6,18)=	-0.0008	C(6,30)=	0.0007	C(6,42)=	-0.0050
C(1,7)=	-0.0065	C(1,19)=	0.0025	C(1,31)=	-0.0031	C(1,43)=	-0.0006
C(2,7)=	0.0054	C(2,19)=	0.0040	C(2,31)=	0.0003	C(2,43)=	-0.0005
C(3,7)=	0.0046	C(3,19)=	0.0017	C(3,31)=	-0.0003	C(3,43)=	-0.0001
C(4,7)=	-0.0115	C(4,19)=	-0.0053	C(4,31)=	0.0014	C(4,43)=	0.0028
C(5,7)=	0.0021	C(5,19)=	-0.0056	C(5,31)=	0.0001	C(5,43)=	0.0016
C(6,7)=	0.0020	C(6,19)=	-0.0055	C(6,31)=	-0.0006	C(6,43)=	0.0006
C(1,8)=	0.0009	C(1,20)=	-0.0040	C(1,32)=	0.0015	C(1,44)=	-0.0025
C(2,8)=	0.0002	C(2,20)=	0.0005	C(2,32)=	-0.0038	C(2,44)=	-0.0003
C(3,8)=	0.0007	C(3,20)=	0.0008	C(3,32)=	-0.0036	C(3,44)=	-0.0009
C(4,8)=	0.0049	C(4,20)=	-0.0015	C(4,32)=	0.0028	C(4,44)=	-0.0006
C(5,8)=	0.0006	C(5,20)=	0.0016	C(5,32)=	0.0033	C(5,44)=	-0.0002

C(6,8)=	-0.0004	C(6,20)=	0.0011	C(6,32)=	0.0032	C(6,44)=	0.0008
C(1,9)=	-0.0004	C(1,21)=	0.0045	C(1,33)=	0.0067	C(1,45)=	-0.0024
C(2,9)=	-0.0053	C(2,21)=	-0.0016	C(2,33)=	0.0012	C(2,45)=	0.0014
C(3,9)=	-0.0051	C(3,21)=	-0.0004	C(3,33)=	0.0006	C(3,45)=	0.0017
C(4,9)=	0.0009	C(4,21)=	0.0034	C(4,33)=	-0.0010	C(4,45)=	0.0003
C(5,9)=	-0.0009	C(5,21)=	-0.0014	C(5,33)=	-0.0020	C(5,45)=	0.0000
C(6,9)=	0.0000	C(6,21)=	0.0006	C(6,33)=	-0.0023	C(6,45)=	-0.0005
C(1,10)=	0.0020	C(1,22)=	-0.0127	C(1,34)=	-0.0027	C(1,46)=	0.0018
C(2,10)=	-0.0034	C(2,22)=	0.0046	C(2,34)=	0.0015	C(2,46)=	0.0008
C(3,10)=	-0.0020	C(3,22)=	0.0038	C(3,34)=	0.0016	C(3,46)=	-0.0003
C(4,10)=	0.0172	C(4,22)=	-0.0077	C(4,34)=	0.0058	C(4,46)=	0.0029
C(5,10)=	0.0036	C(5,22)=	0.0025	C(5,34)=	0.0035	C(5,46)=	-0.0049
C(6,10)=	0.0039	C(6,22)=	0.0021	C(6,34)=	0.0008	C(6,46)=	-0.0052
C(1,11)=	-0.0039	C(1,23)=	0.0021	C(1,35)=	0.0053	C(1,47)=	0.0017
C(2,11)=	-0.0029	C(2,23)=	0.0007	C(2,35)=	0.0042	C(2,47)=	-0.0022
C(3,11)=	-0.0005	C(3,23)=	0.0011	C(3,35)=	0.0030	C(3,47)=	-0.0017
C(4,11)=	0.0121	C(4,23)=	-0.0021	C(4,35)=	-0.0046	C(4,47)=	0.0004
C(5,11)=	0.0039	C(5,23)=	-0.0021	C(5,35)=	-0.0077	C(5,47)=	0.0012
C(6,11)=	0.0034	C(6,23)=	-0.0011	C(6,35)=	-0.0071	C(6,47)=	0.0018
C(1,12)=	0.0160	C(1,24)=	-0.0044	C(1,36)=	-0.0053	C(1,48)=	-0.0088
C(2,12)=	-0.0007	C(2,24)=	0.0019	C(2,36)=	-0.0008	C(2,48)=	0.0019
C(3,12)=	0.0007	C(3,24)=	0.0017	C(3,36)=	-0.0001	C(3,48)=	0.0014
C(4,12)=	0.0129	C(4,24)=	-0.0063	C(4,36)=	0.0056	C(4,48)=	-0.0003
C(5,12)=	-0.0053	C(5,24)=	0.0051	C(5,36)=	0.0060	C(5,48)=	0.0006
C(6,12)=	-0.0087	C(6,24)=	0.0047	C(6,36)=	0.0040	C(6,48)=	0.0006

Matrix D:

D(1,1)=	-0.0012	D(1,4)=	-0.0018	D(1,7)=	0.0000	D(1,10)=	-0.0001
D(2,1)=	-0.0021	D(2,4)=	-0.0037	D(2,7)=	-0.0004	D(2,10)=	0.0022
D(3,1)=	-0.0019	D(3,4)=	-0.0026	D(3,7)=	-0.0005	D(3,10)=	0.0016
D(4,1)=	-0.0019	D(4,4)=	-0.0016	D(4,7)=	-0.0014	D(4,10)=	-0.0009
D(5,1)=	-0.0022	D(5,4)=	-0.0013	D(5,7)=	-0.0015	D(5,10)=	-0.0010
D(6,1)=	-0.0016	D(6,4)=	-0.0010	D(6,7)=	-0.0011	D(6,10)=	-0.0010
D(1,2)=	0.0004	D(1,5)=	0.0020	D(1,8)=	0.0000	D(1,11)=	0.0000
D(2,2)=	0.0006	D(2,5)=	0.0036	D(2,8)=	0.0004	D(2,11)=	-0.0026
D(3,2)=	0.0005	D(3,5)=	0.0025	D(3,8)=	0.0004	D(3,11)=	-0.0018
D(4,2)=	0.0008	D(4,5)=	0.0020	D(4,8)=	0.0005	D(4,11)=	0.0006
D(5,2)=	0.0009	D(5,5)=	0.0018	D(5,8)=	0.0005	D(5,11)=	0.0006
D(6,2)=	0.0007	D(6,5)=	0.0014	D(6,8)=	0.0004	D(6,11)=	0.0007
D(1,3)=	-0.0003	D(1,6)=	0.0004	D(1,9)=	0.0003	D(1,12)=	-0.0002
D(2,3)=	0.0000	D(2,6)=	0.0001	D(2,9)=	-0.0001	D(2,12)=	0.0001
D(3,3)=	0.0000	D(3,6)=	0.0001	D(3,9)=	-0.0001	D(3,12)=	0.0000
D(4,3)=	0.0002	D(4,6)=	0.0001	D(4,9)=	-0.0001	D(4,12)=	-0.0001
D(5,3)=	0.0000	D(5,6)=	0.0000	D(5,9)=	-0.0002	D(5,12)=	0.0000
D(6,3)=	0.0000	D(6,6)=	0.0000	D(6,9)=	-0.0001	D(6,12)=	0.0000

J.0.2 Obtained models - Phase C

J.0.2.1 ARX (State-Space representation)

Sparse matrix A:

A(1,1)=	-2.7549	A(20,2)=	4.5411	A(39,3)=	-0.8401	A(18,5)=	0.7290
A(2,1)=	-2.7583	A(21,2)=	2.3797	A(40,3)=	-0.6743	A(19,5)=	0.7464
A(3,1)=	-2.7640	A(22,2)=	2.3816	A(1,4)=	-1.3035	A(20,5)=	0.5805
A(4,1)=	-4.1753	A(23,2)=	2.3845	A(2,4)=	-1.3038	A(21,5)=	0.6192
A(5,1)=	-3.3460	A(24,2)=	4.1087	A(3,4)=	-1.3041	A(22,5)=	0.6194
A(6,1)=	-2.9151	A(25,2)=	3.2715	A(4,4)=	-1.4820	A(23,5)=	0.6198
A(7,1)=	-2.9180	A(26,2)=	2.1412	A(5,4)=	-1.1215	A(24,5)=	0.6161
A(8,1)=	-2.9223	A(27,2)=	2.1436	A(6,4)=	-1.3338	A(25,5)=	0.4743
A(9,1)=	-4.4885	A(28,2)=	2.1468	A(7,4)=	-1.3343	A(26,5)=	0.4995
A(10,1)=	-3.6181	A(29,2)=	4.3458	A(8,4)=	-1.3348	A(27,5)=	0.4997
A(11,1)=	-2.1766	A(30,2)=	3.5394	A(9,4)=	-1.5055	A(28,5)=	0.5000
A(12,1)=	-2.1788	A(31,2)=	1.6393	A(10,4)=	-1.1463	A(29,5)=	0.6018
A(13,1)=	-2.1822	A(32,2)=	1.6409	A(11,4)=	-1.1943	A(30,5)=	0.4445
A(14,1)=	-3.2536	A(33,2)=	1.6432	A(12,4)=	-1.1945	A(31,5)=	0.4857
A(15,1)=	-2.5966	A(34,2)=	2.7057	A(13,4)=	-1.1948	A(32,5)=	0.4859
A(16,1)=	-1.6964	A(35,2)=	2.1697	A(14,4)=	-1.3678	A(33,5)=	0.4861
A(17,1)=	-1.6982	A(36,2)=	0.8040	A(15,4)=	-1.0645	A(34,5)=	0.4702
A(18,1)=	-1.7007	A(37,2)=	0.8052	A(16,4)=	-0.7883	A(35,5)=	0.3644
A(19,1)=	-3.1186	A(38,2)=	0.8069	A(17,4)=	-0.7886	A(36,5)=	0.3120
A(20,1)=	-2.5464	A(39,2)=	1.9499	A(18,4)=	-0.7891	A(37,5)=	0.3121
A(21,1)=	-1.2325	A(40,2)=	1.5868	A(19,4)=	-0.7514	A(38,5)=	0.3121
A(22,1)=	-1.2336	A(1,3)=	-2.9248	A(20,4)=	-0.5882	A(39,5)=	0.3316
A(23,1)=	-1.2353	A(2,3)=	-2.9272	A(21,4)=	-0.6708	A(40,5)=	0.2602
A(24,1)=	-2.2934	A(3,3)=	-2.9308	A(22,4)=	-0.6711	A(1,6)=	1.0000
A(25,1)=	-1.8483	A(4,3)=	-3.7233	A(23,4)=	-0.6715	A(2,7)=	1.0000
A(26,1)=	-1.1016	A(5,3)=	-2.9278	A(24,4)=	-0.6248	A(3,8)=	1.0000
A(27,1)=	-1.1030	A(6,3)=	-2.9936	A(25,4)=	-0.4840	A(4,9)=	1.0000
A(28,1)=	-1.1049	A(7,3)=	-2.9958	A(26,4)=	-0.5466	A(5,10)=	1.0000
A(29,1)=	-2.4198	A(8,3)=	-2.9991	A(27,4)=	-0.5469	A(6,11)=	1.0000
A(30,1)=	-1.9940	A(9,3)=	-3.9348	A(28,4)=	-0.5472	A(7,12)=	1.0000
A(31,1)=	-0.8648	A(10,3)=	-3.1176	A(29,4)=	-0.6091	A(8,13)=	1.0000
A(32,1)=	-0.8658	A(11,3)=	-2.1733	A(30,4)=	-0.4556	A(9,14)=	1.0000
A(33,1)=	-0.8671	A(12,3)=	-2.1748	A(31,4)=	-0.5042	A(10,15)=	1.0000
A(34,1)=	-1.5072	A(13,3)=	-2.1771	A(32,4)=	-0.5044	A(11,16)=	1.0000
A(35,1)=	-1.2246	A(14,3)=	-2.9131	A(33,4)=	-0.5046	A(12,17)=	1.0000
A(36,1)=	-0.4117	A(15,3)=	-2.2838	A(34,4)=	-0.4628	A(13,18)=	1.0000
A(37,1)=	-0.4124	A(16,3)=	-1.6199	A(35,4)=	-0.3604	A(14,19)=	1.0000
A(38,1)=	-0.4134	A(17,3)=	-1.6213	A(36,4)=	-0.3281	A(15,20)=	1.0000
A(39,1)=	-1.0997	A(18,3)=	-1.6232	A(37,4)=	-0.3282	A(16,21)=	1.0000
A(40,1)=	-0.9050	A(19,3)=	-2.5040	A(38,4)=	-0.3282	A(17,22)=	1.0000
A(1,2)=	5.5580	A(20,3)=	-2.0030	A(39,4)=	-0.3214	A(18,23)=	1.0000
A(2,2)=	5.5637	A(21,3)=	-1.1803	A(40,4)=	-0.2526	A(19,24)=	1.0000

A(3,2)=	5.5730	A(22,3)=	-1.1811	A(1,5)=	1.1707	A(20,25)=	1.0000
A(4,2)=	7.8712	A(23,3)=	-1.1823	A(2,5)=	1.1710	A(21,26)=	1.0000
A(5,2)=	6.2503	A(24,3)=	-1.8126	A(3,5)=	1.1712	A(22,27)=	1.0000
A(6,2)=	5.8239	A(25,3)=	-1.4212	A(4,5)=	1.4601	A(23,28)=	1.0000
A(7,2)=	5.8289	A(26,3)=	-1.0730	A(5,5)=	1.0889	A(24,29)=	1.0000
A(8,2)=	5.8365	A(27,3)=	-1.0740	A(6,5)=	1.2059	A(25,30)=	1.0000
A(9,2)=	8.4120	A(28,3)=	-1.0754	A(7,5)=	1.2063	A(26,31)=	1.0000
A(10,2)=	6.7254	A(29,3)=	-1.9285	A(8,5)=	1.2068	A(27,32)=	1.0000
A(11,2)=	4.3117	A(30,3)=	-1.5484	A(9,5)=	1.4722	A(28,33)=	1.0000
A(12,2)=	4.3155	A(31,3)=	-0.7791	A(10,5)=	1.1066	A(29,34)=	1.0000
A(13,2)=	4.3211	A(32,3)=	-0.7797	A(11,5)=	1.0895	A(30,35)=	1.0000
A(14,2)=	6.1516	A(33,3)=	-0.7807	A(12,5)=	1.0898	A(31,36)=	1.0000
A(15,2)=	4.8659	A(34,3)=	-1.1920	A(13,5)=	1.0900	A(32,37)=	1.0000
A(16,2)=	3.2692	A(35,3)=	-0.9406	A(14,5)=	1.3897	A(33,38)=	1.0000
A(17,2)=	3.2723	A(36,3)=	-0.3947	A(15,5)=	1.0781	A(34,39)=	1.0000
A(18,2)=	3.2767	A(37,3)=	-0.3952	A(16,5)=	0.7283	A(35,40)=	1.0000
A(19,2)=	5.6126	A(38,3)=	-0.3959	A(17,5)=	0.7286		

Matrix B:

B(1,1)=	0.0000	B(31,4)=	0.0000	B(21,8)=	-0.0030	B(11,12)=	-0.0131
B(2,1)=	0.0000	B(32,4)=	0.0000	B(22,8)=	-0.0030	B(12,12)=	-0.0118
B(3,1)=	0.0000	B(33,4)=	0.0000	B(23,8)=	-0.0030	B(13,12)=	-0.0100
B(4,1)=	-0.0001	B(34,4)=	0.0000	B(24,8)=	-0.0019	B(14,12)=	-0.0097
B(5,1)=	0.0000	B(35,4)=	0.0000	B(25,8)=	-0.0015	B(15,12)=	-0.0078
B(6,1)=	-0.0002	B(36,4)=	0.0000	B(26,8)=	-0.0025	B(16,12)=	-0.0001
B(7,1)=	-0.0002	B(37,4)=	0.0000	B(27,8)=	-0.0025	B(17,12)=	-0.0001
B(8,1)=	-0.0002	B(38,4)=	0.0000	B(28,8)=	-0.0025	B(18,12)=	-0.0001
B(9,1)=	-0.0001	B(39,4)=	0.0000	B(29,8)=	-0.0019	B(19,12)=	-0.0001
B(10,1)=	-0.0001	B(40,4)=	0.0000	B(30,8)=	-0.0015	B(20,12)=	-0.0001
B(11,1)=	-0.0008	B(1,5)=	0.0869	B(31,8)=	-0.0018	B(21,12)=	-0.0001
B(12,1)=	-0.0008	B(2,5)=	0.0870	B(32,8)=	-0.0018	B(22,12)=	-0.0001
B(13,1)=	-0.0008	B(3,5)=	0.0871	B(33,8)=	-0.0018	B(23,12)=	-0.0001
B(14,1)=	-0.0007	B(4,5)=	0.2280	B(34,8)=	-0.0012	B(24,12)=	-0.0001
B(15,1)=	-0.0004	B(5,5)=	0.2162	B(35,8)=	-0.0009	B(25,12)=	-0.0001
B(16,1)=	0.0003	B(6,5)=	-0.5806	B(36,8)=	-0.0012	B(26,12)=	-0.0001
B(17,1)=	0.0003	B(7,5)=	-0.5804	B(37,8)=	-0.0012	B(27,12)=	-0.0001
B(18,1)=	0.0003	B(8,5)=	-0.5799	B(38,8)=	-0.0012	B(28,12)=	-0.0001
B(19,1)=	0.0002	B(9,5)=	0.1887	B(39,8)=	-0.0007	B(29,12)=	-0.0001
B(20,1)=	0.0002	B(10,5)=	0.1840	B(40,8)=	-0.0006	B(30,12)=	-0.0001
B(21,1)=	0.0003	B(11,5)=	-1.7623	B(1,9)=	-0.0015	B(31,12)=	-0.0001
B(22,1)=	0.0003	B(12,5)=	-1.7627	B(2,9)=	-0.0015	B(32,12)=	-0.0001
B(23,1)=	0.0003	B(13,5)=	-1.7633	B(3,9)=	-0.0015	B(33,12)=	-0.0001
B(24,1)=	0.0002	B(14,5)=	0.4743	B(4,9)=	-0.0041	B(34,12)=	0.0000
B(25,1)=	0.0001	B(15,5)=	0.4341	B(5,9)=	-0.0033	B(35,12)=	0.0000
B(26,1)=	0.0002	B(16,5)=	-0.0885	B(6,9)=	-0.0009	B(36,12)=	0.0000
B(27,1)=	0.0002	B(17,5)=	-0.0886	B(7,9)=	-0.0009	B(37,12)=	0.0000

B(28,1)=	0.0002	B(18,5)=	-0.0886	B(8,9)=	-0.0009	B(38,12)=	0.0000
B(29,1)=	0.0002	B(19,5)=	-0.0271	B(9,9)=	-0.0042	B(39,12)=	0.0000
B(30,1)=	0.0001	B(20,5)=	-0.0204	B(10,9)=	-0.0033	B(40,12)=	0.0000
B(31,1)=	0.0002	B(21,5)=	-0.0572	B(11,9)=	-0.0070	B(1,13)=	-0.0001
B(32,1)=	0.0002	B(22,5)=	-0.0572	B(12,9)=	-0.0070	B(2,13)=	-0.0001
B(33,1)=	0.0002	B(23,5)=	-0.0572	B(13,9)=	-0.0070	B(3,13)=	-0.0001
B(34,1)=	0.0001	B(24,5)=	0.0077	B(14,9)=	-0.0070	B(4,13)=	-0.0005
B(35,1)=	0.0001	B(25,5)=	0.0079	B(15,9)=	-0.0055	B(5,13)=	-0.0004
B(36,1)=	0.0001	B(26,5)=	-0.0600	B(16,9)=	0.0018	B(6,13)=	0.0000
B(37,1)=	0.0001	B(27,5)=	-0.0600	B(17,9)=	0.0018	B(7,13)=	0.0000
B(38,1)=	0.0001	B(28,5)=	-0.0600	B(18,9)=	0.0018	B(8,13)=	0.0000
B(39,1)=	0.0001	B(29,5)=	-0.0060	B(19,9)=	0.0012	B(9,13)=	-0.0005
B(40,1)=	0.0001	B(30,5)=	-0.0039	B(20,9)=	0.0010	B(10,13)=	-0.0005
B(1,2)=	-0.0892	B(31,5)=	-0.0040	B(21,9)=	0.0015	B(11,13)=	-0.0096
B(2,2)=	-0.0893	B(32,5)=	-0.0040	B(22,9)=	0.0015	B(12,13)=	-0.0096
B(3,2)=	-0.0894	B(33,5)=	-0.0040	B(23,9)=	0.0015	B(13,13)=	-0.0087
B(4,2)=	-0.2319	B(34,5)=	0.0089	B(24,9)=	0.0010	B(14,13)=	-0.0102
B(5,2)=	-0.2197	B(35,5)=	0.0064	B(25,9)=	0.0008	B(15,13)=	-0.0083
B(6,2)=	0.5877	B(36,5)=	0.0014	B(26,9)=	0.0013	B(16,13)=	0.0000
B(7,2)=	0.5874	B(37,5)=	0.0014	B(27,9)=	0.0013	B(17,13)=	0.0000
B(8,2)=	0.5869	B(38,5)=	0.0014	B(28,9)=	0.0013	B(18,13)=	0.0000
B(9,2)=	-0.1922	B(39,5)=	0.0171	B(29,9)=	0.0010	B(19,13)=	0.0000
B(10,2)=	-0.1872	B(40,5)=	0.0125	B(30,9)=	0.0008	B(20,13)=	0.0000
B(11,2)=	1.7861	B(1,6)=	-0.1828	B(31,9)=	0.0009	B(21,13)=	0.0000
B(12,2)=	1.7865	B(2,6)=	-0.1826	B(32,9)=	0.0009	B(22,13)=	0.0000
B(13,2)=	1.7872	B(3,6)=	-0.1822	B(33,9)=	0.0009	B(23,13)=	0.0000
B(14,2)=	-0.4816	B(4,6)=	-0.0070	B(34,9)=	0.0006	B(24,13)=	0.0000
B(15,2)=	-0.4406	B(5,6)=	0.0053	B(35,9)=	0.0005	B(25,13)=	0.0000
B(16,2)=	0.0900	B(6,6)=	0.5042	B(36,9)=	0.0006	B(26,13)=	0.0000
B(17,2)=	0.0900	B(7,6)=	0.5043	B(37,9)=	0.0006	B(27,13)=	0.0000
B(18,2)=	0.0901	B(8,6)=	0.5045	B(38,9)=	0.0006	B(28,13)=	0.0000
B(19,2)=	0.0276	B(9,6)=	-0.3456	B(39,9)=	0.0004	B(29,13)=	0.0000
B(20,2)=	0.0207	B(10,6)=	-0.3157	B(40,9)=	0.0003	B(30,13)=	0.0000
B(21,2)=	0.0582	B(11,6)=	1.6418	B(1,10)=	-0.0004	B(31,13)=	0.0000
B(22,2)=	0.0582	B(12,6)=	1.6416	B(2,10)=	-0.0004	B(32,13)=	0.0000
B(23,2)=	0.0582	B(13,6)=	1.6413	B(3,10)=	-0.0004	B(33,13)=	0.0000
B(24,2)=	-0.0077	B(14,6)=	-0.7875	B(4,10)=	-0.0001	B(34,13)=	0.0000
B(25,2)=	-0.0079	B(15,6)=	-0.7766	B(5,10)=	-0.0001	B(35,13)=	0.0000
B(26,2)=	0.0610	B(16,6)=	0.0857	B(6,10)=	-0.0004	B(36,13)=	0.0000
B(27,2)=	0.0610	B(17,6)=	0.0857	B(7,10)=	-0.0004	B(37,13)=	0.0000
B(28,2)=	0.0610	B(18,6)=	0.0858	B(8,10)=	-0.0004	B(38,13)=	0.0000
B(29,2)=	0.0062	B(19,6)=	0.0291	B(9,10)=	0.0001	B(39,13)=	0.0000
B(30,2)=	0.0041	B(20,6)=	0.0222	B(10,10)=	0.0002	B(40,13)=	0.0000
B(31,2)=	0.0041	B(21,6)=	0.0572	B(11,10)=	0.0016	B(1,14)=	-0.0001
B(32,2)=	0.0041	B(22,6)=	0.0572	B(12,10)=	0.0016	B(2,14)=	-0.0001
B(33,2)=	0.0041	B(23,6)=	0.0572	B(13,10)=	0.0016	B(3,14)=	-0.0001
B(34,2)=	-0.0090	B(24,6)=	-0.0019	B(14,10)=	0.0000	B(4,14)=	0.0000

B(35,2)=	-0.0064	B(25,6)=	-0.0030	B(15,10)=	0.0003	B(5,14)=	-0.0001
B(36,2)=	-0.0013	B(26,6)=	0.0585	B(16,10)=	0.0004	B(6,14)=	-0.0018
B(37,2)=	-0.0013	B(27,6)=	0.0585	B(17,10)=	0.0004	B(7,14)=	-0.0019
B(38,2)=	-0.0014	B(28,6)=	0.0585	B(18,10)=	0.0004	B(8,14)=	-0.0019
B(39,2)=	-0.0173	B(29,6)=	0.0098	B(19,10)=	0.0002	B(9,14)=	-0.0012
B(40,2)=	-0.0127	B(30,6)=	0.0071	B(20,10)=	0.0002	B(10,14)=	-0.0010
B(1,3)=	0.1861	B(31,6)=	0.0080	B(21,10)=	0.0003	B(11,14)=	0.0082
B(2,3)=	0.1859	B(32,6)=	0.0080	B(22,10)=	0.0003	B(12,14)=	0.0064
B(3,3)=	0.1855	B(33,6)=	0.0080	B(23,10)=	0.0003	B(13,14)=	0.0038
B(4,3)=	0.0079	B(34,6)=	-0.0049	B(24,10)=	0.0001	B(14,14)=	0.0027
B(5,3)=	-0.0048	B(35,6)=	-0.0032	B(25,10)=	0.0001	B(15,14)=	0.0016
B(6,3)=	-0.5100	B(36,6)=	0.0020	B(26,10)=	0.0003	B(16,14)=	-0.0001
B(7,3)=	-0.5102	B(37,6)=	0.0020	B(27,10)=	0.0003	B(17,14)=	-0.0001
B(8,3)=	-0.5104	B(38,6)=	0.0020	B(28,10)=	0.0003	B(18,14)=	-0.0001
B(9,3)=	0.3513	B(39,6)=	-0.0132	B(29,10)=	0.0002	B(19,14)=	-0.0001
B(10,3)=	0.3208	B(40,6)=	-0.0095	B(30,10)=	0.0001	B(20,14)=	-0.0001
B(11,3)=	-1.6633	B(1,7)=	-0.0012	B(31,10)=	0.0001	B(21,14)=	-0.0001
B(12,3)=	-1.6631	B(2,7)=	-0.0012	B(32,10)=	0.0001	B(22,14)=	-0.0001
B(13,3)=	-1.6628	B(3,7)=	-0.0012	B(33,10)=	0.0001	B(23,14)=	-0.0001
B(14,3)=	0.8005	B(4,7)=	-0.0043	B(34,10)=	0.0001	B(24,14)=	-0.0001
B(15,3)=	0.7888	B(5,7)=	-0.0036	B(35,10)=	0.0001	B(25,14)=	-0.0001
B(16,3)=	-0.0875	B(6,7)=	-0.0006	B(36,10)=	0.0001	B(26,14)=	-0.0001
B(17,3)=	-0.0875	B(7,7)=	-0.0006	B(37,10)=	0.0001	B(27,14)=	-0.0001
B(18,3)=	-0.0876	B(8,7)=	-0.0006	B(38,10)=	0.0001	B(28,14)=	-0.0001
B(19,3)=	-0.0298	B(9,7)=	-0.0042	B(39,10)=	0.0000	B(29,14)=	-0.0001
B(20,3)=	-0.0228	B(10,7)=	-0.0034	B(40,10)=	0.0000	B(30,14)=	-0.0001
B(21,3)=	-0.0585	B(11,7)=	-0.0038	B(1,11)=	0.0005	B(31,14)=	-0.0001
B(22,3)=	-0.0585	B(12,7)=	-0.0038	B(2,11)=	0.0005	B(32,14)=	-0.0001
B(23,3)=	-0.0585	B(13,7)=	-0.0038	B(3,11)=	0.0005	B(33,14)=	-0.0001
B(24,3)=	0.0016	B(14,7)=	-0.0065	B(4,11)=	0.0003	B(34,14)=	-0.0001
B(25,3)=	0.0028	B(15,7)=	-0.0050	B(5,11)=	0.0002	B(35,14)=	0.0000
B(26,3)=	-0.0597	B(16,7)=	0.0017	B(6,11)=	0.0003	B(36,14)=	0.0000
B(27,3)=	-0.0598	B(17,7)=	0.0017	B(7,11)=	0.0003	B(37,14)=	0.0000
B(28,3)=	-0.0598	B(18,7)=	0.0017	B(8,11)=	0.0003	B(38,14)=	0.0000
B(29,3)=	-0.0102	B(19,7)=	0.0011	B(9,11)=	-0.0001	B(39,14)=	0.0000
B(30,3)=	-0.0075	B(20,7)=	0.0009	B(10,11)=	-0.0002	B(40,14)=	0.0000
B(31,3)=	-0.0084	B(21,7)=	0.0015	B(11,11)=	-0.0015	B(1,15)=	0.0000
B(32,3)=	-0.0084	B(22,7)=	0.0015	B(12,11)=	-0.0015	B(2,15)=	0.0000
B(33,3)=	-0.0084	B(23,7)=	0.0015	B(13,11)=	-0.0015	B(3,15)=	0.0000
B(34,3)=	0.0048	B(24,7)=	0.0009	B(14,11)=	-0.0013	B(4,15)=	-0.0002
B(35,3)=	0.0031	B(25,7)=	0.0007	B(15,11)=	-0.0015	B(5,15)=	-0.0002
B(36,3)=	-0.0022	B(26,7)=	0.0013	B(16,11)=	-0.0004	B(6,15)=	0.0016
B(37,3)=	-0.0022	B(27,7)=	0.0013	B(17,11)=	-0.0004	B(7,15)=	0.0016
B(38,3)=	-0.0022	B(28,7)=	0.0013	B(18,11)=	-0.0004	B(8,15)=	0.0016
B(39,3)=	0.0132	B(29,7)=	0.0009	B(19,11)=	-0.0002	B(9,15)=	0.0010
B(40,3)=	0.0095	B(30,7)=	0.0007	B(20,11)=	-0.0002	B(10,15)=	0.0008
B(1,4)=	0.0001	B(31,7)=	0.0009	B(21,11)=	-0.0003	B(11,15)=	0.0022

B(2,4)=	0.0001	B(32,7)=	0.0009	B(22,11)=	-0.0003	B(12,15)=	0.0023
B(3,4)=	0.0001	B(33,7)=	0.0009	B(23,11)=	-0.0003	B(13,15)=	0.0023
B(4,4)=	0.0000	B(34,7)=	0.0006	B(24,11)=	-0.0001	B(14,15)=	0.0021
B(5,4)=	0.0000	B(35,7)=	0.0004	B(25,11)=	-0.0001	B(15,15)=	0.0018
B(6,4)=	0.0000	B(36,7)=	0.0006	B(26,11)=	-0.0003	B(16,15)=	0.0001
B(7,4)=	0.0000	B(37,7)=	0.0006	B(27,11)=	-0.0003	B(17,15)=	0.0001
B(8,4)=	0.0000	B(38,7)=	0.0006	B(28,11)=	-0.0003	B(18,15)=	0.0001
B(9,4)=	-0.0001	B(39,7)=	0.0003	B(29,11)=	-0.0001	B(19,15)=	0.0001
B(10,4)=	-0.0001	B(40,7)=	0.0003	B(30,11)=	-0.0001	B(20,15)=	0.0001
B(11,4)=	-0.0001	B(1,8)=	0.0027	B(31,11)=	-0.0001	B(21,15)=	0.0001
B(12,4)=	-0.0001	B(2,8)=	0.0027	B(32,11)=	-0.0001	B(22,15)=	0.0001
B(13,4)=	-0.0001	B(3,8)=	0.0027	B(33,11)=	-0.0001	B(23,15)=	0.0001
B(14,4)=	-0.0005	B(4,8)=	0.0082	B(34,11)=	-0.0001	B(24,15)=	0.0001
B(15,4)=	-0.0005	B(5,8)=	0.0067	B(35,11)=	-0.0001	B(25,15)=	0.0001
B(16,4)=	0.0000	B(6,8)=	0.0016	B(36,11)=	-0.0001	B(26,15)=	0.0001
B(17,4)=	0.0000	B(7,8)=	0.0016	B(37,11)=	-0.0001	B(27,15)=	0.0001
B(18,4)=	0.0000	B(8,8)=	0.0016	B(38,11)=	-0.0001	B(28,15)=	0.0001
B(19,4)=	0.0000	B(9,8)=	0.0082	B(39,11)=	0.0000	B(29,15)=	0.0001
B(20,4)=	0.0000	B(10,8)=	0.0065	B(40,11)=	0.0000	B(30,15)=	0.0001
B(21,4)=	0.0000	B(11,8)=	0.0100	B(1,12)=	0.0002	B(31,15)=	0.0001
B(22,4)=	0.0000	B(12,8)=	0.0100	B(2,12)=	0.0002	B(32,15)=	0.0001
B(23,4)=	0.0000	B(13,8)=	0.0100	B(3,12)=	0.0002	B(33,15)=	0.0001
B(24,4)=	0.0000	B(14,8)=	0.0140	B(4,12)=	0.0003	B(34,15)=	0.0000
B(25,4)=	0.0000	B(15,8)=	0.0109	B(5,12)=	0.0002	B(35,15)=	0.0000
B(26,4)=	0.0000	B(16,8)=	-0.0035	B(6,12)=	0.0008	B(36,15)=	0.0000
B(27,4)=	0.0000	B(17,8)=	-0.0035	B(7,12)=	0.0008	B(37,15)=	0.0000
B(28,4)=	0.0000	B(18,8)=	-0.0035	B(8,12)=	0.0008	B(38,15)=	0.0000
B(29,4)=	0.0000	B(19,8)=	-0.0023	B(9,12)=	0.0008	B(39,15)=	0.0000
B(30,4)=	0.0000	B(20,8)=	-0.0019	B(10,12)=	0.0007	B(40,15)=	0.0000

Sparse matrix C:

C(1,1)=	1	C(2,2)=	1	C(3,3)=	1	C(4,4)=	1
C(5,5)=	1						

Matrix D:

D(1,1)=	-0.0004	D(5,4)=	-0.0001	D(4,8)=	0.0171	D(3,12)=	0.0006
D(2,1)=	-0.0004	D(1,5)=	2.5291	D(5,8)=	0.0142	D(4,12)=	0.0005
D(3,1)=	-0.0004	D(2,5)=	2.5288	D(1,9)=	-0.0039	D(5,12)=	0.0004
D(4,1)=	-0.0012	D(3,5)=	2.5282	D(2,9)=	-0.0039	D(1,13)=	-0.0001
D(5,1)=	-0.0009	D(4,5)=	-0.5954	D(3,9)=	-0.0039	D(2,13)=	-0.0001
D(1,2)=	-2.5648	D(5,5)=	-0.6028	D(4,9)=	-0.0084	D(3,13)=	-0.0001
D(2,2)=	-2.5645	D(1,6)=	-2.2015	D(5,9)=	-0.0069	D(4,13)=	-0.0003
D(3,2)=	-2.5639	D(2,6)=	-2.2012	D(1,10)=	-0.0034	D(5,13)=	-0.0003
D(4,2)=	0.6018	D(3,6)=	-2.2004	D(2,10)=	-0.0034	D(1,14)=	0.0001
D(5,2)=	0.6095	D(4,6)=	0.4601	D(3,10)=	-0.0034	D(2,14)=	0.0001

D(1,3)=	2.2335	D(5,6)=	0.4740	D(4,10)=	-0.0010	D(3,14)=	0.0001
D(2,3)=	2.2332	D(1,7)=	-0.0043	D(5,10)=	-0.0008	D(4,14)=	0.0005
D(3,3)=	2.2324	D(2,7)=	-0.0043	D(1,11)=	0.0031	D(5,14)=	0.0004
D(4,3)=	-0.4634	D(3,7)=	-0.0043	D(2,11)=	0.0031	D(1,15)=	-0.0002
D(5,3)=	-0.4779	D(4,7)=	-0.0090	D(3,11)=	0.0031	D(2,15)=	-0.0002
D(1,4)=	-0.0001	D(5,7)=	-0.0076	D(4,11)=	0.0013	D(3,15)=	-0.0002
D(2,4)=	-0.0001	D(1,8)=	0.0086	D(5,11)=	0.0011	D(4,15)=	-0.0006
D(3,4)=	-0.0001	D(2,8)=	0.0086	D(1,12)=	0.0006	D(5,15)=	-0.0005
D(4,4)=	-0.0001	D(3,8)=	0.0086	D(2,12)=	0.0006		

J.0.2.2 ARMAX (State-Space representation)

Sparse matrix A:

A(1,1)=	0.3779	A(20,2)=	0.0358	A(39,3)=	0.4809	A(18,5)=	0.2683
A(2,1)=	0.3926	A(21,2)=	-0.6077	A(40,3)=	0.3894	A(19,5)=	0.1825
A(3,1)=	0.3619	A(22,2)=	-0.6404	A(1,4)=	-1.5735	A(20,5)=	0.2285
A(4,1)=	-0.2751	A(23,2)=	-0.6027	A(2,4)=	-1.5740	A(21,5)=	0.1499
A(5,1)=	-0.0855	A(24,2)=	-0.5838	A(3,4)=	-1.5743	A(22,5)=	0.1503
A(6,1)=	0.1930	A(25,2)=	-0.4731	A(4,4)=	-1.4820	A(23,5)=	0.1504
A(7,1)=	0.2037	A(26,2)=	-0.7303	A(5,4)=	-1.3535	A(24,5)=	0.0313
A(8,1)=	0.1850	A(27,2)=	-0.7448	A(6,4)=	-1.2315	A(25,5)=	0.0606
A(9,1)=	-0.3209	A(28,2)=	-0.7286	A(7,4)=	-1.2335	A(26,5)=	0.1024
A(10,1)=	-0.1279	A(29,2)=	0.6287	A(8,4)=	-1.2338	A(27,5)=	0.1005
A(11,1)=	1.0835	A(30,2)=	0.6400	A(9,4)=	-1.1649	A(28,5)=	0.1030
A(12,1)=	1.0875	A(31,2)=	-0.2302	A(10,4)=	-1.0848	A(29,5)=	0.0682
A(13,1)=	1.0787	A(32,2)=	-0.2402	A(11,4)=	-0.8221	A(30,5)=	0.0558
A(14,1)=	0.7291	A(33,2)=	-0.2340	A(12,4)=	-0.8245	A(31,5)=	0.1797
A(15,1)=	0.6976	A(34,2)=	-0.4916	A(13,4)=	-0.8239	A(32,5)=	0.1769
A(16,1)=	0.1893	A(35,2)=	-0.4438	A(14,4)=	-0.7802	A(33,5)=	0.1801
A(17,1)=	0.2067	A(36,2)=	-0.9695	A(15,4)=	-0.7542	A(34,5)=	0.0377
A(18,1)=	0.1906	A(37,2)=	-0.9606	A(16,4)=	-0.2316	A(35,5)=	0.0717
A(19,1)=	-0.0930	A(38,2)=	-0.9681	A(17,4)=	-0.2344	A(36,5)=	0.0712
A(20,1)=	-0.0733	A(39,2)=	-0.9636	A(18,4)=	-0.2332	A(37,5)=	0.0678
A(21,1)=	0.3257	A(40,2)=	-0.7956	A(19,4)=	-0.1044	A(38,5)=	0.0708
A(22,1)=	0.3429	A(1,3)=	0.2334	A(20,4)=	-0.1492	A(39,5)=	-0.0260
A(23,1)=	0.3228	A(2,3)=	0.2415	A(21,4)=	-0.1278	A(40,5)=	0.0370
A(24,1)=	0.2672	A(3,3)=	0.2199	A(22,4)=	-0.1280	A(1,6)=	1.0000
A(25,1)=	0.2174	A(4,3)=	-0.5075	A(23,4)=	-0.1283	A(2,7)=	1.0000
A(26,1)=	0.3907	A(5,3)=	-0.3099	A(24,4)=	0.0038	A(3,8)=	1.0000
A(27,1)=	0.3980	A(6,3)=	0.1655	A(25,4)=	-0.0258	A(4,9)=	1.0000
A(28,1)=	0.3896	A(7,3)=	0.1698	A(26,4)=	-0.0918	A(5,10)=	1.0000
A(29,1)=	-0.3913	A(8,3)=	0.1588	A(27,4)=	-0.0899	A(6,11)=	1.0000
A(30,1)=	-0.3914	A(9,3)=	-0.4378	A(28,4)=	-0.0925	A(7,12)=	1.0000
A(31,1)=	0.1199	A(10,3)=	-0.2596	A(29,4)=	-0.0485	A(8,13)=	1.0000
A(32,1)=	0.1249	A(11,3)=	1.1570	A(30,4)=	-0.0411	A(9,14)=	1.0000
A(33,1)=	0.1216	A(12,3)=	1.1573	A(31,4)=	-0.1451	A(10,15)=	1.0000

A(34,1)=	0.2428	A(13,3)=	1.1536	A(32,4)=	-0.1425	A(11,16)=	1.0000
A(35,1)=	0.2249	A(14,3)=	0.4589	A(33,4)=	-0.1455	A(12,17)=	1.0000
A(36,1)=	0.5163	A(15,3)=	0.4427	A(34,4)=	-0.0048	A(13,18)=	1.0000
A(37,1)=	0.5119	A(16,3)=	0.2073	A(35,4)=	-0.0367	A(14,19)=	1.0000
A(38,1)=	0.5153	A(17,3)=	0.2249	A(36,4)=	-0.0454	A(15,20)=	1.0000
A(39,1)=	0.4814	A(18,3)=	0.2096	A(37,4)=	-0.0425	A(16,21)=	1.0000
A(40,1)=	0.4050	A(19,3)=	0.0444	A(38,4)=	-0.0450	A(17,22)=	1.0000
A(1,2)=	-0.4331	A(20,3)=	0.0351	A(39,4)=	0.0734	A(18,23)=	1.0000
A(2,2)=	-0.4562	A(21,3)=	0.3001	A(40,4)=	0.0130	A(19,24)=	1.0000
A(3,2)=	-0.4045	A(22,3)=	0.3167	A(1,5)=	1.4476	A(20,25)=	1.0000
A(4,2)=	0.7543	A(23,3)=	0.2979	A(2,5)=	1.4480	A(21,26)=	1.0000
A(5,2)=	0.3709	A(24,3)=	0.3214	A(3,5)=	1.4485	A(22,27)=	1.0000
A(6,2)=	-0.1810	A(25,3)=	0.2601	A(4,5)=	1.7482	A(23,28)=	1.0000
A(7,2)=	-0.1966	A(26,3)=	0.3719	A(5,5)=	1.6067	A(24,29)=	1.0000
A(8,2)=	-0.1666	A(27,3)=	0.3794	A(6,5)=	1.1495	A(25,30)=	1.0000
A(9,2)=	0.7505	A(28,3)=	0.3714	A(7,5)=	1.1515	A(26,31)=	1.0000
A(10,2)=	0.3799	A(29,3)=	-0.2441	A(8,5)=	1.1518	A(27,32)=	1.0000
A(11,2)=	-2.0371	A(30,3)=	-0.2549	A(9,5)=	1.3753	A(28,33)=	1.0000
A(12,2)=	-2.0417	A(31,3)=	0.1343	A(10,5)=	1.2948	A(29,34)=	1.0000
A(13,2)=	-2.0288	A(32,3)=	0.1394	A(11,5)=	0.7900	A(30,35)=	1.0000
A(14,2)=	-1.2002	A(33,3)=	0.1367	A(12,5)=	0.7925	A(31,36)=	1.0000
A(15,2)=	-1.1521	A(34,3)=	0.2491	A(13,5)=	0.7918	A(32,37)=	1.0000
A(16,2)=	-0.3651	A(35,3)=	0.2186	A(14,5)=	0.9857	A(33,38)=	1.0000
A(17,2)=	-0.3984	A(36,3)=	0.4824	A(15,5)=	0.9566	A(34,39)=	1.0000
A(18,2)=	-0.3682	A(37,3)=	0.4771	A(16,5)=	0.2669	A(35,40)=	1.0000
A(19,2)=	0.0448	A(38,3)=	0.4819	A(17,5)=	0.2696		

Matrix B:

B(1,1)=	8.42E-05	B(31,4)=	-3.08E-06	B(21,8)=	0.00042	B(11,12)=	-0.0137
B(2,1)=	7.82E-05	B(32,4)=	-3.12E-06	B(22,8)=	0.000449	B(12,12)=	-0.01246
B(3,1)=	8.41E-05	B(33,4)=	-3.10E-06	B(23,8)=	0.000415	B(13,12)=	-0.01068
B(4,1)=	-0.0001	B(34,4)=	-2.93E-06	B(24,8)=	0.000982	B(14,12)=	-0.0107
B(5,1)=	-3.41E-05	B(35,4)=	-2.51E-06	B(25,8)=	0.000814	B(15,12)=	-0.00858
B(6,1)=	-2.92E-05	B(36,4)=	-4.60E-06	B(26,8)=	0.000543	B(16,12)=	3.90E-06
B(7,1)=	-3.75E-05	B(37,4)=	-4.52E-06	B(27,8)=	0.000559	B(17,12)=	4.41E-06
B(8,1)=	-2.97E-05	B(38,4)=	-4.60E-06	B(28,8)=	0.000539	B(18,12)=	4.01E-06
B(9,1)=	-0.00011	B(39,4)=	-5.46E-06	B(29,8)=	-0.00018	B(19,12)=	-5.76E-06
B(10,1)=	-3.91E-05	B(40,4)=	-4.66E-06	B(30,8)=	-0.00024	B(20,12)=	-6.62E-06
B(11,1)=	-0.00055	B(1,5)=	-0.59292	B(31,8)=	0.000471	B(21,12)=	2.17E-06
B(12,1)=	-0.00056	B(2,5)=	-0.59167	B(32,8)=	0.000482	B(22,12)=	2.52E-06
B(13,1)=	-0.00055	B(3,5)=	-0.59045	B(33,8)=	0.000473	B(23,12)=	2.10E-06
B(14,1)=	-0.00062	B(4,5)=	0.780957	B(34,8)=	0.00082	B(24,12)=	9.85E-07
B(15,1)=	-0.00039	B(5,5)=	0.734548	B(35,8)=	0.000714	B(25,12)=	1.99E-08
B(16,1)=	3.00E-05	B(6,5)=	-1.19302	B(36,8)=	0.001069	B(26,12)=	8.60E-06
B(17,1)=	3.03E-05	B(7,5)=	-1.19295	B(37,8)=	0.001057	B(27,12)=	8.76E-06
B(18,1)=	3.05E-05	B(8,5)=	-1.19101	B(38,8)=	0.001068	B(28,12)=	8.60E-06

B(19,1)=	-3.99E-05	B(9,5)=	0.721991	B(39,8)=	0.001573	B(29,12)=	-4.00E-06
B(20,1)=	-2.65E-05	B(10,5)=	0.681095	B(40,8)=	0.001325	B(30,12)=	-3.50E-06
B(21,1)=	1.41E-05	B(11,5)=	-2.20027	B(1,9)=	-0.00243	B(31,12)=	3.84E-06
B(22,1)=	1.35E-05	B(12,5)=	-2.19777	B(2,9)=	-0.00222	B(32,12)=	3.97E-06
B(23,1)=	1.43E-05	B(13,5)=	-2.20031	B(3,9)=	-0.00245	B(33,12)=	3.95E-06
B(24,1)=	-3.76E-05	B(14,5)=	0.978134	B(4,9)=	-0.00641	B(34,12)=	-8.34E-07
B(25,1)=	-2.71E-05	B(15,5)=	0.894188	B(5,9)=	-0.00531	B(35,12)=	-2.02E-06
B(26,1)=	6.71E-06	B(16,5)=	0.049913	B(6,9)=	-0.00193	B(36,12)=	8.50E-06
B(27,1)=	5.94E-06	B(17,5)=	0.05328	B(7,9)=	-0.00173	B(37,12)=	8.33E-06
B(28,1)=	6.96E-06	B(18,5)=	0.050807	B(8,9)=	-0.00195	B(38,12)=	8.51E-06
B(29,1)=	-5.16E-07	B(19,5)=	-0.02938	B(9,9)=	-0.00584	B(39,12)=	5.03E-07
B(30,1)=	1.70E-06	B(20,5)=	-0.02827	B(10,9)=	-0.00479	B(40,12)=	-1.24E-06
B(31,1)=	4.34E-06	B(21,5)=	0.027828	B(11,9)=	-0.00883	B(1,13)=	-3.56E-05
B(32,1)=	3.61E-06	B(22,5)=	0.029902	B(12,9)=	-0.00867	B(2,13)=	-2.88E-05
B(33,1)=	4.40E-06	B(23,5)=	0.027511	B(13,9)=	-0.00886	B(3,13)=	-3.64E-05
B(34,1)=	-3.05E-05	B(24,5)=	0.001093	B(14,9)=	-0.00861	B(4,13)=	-0.00037
B(35,1)=	-2.14E-05	B(25,5)=	-0.00047	B(15,9)=	-0.0069	B(5,13)=	-0.00035
B(36,1)=	-2.26E-05	B(26,5)=	0.061306	B(16,9)=	-0.00011	B(6,13)=	0.000108
B(37,1)=	-2.27E-05	B(27,5)=	0.061939	B(17,9)=	-0.00012	B(7,13)=	0.000118
B(38,1)=	-2.26E-05	B(28,5)=	0.061407	B(18,9)=	-0.0001	B(8,13)=	0.000106
B(39,1)=	-7.04E-05	B(29,5)=	-0.01935	B(19,9)=	-0.00045	B(9,13)=	-0.00029
B(40,1)=	-5.25E-05	B(30,5)=	-0.01687	B(20,9)=	-0.00039	B(10,13)=	-0.00028
B(1,2)=	0.599191	B(31,5)=	0.03728	B(21,9)=	-0.00017	B(11,13)=	-0.00946
B(2,2)=	0.597921	B(32,5)=	0.037673	B(22,9)=	-0.00018	B(12,13)=	-0.00945
B(3,2)=	0.596684	B(33,5)=	0.037971	B(23,9)=	-0.00016	B(13,13)=	-0.00858
B(4,2)=	-0.79284	B(34,5)=	-0.0081	B(24,9)=	-0.00045	B(14,13)=	-0.00983
B(5,2)=	-0.74551	B(35,5)=	-0.01083	B(25,9)=	-0.00037	B(15,13)=	-0.00797
B(6,2)=	1.207776	B(36,5)=	0.052237	B(26,9)=	-0.00023	B(16,13)=	-1.02E-05
B(7,2)=	1.207687	B(37,5)=	0.050966	B(27,9)=	-0.00024	B(17,13)=	-1.03E-05
B(8,2)=	1.205727	B(38,5)=	0.05228	B(28,9)=	-0.00023	B(18,13)=	-1.01E-05
B(9,2)=	-0.73309	B(39,5)=	-0.01282	B(29,9)=	8.11E-05	B(19,13)=	-2.11E-05
B(10,2)=	-0.69137	B(40,5)=	-0.01505	B(30,9)=	0.000111	B(20,13)=	-2.11E-05
B(11,2)=	2.229707	B(1,6)=	0.463453	B(31,9)=	-0.0002	B(21,13)=	-7.92E-06
B(12,2)=	2.227165	B(2,6)=	0.461619	B(32,9)=	-0.0002	B(22,13)=	-8.12E-06
B(13,2)=	2.229751	B(3,6)=	0.462812	B(33,9)=	-0.0002	B(23,13)=	-7.91E-06
B(14,2)=	-0.99246	B(4,6)=	-0.3438	B(34,9)=	-0.00038	B(24,13)=	-1.23E-05
B(15,2)=	-0.90709	B(5,6)=	-0.33503	B(35,9)=	-0.00032	B(25,13)=	-1.16E-05
B(16,2)=	-0.05065	B(6,6)=	1.194175	B(36,9)=	-0.00049	B(26,13)=	-5.66E-06
B(17,2)=	-0.05407	B(7,6)=	1.191661	B(37,9)=	-0.00048	B(27,13)=	-5.74E-06
B(18,2)=	-0.05156	B(8,6)=	1.193698	B(38,9)=	-0.00049	B(28,13)=	-5.64E-06
B(19,2)=	0.029669	B(9,6)=	-0.66508	B(39,9)=	-0.00074	B(29,13)=	-2.74E-06
B(20,2)=	0.0286	B(10,6)=	-0.6466	B(40,9)=	-0.00061	B(30,13)=	-1.33E-06
B(21,2)=	-0.0282	B(11,6)=	2.1934	B(1,10)=	2.20E-05	B(31,13)=	-9.98E-06
B(22,2)=	-0.0303	B(12,6)=	2.1869	B(2,10)=	2.37E-05	B(32,13)=	-9.98E-06
B(23,2)=	-0.0279	B(13,6)=	2.1925	B(3,10)=	2.17E-05	B(33,13)=	-9.98E-06
B(24,2)=	-0.0012	B(14,6)=	-1.0173	B(4,10)=	0.000135	B(34,13)=	-1.12E-05
B(25,2)=	0.0004	B(15,6)=	-1.0224	B(5,10)=	0.000213	B(35,13)=	-1.13E-05

B(26,2)=	-0.0622	B(16,6)=	-0.0455	B(6,10)=	9.22E-05	B(36,13)=	-1.12E-05
B(27,2)=	-0.0628	B(17,6)=	-0.0485	B(7,10)=	9.20E-05	B(37,13)=	-1.10E-05
B(28,2)=	-0.0623	B(18,6)=	-0.0463	B(8,10)=	9.31E-05	B(38,13)=	-1.12E-05
B(29,2)=	0.0196	B(19,6)=	0.0259	B(9,10)=	0.000365	B(39,13)=	-1.77E-05
B(30,2)=	0.0171	B(20,6)=	0.0242	B(10,10)=	0.000448	B(40,13)=	-1.73E-05
B(31,2)=	-0.0379	B(21,6)=	-0.0259	B(11,10)=	0.002205	B(1,14)=	-0.00233
B(32,2)=	-0.0383	B(22,6)=	-0.0277	B(12,10)=	0.002204	B(2,14)=	-0.00232
B(33,2)=	-0.0386	B(23,6)=	-0.0257	B(13,10)=	0.002207	B(3,14)=	-0.00233
B(34,2)=	0.0082	B(24,6)=	-0.0006	B(14,10)=	6.86E-05	B(4,14)=	-2.92E-05
B(35,2)=	0.0109	B(25,6)=	0.0004	B(15,10)=	0.000338	B(5,14)=	-6.44E-05
B(36,2)=	-0.0530	B(26,6)=	-0.0543	B(16,10)=	-6.48E-05	B(6,14)=	-0.00419
B(37,2)=	-0.0517	B(27,6)=	-0.0548	B(17,10)=	-6.92E-05	B(7,14)=	-0.00418
B(38,2)=	-0.0531	B(28,6)=	-0.0544	B(18,10)=	-6.57E-05	B(8,14)=	-0.0042
B(39,2)=	0.0129	B(29,6)=	0.0173	B(19,10)=	-1.67E-05	B(9,14)=	-0.00146
B(40,2)=	0.0152	B(30,6)=	0.0152	B(20,10)=	-1.07E-05	B(10,14)=	-0.00116
B(1,3)=	-0.4685	B(31,6)=	-0.0332	B(21,10)=	-4.06E-05	B(11,14)=	0.00645
B(2,3)=	-0.4666	B(32,6)=	-0.0335	B(22,10)=	-4.39E-05	B(12,14)=	0.004648
B(3,3)=	-0.4678	B(33,6)=	-0.0338	B(23,10)=	-4.00E-05	B(13,14)=	0.002051
B(4,3)=	0.3499	B(34,6)=	0.0071	B(24,10)=	-4.09E-05	B(14,14)=	0.002568
B(5,3)=	0.3407	B(35,6)=	0.0090	B(25,10)=	-3.21E-05	B(15,14)=	0.001494
B(6,3)=	-1.2090	B(36,6)=	-0.0457	B(26,10)=	-8.52E-05	B(16,14)=	-4.94E-05
B(7,3)=	-1.2064	B(37,6)=	-0.0446	B(27,10)=	-8.66E-05	B(17,14)=	-5.18E-05
B(8,3)=	-1.2085	B(38,6)=	-0.0458	B(28,10)=	-8.52E-05	B(18,14)=	-5.02E-05
B(9,3)=	0.6757	B(39,6)=	0.0121	B(29,10)=	2.00E-05	B(19,14)=	3.21E-05
B(10,3)=	0.6566	B(40,6)=	0.0133	B(30,10)=	2.02E-05	B(20,14)=	2.56E-05
B(11,3)=	-2.2222	B(1,7)=	-0.0009	B(31,10)=	-6.23E-05	B(21,14)=	-2.64E-05
B(12,3)=	-2.2156	B(2,7)=	-0.0006	B(32,10)=	-6.32E-05	B(22,14)=	-2.76E-05
B(13,3)=	-2.2213	B(3,7)=	-0.0009	B(33,10)=	-6.32E-05	B(23,14)=	-2.63E-05
B(14,3)=	1.0337	B(4,7)=	-0.0069	B(34,10)=	-2.31E-05	B(24,14)=	1.30E-05
B(15,3)=	1.0381	B(5,7)=	-0.0059	B(35,10)=	-1.47E-05	B(25,14)=	9.70E-06
B(16,3)=	0.0462	B(6,7)=	-0.0004	B(36,10)=	-9.79E-05	B(26,14)=	-4.58E-05
B(17,3)=	0.0492	B(7,7)=	-0.0001	B(37,10)=	-9.60E-05	B(27,14)=	-4.60E-05
B(18,3)=	0.0470	B(8,7)=	-0.0004	B(38,10)=	-9.79E-05	B(28,14)=	-4.60E-05
B(19,3)=	-0.0261	B(9,7)=	-0.0060	B(39,10)=	-4.86E-05	B(29,14)=	1.24E-05
B(20,3)=	-0.0244	B(10,7)=	-0.0051	B(40,10)=	-3.54E-05	B(30,14)=	1.01E-05
B(21,3)=	0.0263	B(11,7)=	-0.0045	B(1,11)=	0.000183	B(31,14)=	-3.01E-05
B(22,3)=	0.0281	B(12,7)=	-0.0043	B(2,11)=	0.000179	B(32,14)=	-3.00E-05
B(23,3)=	0.0260	B(13,7)=	-0.0045	B(3,11)=	0.000182	B(33,14)=	-3.06E-05
B(24,3)=	0.0007	B(14,7)=	-0.0085	B(4,11)=	-0.00033	B(34,14)=	1.64E-05
B(25,3)=	-0.0003	B(15,7)=	-0.0067	B(5,11)=	-0.0004	B(35,14)=	1.43E-05
B(26,3)=	0.0551	B(16,7)=	-0.0002	B(6,11)=	-0.00019	B(36,14)=	-2.83E-05
B(27,3)=	0.0556	B(17,7)=	-0.0002	B(7,11)=	-0.00019	B(37,14)=	-2.74E-05
B(28,3)=	0.0552	B(18,7)=	-0.0002	B(8,11)=	-0.00019	B(38,14)=	-2.83E-05
B(29,3)=	-0.0175	B(19,7)=	-0.0006	B(9,11)=	-0.00071	B(39,14)=	3.56E-05
B(30,3)=	-0.0154	B(20,7)=	-0.0005	B(10,11)=	-0.00078	B(40,14)=	2.94E-05
B(31,3)=	0.0337	B(21,7)=	-0.0003	B(11,11)=	-0.0019	B(1,15)=	0.002094
B(32,3)=	0.0341	B(22,7)=	-0.0003	B(12,11)=	-0.00191	B(2,15)=	0.00208

B(33,3)=	0.0344	B(23,7)=	-0.0002	B(13,11)=	-0.00191	B(3,15)=	0.002088
B(34,3)=	-0.0071	B(24,7)=	-0.0005	B(14,11)=	-0.00182	B(4,15)=	-0.00035
B(35,3)=	-0.0091	B(25,7)=	-0.0004	B(15,11)=	-0.00196	B(5,15)=	-0.00028
B(36,3)=	0.0465	B(26,7)=	-0.0003	B(16,11)=	7.07E-05	B(6,15)=	0.003833
B(37,3)=	0.0453	B(27,7)=	-0.0003	B(17,11)=	7.50E-05	B(7,15)=	0.003823
B(38,3)=	0.0465	B(28,7)=	-0.0003	B(18,11)=	7.16E-05	B(8,15)=	0.003843
B(39,3)=	-0.0121	B(29,7)=	0.0001	B(19,11)=	2.64E-05	B(9,15)=	0.001131
B(40,3)=	-0.0134	B(30,7)=	0.0001	B(20,11)=	2.22E-05	B(10,15)=	0.000851
B(1,4)=	0.0001	B(31,7)=	-0.0003	B(21,11)=	4.49E-05	B(11,15)=	0.003974
B(2,4)=	0.0001	B(32,7)=	-0.0003	B(22,11)=	4.81E-05	B(12,15)=	0.003972
B(3,4)=	0.0001	B(33,7)=	-0.0003	B(23,11)=	4.44E-05	B(13,15)=	0.004011
B(4,4)=	0.0000	B(34,7)=	-0.0005	B(24,11)=	4.32E-05	B(14,15)=	0.002083
B(5,4)=	0.0000	B(35,7)=	-0.0004	B(25,11)=	3.54E-05	B(15,15)=	0.001826
B(6,4)=	0.0000	B(36,7)=	-0.0006	B(26,11)=	8.44E-05	B(16,15)=	3.45E-05
B(7,4)=	0.0000	B(37,7)=	-0.0006	B(27,11)=	8.57E-05	B(17,15)=	3.65E-05
B(8,4)=	0.0000	B(38,7)=	-0.0006	B(28,11)=	8.44E-05	B(18,15)=	3.52E-05
B(9,4)=	-0.0001	B(39,7)=	-0.0009	B(29,11)=	-1.69E-05	B(19,15)=	-4.72E-05
B(10,4)=	-0.0001	B(40,7)=	-0.0007	B(30,11)=	-1.78E-05	B(20,15)=	-4.13E-05
B(11,4)=	-0.0002	B(1,8)=	0.0030	B(31,11)=	6.58E-05	B(21,15)=	1.69E-05
B(12,4)=	-0.0002	B(2,8)=	0.0025	B(32,11)=	6.65E-05	B(22,15)=	1.78E-05
B(13,4)=	-0.0002	B(3,8)=	0.0030	B(33,11)=	6.66E-05	B(23,15)=	1.68E-05
B(14,4)=	-0.0005	B(4,8)=	0.0131	B(34,11)=	2.64E-05	B(24,15)=	-2.19E-05
B(15,4)=	-0.0004	B(5,8)=	0.0111	B(35,11)=	1.96E-05	B(25,15)=	-1.83E-05
B(16,4)=	0.0000	B(6,8)=	0.0022	B(36,11)=	9.73E-05	B(26,15)=	3.56E-05
B(17,4)=	0.0000	B(7,8)=	0.0017	B(37,11)=	9.53E-05	B(27,15)=	3.57E-05
B(18,4)=	0.0000	B(8,8)=	0.0022	B(38,11)=	9.73E-05	B(28,15)=	3.58E-05
B(19,4)=	0.0000	B(9,8)=	0.0118	B(39,11)=	5.09E-05	B(29,15)=	-1.43E-05
B(20,4)=	0.0000	B(10,8)=	0.0098	B(40,11)=	4.00E-05	B(30,15)=	-1.10E-05
B(21,4)=	0.0000	B(11,8)=	0.0121	B(1,12)=	0.000153	B(31,15)=	1.73E-05
B(22,4)=	0.0000	B(12,8)=	0.0117	B(2,12)=	0.000149	B(32,15)=	1.73E-05
B(23,4)=	0.0000	B(13,8)=	0.0121	B(3,12)=	0.00015	B(33,15)=	1.78E-05
B(24,4)=	0.0000	B(14,8)=	0.0177	B(4,12)=	-0.00025	B(34,15)=	-2.37E-05
B(25,4)=	0.0000	B(15,8)=	0.01422	B(5,12)=	-0.00025	B(35,15)=	-2.19E-05
B(26,4)=	0.0000	B(16,8)=	0.000313	B(6,12)=	0.000458	B(36,15)=	1.56E-05
B(27,4)=	0.0000	B(17,8)=	0.000335	B(7,12)=	0.000452	B(37,15)=	1.49E-05
B(28,4)=	0.0000	B(18,8)=	0.000311	B(8,12)=	0.000456	B(38,15)=	1.56E-05
B(29,4)=	0.0000	B(19,8)=	0.000996	B(9,12)=	4.95E-05	B(39,15)=	-4.58E-05
B(30,4)=	0.0000	B(20,8)=	0.000877	B(10,12)=	1.06E-05	B(40,15)=	-4.01E-05

Sparse matrix C:

C(1,1)=	1	C(2,2)=	1	C(3,3)=	1	C(4,4)=	1
C(5,5)=	1						

Matrix D:

D(1,1)=	-0.0005	D(5,4)=	-0.0001	D(4,8)=	0.0219	D(3,12)=	0.00037

D(2,1)=	-0.0005	D(1,5)=	2.0973	D(5,8)=	0.0183	D(4,12)=	1.63E-05
D(3,1)=	-0.0005	D(2,5)=	2.0991	D(1,9)=	-0.0053	D(5,12)=	-1.41E-05
D(4,1)=	-0.0013	D(3,5)=	2.0979	D(2,9)=	-0.0051	D(1,13)=	-1.67E-05
D(5,1)=	-0.0010	D(4,5)=	-0.2011	D(3,9)=	-0.0053	D(2,13)=	-1.36E-05
D(1,2)=	-2.1275	D(5,5)=	-0.2332	D(4,9)=	-0.0106	D(3,13)=	-1.84E-05
D(2,2)=	-2.1293	D(1,6)=	-1.7798	D(5,9)=	-0.0087	D(4,13)=	-0.00029
D(3,2)=	-2.1281	D(2,6)=	-1.7792	D(1,10)=	-0.0031	D(5,13)=	-0.00028
D(4,2)=	0.2019	D(3,6)=	-1.7791	D(2,10)=	-0.0031	D(1,14)=	-0.00128
D(5,2)=	0.2346	D(4,6)=	0.2186	D(3,10)=	-0.0031	D(2,14)=	-0.00128
D(1,3)=	1.8065	D(5,6)=	0.2296	D(4,10)=	-0.0009	D(3,14)=	-0.00127
D(2,3)=	1.8059	D(1,7)=	-0.0048	D(5,10)=	-0.0007	D(4,14)=	0.000622
D(3,3)=	1.8058	D(2,7)=	-0.0046	D(1,11)=	0.0028	D(5,14)=	0.000503
D(4,3)=	-0.2180	D(3,7)=	-0.0049	D(2,11)=	0.0028	D(1,15)=	0.001069
D(5,3)=	-0.2298	D(4,7)=	-0.0115	D(3,11)=	0.0028	D(2,15)=	0.001067
D(1,4)=	-0.0001	D(5,7)=	-0.0098	D(4,11)=	0.0009	D(3,15)=	0.001059
D(2,4)=	-0.0001	D(1,8)=	0.0104	D(5,11)=	0.0007	D(4,15)=	-0.00082
D(3,4)=	-0.0001	D(2,8)=	0.0099	D(1,12)=	0.0004	D(5,15)=	-0.0007
D(4,4)=	-0.0001	D(3,8)=	0.0104	D(2,12)=	0.0004		

J.0.2.3 DMDc

Matrix A:

A(1,1)=	-0.2224	A(3,2)=	-0.0146	A(5,3)=	-0.0002	A(2,5)=	-0.8011
A(2,1)=	0.0154	A(4,2)=	0.0014	A(1,4)=	3.3467	A(3,5)=	-0.2135
A(3,1)=	-0.0016	A(5,2)=	-1.85E-05	A(2,4)=	0.8444	A(4,5)=	-0.1351
A(4,1)=	-0.0007	A(1,3)=	0.8300	A(3,4)=	0.1393	A(5,5)=	-0.2212
A(5,1)=	1.17E-05	A(2,3)=	0.0085	A(4,4)=	-0.1100		
A(1,2)=	-0.3787	A(3,3)=	-0.1788	A(5,4)=	-0.0008		
A(2,2)=	-0.0331	A(4,3)=	0.0195	A(1,5)=	-4.8697		

Matrix B:

B(1,1)=	0.0014	B(5,4)=	1.03E-06	B(4,8)=	5.94E-05	B(3,12)=	0.0002
B(2,1)=	0.0002	B(1,5)=	0.1425	B(5,8)=	0.0003	B(4,12)=	2.72E-05
B(3,1)=	0.0001	B(2,5)=	-0.4667	B(1,9)=	-0.0002	B(5,12)=	7.56E-06
B(4,1)=	-2.58E-05	B(3,5)=	0.0936	B(2,9)=	-0.00012	B(1,13)=	-0.0036
B(5,1)=	-2.47E-07	B(4,5)=	-0.0330	B(3,9)=	6.88E-05	B(2,13)=	-0.0007
B(1,2)=	-0.1476	B(5,5)=	-0.0022	B(4,9)=	-7.23E-05	B(3,13)=	-1.74E-05
B(2,2)=	0.4723	B(1,6)=	0.1273	B(5,9)=	-0.00012	B(4,13)=	4.14E-05
B(3,2)=	-0.0945	B(2,6)=	-0.1370	B(1,10)=	0.000117	B(5,13)=	-5.18E-05
B(4,2)=	0.0335	B(3,6)=	-0.0329	B(2,10)=	-0.00034	B(1,14)=	0.0021
B(5,2)=	0.0022	B(4,6)=	-0.0092	B(3,10)=	7.01E-05	B(2,14)=	0.0002
B(1,3)=	-0.1300	B(5,6)=	0.0014	B(4,10)=	-6.99E-06	B(3,14)=	-0.0004
B(2,3)=	0.1393	B(1,7)=	-0.0030	B(5,10)=	-7.38E-06	B(4,14)=	2.38E-05
B(3,3)=	0.0333	B(2,7)=	-0.0012	B(1,11)=	-0.0009	B(5,14)=	8.61E-06
B(4,3)=	0.0093	B(3,7)=	-0.0002	B(2,11)=	0.00013	B(1,15)=	-0.0003

B(5,3)=	-0.0014	B(4,7)=	0.0000	B(3,11)=	-8.62E-05	B(2,15)=	-0.0002
B(1,4)=	0.0002	B(5,7)=	-0.0002	B(4,11)=	1.72E-06	B(3,15)=	0.0001
B(2,4)=	0.0001	B(1,8)=	0.0040	B(5,11)=	7.76E-06	B(4,15)=	-1.35E-05
B(3,4)=	-9.49E-06	B(2,8)=	0.0017	B(1,12)=	-0.0049	B(5,15)=	-1.05E-05
B(4,4)=	-1.67E-07	B(3,8)=	0.0001	B(2,12)=	-0.0006		

Matrix C:

C(1,1)=	-0.5419	C(3,2)=	0.2564	C(5,3)=	-0.1186	C(2,5)=	-0.8124
C(2,1)=	-0.5192	C(4,2)=	-0.6765	C(1,4)=	-0.1056	C(3,5)=	0.3373
C(3,1)=	-0.4829	C(5,2)=	-0.5819	C(2,4)=	-0.0041	C(4,5)=	0.0105
C(4,1)=	-0.3503	C(1,3)=	0.6313	C(3,4)=	0.1003	C(5,5)=	-0.0083
C(5,1)=	-0.2845	C(2,3)=	0.0562	C(4,4)=	0.6423		
C(1,2)=	0.2660	C(3,3)=	-0.7598	C(5,4)=	-0.7525		
C(2,2)=	0.2593	C(4,3)=	0.0838	C(1,5)=	0.4754		

Matrix D: All zero sparse 6×12

J.0.2.4 OKID-ERA

Matrix A:

A(1,1)=	0.9779	A(1,11)=	-0.0114	A(1,21)=	-0.0026	A(1,31)=	-0.0023
A(2,1)=	0.0648	A(2,11)=	0.0006	A(2,21)=	-0.001	A(2,31)=	-0.0055
A(3,1)=	0.0290	A(3,11)=	-0.0121	A(3,21)=	0.0161	A(3,31)=	-0.02
A(4,1)=	0.0411	A(4,11)=	-0.0261	A(4,21)=	-0.0019	A(4,31)=	0.0179
A(5,1)=	0.0019	A(5,11)=	-0.0125	A(5,21)=	0.0018	A(5,31)=	-0.0037
A(6,1)=	0.0152	A(6,11)=	0.0226	A(6,21)=	0.0028	A(6,31)=	-0.0115
A(7,1)=	-0.0098	A(7,11)=	-0.0743	A(7,21)=	0.0161	A(7,31)=	-0.0137
A(8,1)=	0.0205	A(8,11)=	-0.0534	A(8,21)=	0.0215	A(8,31)=	-0.0434
A(9,1)=	-0.0138	A(9,11)=	0.2114	A(9,21)=	-0.0064	A(9,31)=	-0.0312
A(10,1)=	-0.0245	A(10,11)=	0.1219	A(10,21)=	0.0019	A(10,31)=	0.0057
A(11,1)=	0.0099	A(11,11)=	-0.046	A(11,21)=	-0.0253	A(11,31)=	0.0384
A(12,1)=	-0.0031	A(12,11)=	-0.8928	A(12,21)=	-0.0127	A(12,31)=	-0.0016
A(13,1)=	0.0134	A(13,11)=	0.0016	A(13,21)=	-0.0069	A(13,31)=	0.0007
A(14,1)=	-0.0069	A(14,11)=	-0.1797	A(14,21)=	0.02	A(14,31)=	-0.0575
A(15,1)=	-0.0017	A(15,11)=	0.0887	A(15,21)=	-0.0211	A(15,31)=	0.0583
A(16,1)=	0.0099	A(16,11)=	0.1421	A(16,21)=	0.0679	A(16,31)=	-0.036
A(17,1)=	0.0200	A(17,11)=	0.0829	A(17,21)=	-0.0334	A(17,31)=	0.0589
A(18,1)=	-0.0241	A(18,11)=	-0.0444	A(18,21)=	0.0963	A(18,31)=	-0.0107
A(19,1)=	-0.0211	A(19,11)=	-0.1566	A(19,21)=	-0.3778	A(19,31)=	0.0822
A(20,1)=	0.0115	A(20,11)=	0.0055	A(20,21)=	0.0309	A(20,31)=	-0.0294
A(21,1)=	0.0052	A(21,11)=	-0.013	A(21,21)=	-0.4336	A(21,31)=	-0.0482
A(22,1)=	0.0125	A(22,11)=	0.0422	A(22,21)=	-0.7242	A(22,31)=	-0.0264
A(23,1)=	0.0075	A(23,11)=	0.0405	A(23,21)=	-0.2023	A(23,31)=	-0.0047
A(24,1)=	0.0106	A(24,11)=	0.0019	A(24,21)=	0.0418	A(24,31)=	0.0063
A(25,1)=	0.0058	A(25,11)=	0.0056	A(25,21)=	0.1492	A(25,31)=	0.0939

A(26,1)=	-0.0053	A(26,11)=	-0.0379	A(26,21)=	0.0707	A(26,31)=	0.0061
A(27,1)=	0.0219	A(27,11)=	0.0812	A(27,21)=	-0.0746	A(27,31)=	-0.0051
A(28,1)=	-0.0048	A(28,11)=	-0.003	A(28,21)=	0.0036	A(28,31)=	-0.0196
A(29,1)=	0.0242	A(29,11)=	-0.0398	A(29,21)=	0.1342	A(29,31)=	0.0073
A(30,1)=	-0.0010	A(30,11)=	0.0023	A(30,21)=	0.0155	A(30,31)=	0.6036
A(31,1)=	-0.0102	A(31,11)=	-0.037	A(31,21)=	0.0192	A(31,31)=	-0.3783
A(32,1)=	0.0146	A(32,11)=	-0.0193	A(32,21)=	0.0646	A(32,31)=	-0.085
A(33,1)=	-0.0013	A(33,11)=	0.022	A(33,21)=	-0.0083	A(33,31)=	-0.6304
A(34,1)=	0.0056	A(34,11)=	0.0329	A(34,21)=	-0.0456	A(34,31)=	-0.018
A(35,1)=	0.0064	A(35,11)=	0.0289	A(35,21)=	-0.0247	A(35,31)=	0.0565
A(36,1)=	0.0217	A(36,11)=	0.0351	A(36,21)=	-0.0226	A(36,31)=	-0.0269
A(37,1)=	0.0011	A(37,11)=	-0.0072	A(37,21)=	0.0472	A(37,31)=	-0.1722
A(38,1)=	0.0107	A(38,11)=	0.0409	A(38,21)=	-0.0245	A(38,31)=	0.0081
A(39,1)=	-0.0108	A(39,11)=	-0.0398	A(39,21)=	0.0097	A(39,31)=	0.0419
A(40,1)=	0.0102	A(40,11)=	0.0127	A(40,21)=	0.0072	A(40,31)=	-0.0471
A(1,2)=	-0.0686	A(1,12)=	-0.0027	A(1,22)=	0.0077	A(1,32)=	-0.0288
A(2,2)=	0.9934	A(2,12)=	-0.0036	A(2,22)=	0.0054	A(2,32)=	-0.0139
A(3,2)=	-0.0716	A(3,12)=	-0.011	A(3,22)=	0.0064	A(3,32)=	-0.0032
A(4,2)=	-0.0110	A(4,12)=	0.0391	A(4,22)=	-0.032	A(4,32)=	0.058
A(5,2)=	-0.0074	A(5,12)=	-0.0038	A(5,22)=	0.009	A(5,32)=	-0.0167
A(6,2)=	-0.0071	A(6,12)=	0.0019	A(6,22)=	-0.0035	A(6,32)=	0.0251
A(7,2)=	-0.0005	A(7,12)=	-0.0244	A(7,22)=	0.0165	A(7,32)=	-0.0528
A(8,2)=	-0.0111	A(8,12)=	-0.0634	A(8,22)=	0.0262	A(8,32)=	-0.063
A(9,2)=	0.0054	A(9,12)=	-0.1417	A(9,22)=	0.0537	A(9,32)=	-0.0705
A(10,2)=	0.0054	A(10,12)=	-0.0523	A(10,22)=	0.0031	A(10,32)=	-0.0008
A(11,2)=	0.0022	A(11,12)=	0.8885	A(11,22)=	-0.0397	A(11,32)=	0.0782
A(12,2)=	0.0022	A(12,12)=	-0.177	A(12,22)=	0.002	A(12,32)=	0.0231
A(13,2)=	-0.0041	A(13,12)=	-0.1118	A(13,22)=	-0.013	A(13,32)=	0.033
A(14,2)=	-0.0015	A(14,12)=	0.2652	A(14,22)=	0.0626	A(14,32)=	-0.0742
A(15,2)=	0.0062	A(15,12)=	-0.2363	A(15,22)=	-0.0794	A(15,32)=	0.0901
A(16,2)=	-0.0078	A(16,12)=	0.0105	A(16,22)=	-0.0169	A(16,32)=	-0.0245
A(17,2)=	-0.0034	A(17,12)=	-0.103	A(17,22)=	-0.1059	A(17,32)=	0.0972
A(18,2)=	0.0075	A(18,12)=	0.0256	A(18,22)=	-0.0902	A(18,32)=	0.0582
A(19,2)=	0.0117	A(19,12)=	-0.0064	A(19,22)=	-0.0634	A(19,32)=	0.1954
A(20,2)=	-0.0035	A(20,12)=	-0.0056	A(20,22)=	-0.0266	A(20,32)=	0.0224
A(21,2)=	-0.0034	A(21,12)=	0.0046	A(21,22)=	0.7337	A(21,32)=	-0.0189
A(22,2)=	-0.0054	A(22,12)=	-0.0052	A(22,22)=	-0.5031	A(22,32)=	-0.0217
A(23,2)=	-0.0033	A(23,12)=	-0.0096	A(23,22)=	0.3037	A(23,32)=	0.0432
A(24,2)=	-0.0029	A(24,12)=	-0.0086	A(24,22)=	0.1054	A(24,32)=	0.0562
A(25,2)=	-0.0001	A(25,12)=	-0.0258	A(25,22)=	0.1922	A(25,32)=	0.1299
A(26,2)=	0.0038	A(26,12)=	-0.0005	A(26,22)=	0.0273	A(26,32)=	0.1833
A(27,2)=	-0.0067	A(27,12)=	-0.0157	A(27,22)=	0.0371	A(27,32)=	-0.083
A(28,2)=	0.0010	A(28,12)=	0.0032	A(28,22)=	-0.0278	A(28,32)=	-0.173
A(29,2)=	-0.0050	A(29,12)=	-0.0141	A(29,22)=	-0.0778	A(29,32)=	0.1955
A(30,2)=	0.0023	A(30,12)=	-0.0052	A(30,22)=	0.0307	A(30,32)=	0.2836
A(31,2)=	0.0031	A(31,12)=	0.0126	A(31,22)=	-0.0261	A(31,32)=	-0.2065
A(32,2)=	-0.0035	A(32,12)=	-0.0084	A(32,22)=	-0.0428	A(32,32)=	0.0799

A(33,2)=	0.0014	A(33,12)=	-0.006	A(33,22)=	0.0276	A(33,32)=	0.4797
A(34,2)=	-0.0033	A(34,12)=	0.0004	A(34,22)=	0.0267	A(34,32)=	0.047
A(35,2)=	-0.0036	A(35,12)=	-0.0072	A(35,22)=	0.0183	A(35,32)=	0.0689
A(36,2)=	-0.0090	A(36,12)=	-0.0163	A(36,22)=	0.0485	A(36,32)=	-0.4916
A(37,2)=	0.0020	A(37,12)=	-0.0123	A(37,22)=	-0.006	A(37,32)=	-0.061
A(38,2)=	-0.0052	A(38,12)=	-0.0106	A(38,22)=	0.0228	A(38,32)=	0.1947
A(39,2)=	0.0035	A(39,12)=	0.012	A(39,22)=	-0.0133	A(39,32)=	-0.1998
A(40,2)=	-0.0036	A(40,12)=	-0.0127	A(40,22)=	0.0187	A(40,32)=	-0.1413
A(1,3)=	0.0223	A(1,13)=	-0.007	A(1,23)=	0.0047	A(1,33)=	-0.0051
A(2,3)=	0.0698	A(2,13)=	-0.0002	A(2,23)=	0.004	A(2,33)=	0.0007
A(3,3)=	0.9717	A(3,13)=	-0.0075	A(3,23)=	0.0212	A(3,33)=	-0.0128
A(4,3)=	0.0912	A(4,13)=	0.0039	A(4,23)=	-0.0197	A(4,33)=	0.0136
A(5,3)=	-0.0250	A(5,13)=	-0.0138	A(5,23)=	0.0095	A(5,33)=	-0.0116
A(6,3)=	-0.0380	A(6,13)=	0.015	A(6,23)=	0.008	A(6,33)=	0.0031
A(7,3)=	0.0502	A(7,13)=	-0.0364	A(7,23)=	0.0219	A(7,33)=	-0.0229
A(8,3)=	-0.0196	A(8,13)=	-0.0086	A(8,23)=	0.0357	A(8,33)=	-0.0075
A(9,3)=	-0.0667	A(9,13)=	0.0139	A(9,23)=	0.0353	A(9,33)=	-0.0154
A(10,3)=	0.0220	A(10,13)=	0.0221	A(10,23)=	-0.0072	A(10,33)=	-0.0028
A(11,3)=	-0.0028	A(11,13)=	0.0106	A(11,23)=	-0.0365	A(11,33)=	0.0165
A(12,3)=	-0.0226	A(12,13)=	0.1284	A(12,23)=	-0.001	A(12,33)=	0.0053
A(13,3)=	-0.0176	A(13,13)=	-0.8642	A(13,23)=	0.0043	A(13,33)=	0.0007
A(14,3)=	-0.0288	A(14,13)=	-0.4171	A(14,23)=	0.0574	A(14,33)=	-0.0136
A(15,3)=	0.0430	A(15,13)=	-0.1733	A(15,23)=	-0.0754	A(15,33)=	0.0264
A(16,3)=	0.0330	A(16,13)=	0.0523	A(16,23)=	0.0373	A(16,33)=	-0.016
A(17,3)=	0.0116	A(17,13)=	0.0342	A(17,23)=	-0.0706	A(17,33)=	0.0168
A(18,3)=	0.0349	A(18,13)=	-0.0591	A(18,23)=	-0.0834	A(18,33)=	0.0436
A(19,3)=	-0.0314	A(19,13)=	-0.0858	A(19,23)=	-0.2332	A(19,33)=	0.0858
A(20,3)=	-0.0128	A(20,13)=	0.0012	A(20,23)=	0.0934	A(20,33)=	0
A(21,3)=	-0.0180	A(21,13)=	-0.0011	A(21,23)=	0.2445	A(21,33)=	-0.0238
A(22,3)=	0.0006	A(22,13)=	0.0269	A(22,23)=	0.2857	A(22,33)=	-0.0322
A(23,3)=	0.0189	A(23,13)=	0.0112	A(23,23)=	-0.6536	A(23,33)=	-0.0023
A(24,3)=	-0.0095	A(24,13)=	-0.0004	A(24,23)=	0.2218	A(24,33)=	0.0335
A(25,3)=	-0.0040	A(25,13)=	0.004	A(25,23)=	0.5104	A(25,33)=	-0.0027
A(26,3)=	-0.0108	A(26,13)=	-0.0226	A(26,23)=	0.0651	A(26,33)=	0.0447
A(27,3)=	0.0100	A(27,13)=	0.0476	A(27,23)=	-0.1177	A(27,33)=	-0.1449
A(28,3)=	0.0004	A(28,13)=	0.0012	A(28,23)=	-0.0152	A(28,33)=	-0.0897
A(29,3)=	-0.0742	A(29,13)=	0.0026	A(29,23)=	-0.0787	A(29,33)=	0.0027
A(30,3)=	0.0057	A(30,13)=	-0.001	A(30,23)=	0.0579	A(30,33)=	0.241
A(31,3)=	-0.0090	A(31,13)=	-0.0169	A(31,23)=	0.0209	A(31,33)=	0.7455
A(32,3)=	-0.0424	A(32,13)=	0.0036	A(32,23)=	-0.0307	A(32,33)=	-0.2814
A(33,3)=	0.0188	A(33,13)=	0.0065	A(33,23)=	0.0394	A(33,33)=	-0.1862
A(34,3)=	0.0169	A(34,13)=	0.0153	A(34,23)=	-0.0096	A(34,33)=	-0.0486
A(35,3)=	0.0120	A(35,13)=	0.0116	A(35,23)=	-0.0159	A(35,33)=	0.3011
A(36,3)=	0.0018	A(36,13)=	0.0153	A(36,23)=	-0.0089	A(36,33)=	-0.0209
A(37,3)=	-0.0145	A(37,13)=	0.0027	A(37,23)=	0.0157	A(37,33)=	0.1314
A(38,3)=	0.0148	A(38,13)=	0.0169	A(38,23)=	-0.0107	A(38,33)=	0.1644
A(39,3)=	-0.0086	A(39,13)=	-0.0206	A(39,23)=	0.0099	A(39,33)=	-0.1702

A(40,3)=	-0.0038	A(40,13)=	0.0069	A(40,23)=	0.0018	A(40,33)=	0.0437
A(1,4)=	-0.0280	A(1,14)=	-0.0067	A(1,24)=	-0.0009	A(1,34)=	0.0004
A(2,4)=	-0.0035	A(2,14)=	-0.0019	A(2,24)=	-0.0012	A(2,34)=	0.0021
A(3,4)=	-0.1075	A(3,14)=	-0.0333	A(3,24)=	-0.0011	A(3,34)=	-0.0019
A(4,4)=	0.9371	A(4,14)=	-0.0176	A(4,24)=	-0.0023	A(4,34)=	-0.0108
A(5,4)=	0.1732	A(5,14)=	-0.0044	A(5,24)=	0.0074	A(5,34)=	0.0059
A(6,4)=	-0.0385	A(6,14)=	0.0098	A(6,24)=	-0.0174	A(6,34)=	-0.0127
A(7,4)=	0.2514	A(7,14)=	-0.0824	A(7,24)=	0.0077	A(7,34)=	0.0015
A(8,4)=	0.1050	A(8,14)=	-0.1318	A(8,24)=	-0.0059	A(8,34)=	0.0021
A(9,4)=	-0.0336	A(9,14)=	0.1261	A(9,24)=	-0.0107	A(9,34)=	0.0096
A(10,4)=	-0.0100	A(10,14)=	0.053	A(10,24)=	0.0038	A(10,34)=	0.0022
A(11,4)=	-0.0447	A(11,14)=	0.2301	A(11,24)=	-0.0027	A(11,34)=	-0.0099
A(12,4)=	-0.0363	A(12,14)=	0.3175	A(12,24)=	-0.0178	A(12,34)=	-0.0062
A(13,4)=	-0.0094	A(13,14)=	0.3591	A(13,24)=	-0.0102	A(13,34)=	-0.0063
A(14,4)=	0.0082	A(14,14)=	-0.4194	A(14,24)=	-0.0239	A(14,34)=	0.0029
A(15,4)=	-0.0071	A(15,14)=	-0.0737	A(15,24)=	0.0056	A(15,34)=	-0.015
A(16,4)=	0.0667	A(16,14)=	0.555	A(16,24)=	-0.0022	A(16,34)=	-0.0152
A(17,4)=	-0.0028	A(17,14)=	0.0458	A(17,24)=	0.0299	A(17,34)=	-0.0041
A(18,4)=	0.0082	A(18,14)=	0.0139	A(18,24)=	-0.1157	A(18,34)=	-0.0482
A(19,4)=	-0.0883	A(19,14)=	-0.3006	A(19,24)=	-0.126	A(19,34)=	-0.0068
A(20,4)=	0.0044	A(20,14)=	0.0141	A(20,24)=	-0.0754	A(20,34)=	-0.0132
A(21,4)=	-0.0056	A(21,14)=	-0.0171	A(21,24)=	-0.0578	A(21,34)=	0.0062
A(22,4)=	0.0188	A(22,14)=	0.0599	A(22,24)=	0.0831	A(22,34)=	-0.004
A(23,4)=	0.0252	A(23,14)=	0.0758	A(23,24)=	0.1508	A(23,34)=	-0.03
A(24,4)=	-0.0036	A(24,14)=	0.0011	A(24,24)=	0.7936	A(24,34)=	0.0102
A(25,4)=	-0.0118	A(25,14)=	-0.0281	A(25,24)=	-0.3072	A(25,34)=	0.0022
A(26,4)=	-0.0207	A(26,14)=	-0.0618	A(26,24)=	0.3994	A(26,34)=	-0.0675
A(27,4)=	0.0375	A(27,14)=	0.0941	A(27,24)=	-0.0791	A(27,34)=	-0.0466
A(28,4)=	-0.0009	A(28,14)=	-0.0069	A(28,24)=	-0.0171	A(28,34)=	0.0249
A(29,4)=	-0.0511	A(29,14)=	-0.1137	A(29,24)=	0.0202	A(29,34)=	0.1932
A(30,4)=	-0.0015	A(30,14)=	-0.0021	A(30,24)=	-0.0118	A(30,34)=	0.0146
A(31,4)=	-0.0168	A(31,14)=	-0.0415	A(31,24)=	0.0176	A(31,34)=	0.195
A(32,4)=	-0.0307	A(32,14)=	-0.0605	A(32,24)=	-0.0161	A(32,34)=	0.5011
A(33,4)=	0.0108	A(33,14)=	0.0282	A(33,24)=	-0.032	A(33,34)=	-0.0867
A(34,4)=	0.0262	A(34,14)=	0.058	A(34,24)=	-0.0258	A(34,34)=	0.6927
A(35,4)=	0.0175	A(35,14)=	0.042	A(35,24)=	-0.0238	A(35,34)=	0.2389
A(36,4)=	0.0149	A(36,14)=	0.0477	A(36,24)=	-0.0315	A(36,34)=	-0.074
A(37,4)=	-0.0197	A(37,14)=	-0.0436	A(37,24)=	-0.0133	A(37,34)=	-0.0971
A(38,4)=	0.0262	A(38,14)=	0.0607	A(38,24)=	-0.0499	A(38,34)=	-0.1004
A(39,4)=	-0.0195	A(39,14)=	-0.0443	A(39,24)=	0.0464	A(39,34)=	0.0797
A(40,4)=	-0.0010	A(40,14)=	0.005	A(40,24)=	-0.0169	A(40,34)=	-0.0192
A(1,5)=	0.0134	A(1,15)=	-0.0059	A(1,25)=	-0.0115	A(1,35)=	-0.0006
A(2,5)=	0.0100	A(2,15)=	-0.0029	A(2,25)=	-0.0003	A(2,35)=	0.0023
A(3,5)=	0.0366	A(3,15)=	-0.0206	A(3,25)=	-0.0054	A(3,35)=	-0.0037
A(4,5)=	-0.1605	A(4,15)=	-0.0228	A(4,25)=	0.006	A(4,35)=	-0.0079
A(5,5)=	0.9787	A(5,15)=	-0.0045	A(5,25)=	-0.0087	A(5,35)=	0.0044
A(6,5)=	-0.0713	A(6,15)=	-0.0069	A(6,25)=	0.0089	A(6,35)=	-0.0079

A(7,5)=	-0.0500	A(7,15)=	-0.0365	A(7,25)=	-0.0319	A(7,35)=	-0.002
A(8,5)=	-0.0529	A(8,15)=	-0.0698	A(8,25)=	-0.0087	A(8,35)=	0.0049
A(9,5)=	-0.0209	A(9,15)=	0.0748	A(9,25)=	0.001	A(9,35)=	0.0091
A(10,5)=	0.0145	A(10,15)=	0.075	A(10,25)=	0.0044	A(10,35)=	-0.0008
A(11,5)=	0.0129	A(11,15)=	0.0423	A(11,25)=	0.0099	A(11,35)=	-0.0037
A(12,5)=	-0.0023	A(12,15)=	0.1286	A(12,25)=	0.0196	A(12,35)=	-0.0043
A(13,5)=	-0.0061	A(13,15)=	-0.2884	A(13,25)=	0.0044	A(13,35)=	-0.0079
A(14,5)=	-0.0193	A(14,15)=	0.5053	A(14,25)=	0.0086	A(14,35)=	0.0015
A(15,5)=	0.0184	A(15,15)=	0.663	A(15,25)=	0.0086	A(15,35)=	-0.0126
A(16,5)=	-0.0135	A(16,15)=	0.3273	A(16,25)=	-0.0386	A(16,35)=	-0.0171
A(17,5)=	0.0090	A(17,15)=	0.1	A(17,25)=	-0.0078	A(17,35)=	-0.0023
A(18,5)=	0.0007	A(18,15)=	-0.0452	A(18,25)=	0.0922	A(18,35)=	-0.0408
A(19,5)=	0.0148	A(19,15)=	-0.1783	A(19,25)=	0.3017	A(19,35)=	-0.0008
A(20,5)=	-0.0081	A(20,15)=	0.0322	A(20,25)=	-0.0005	A(20,35)=	-0.0209
A(21,5)=	-0.0047	A(21,15)=	0.0038	A(21,25)=	0.0369	A(21,35)=	0.002
A(22,5)=	-0.0053	A(22,15)=	0.0472	A(22,25)=	-0.2361	A(22,35)=	0.0009
A(23,5)=	-0.0030	A(23,15)=	0.0459	A(23,25)=	-0.4476	A(23,35)=	-0.0266
A(24,5)=	-0.0012	A(24,15)=	0.014	A(24,25)=	0.3629	A(24,35)=	0.0002
A(25,5)=	0.0043	A(25,15)=	0.0024	A(25,25)=	-0.3223	A(25,35)=	-0.0046
A(26,5)=	-0.0024	A(26,15)=	-0.0304	A(26,25)=	-0.4243	A(26,35)=	-0.0448
A(27,5)=	-0.0081	A(27,15)=	0.0723	A(27,25)=	0.3652	A(27,35)=	-0.012
A(28,5)=	0.0011	A(28,15)=	-0.0072	A(28,25)=	0.0196	A(28,35)=	0.0206
A(29,5)=	-0.0043	A(29,15)=	-0.0171	A(29,25)=	-0.1061	A(29,35)=	0.111
A(30,5)=	0.0031	A(30,15)=	-0.0032	A(30,25)=	-0.0075	A(30,35)=	-0.0124
A(31,5)=	0.0029	A(31,15)=	-0.0325	A(31,25)=	-0.0888	A(31,35)=	0
A(32,5)=	-0.0003	A(32,15)=	-0.0104	A(32,25)=	-0.0419	A(32,35)=	0.3388
A(33,5)=	0.0034	A(33,15)=	0.0087	A(33,25)=	0.0412	A(33,35)=	0.1187
A(34,5)=	-0.0020	A(34,15)=	0.0307	A(34,25)=	0.0581	A(34,35)=	-0.5957
A(35,5)=	-0.0012	A(35,15)=	0.0269	A(35,25)=	0.0521	A(35,35)=	0.5788
A(36,5)=	-0.0021	A(36,15)=	0.0431	A(36,25)=	0.0274	A(36,35)=	0.1505
A(37,5)=	0.0034	A(37,15)=	-0.0137	A(37,25)=	0.0041	A(37,35)=	-0.2601
A(38,5)=	-0.0005	A(38,15)=	0.0401	A(38,25)=	0.0606	A(38,35)=	-0.0181
A(39,5)=	0.0005	A(39,15)=	-0.0333	A(39,25)=	-0.0717	A(39,35)=	0.0825
A(40,5)=	0.0006	A(40,15)=	0.014	A(40,25)=	0.0106	A(40,35)=	-0.0445
A(1,6)=	0.0079	A(1,16)=	0.006	A(1,26)=	0.0134	A(1,36)=	-0.0084
A(2,6)=	0.0048	A(2,16)=	0.009	A(2,26)=	0.0033	A(2,36)=	0
A(3,6)=	0.0095	A(3,16)=	0.0242	A(3,26)=	0.0093	A(3,36)=	0.0141
A(4,6)=	0.0616	A(4,16)=	-0.06	A(4,26)=	-0.046	A(4,36)=	-0.0123
A(5,6)=	0.0760	A(5,16)=	0.0207	A(5,26)=	0.0146	A(5,36)=	0.0068
A(6,6)=	0.9614	A(6,16)=	-0.0032	A(6,26)=	-0.0075	A(6,36)=	0.0031
A(7,6)=	-0.1581	A(7,16)=	0.0332	A(7,26)=	0.0331	A(7,36)=	-0.0027
A(8,6)=	-0.0201	A(8,16)=	0.0812	A(8,26)=	0.0188	A(8,36)=	0.0064
A(9,6)=	0.0173	A(9,16)=	0.1387	A(9,26)=	0.0689	A(9,36)=	0.0185
A(10,6)=	0.0443	A(10,16)=	0.0049	A(10,26)=	0.0177	A(10,36)=	0.0036
A(11,6)=	-0.0266	A(11,16)=	-0.1619	A(11,26)=	-0.0524	A(11,36)=	-0.0121
A(12,6)=	0.0110	A(12,16)=	-0.0008	A(12,26)=	0.0046	A(12,36)=	0.0047
A(13,6)=	-0.0161	A(13,16)=	-0.0548	A(13,26)=	-0.0178	A(13,36)=	0.0004

A(14,6)=	0.0240	A(14,16)=	0.3795	A(14,26)=	0.0712	A(14,36)=	0.0233
A(15,6)=	0.0033	A(15,16)=	-0.5191	A(15,26)=	-0.0802	A(15,36)=	-0.0375
A(16,6)=	-0.0025	A(16,16)=	0.2387	A(16,26)=	-0.0119	A(16,36)=	-0.0118
A(17,6)=	-0.0315	A(17,16)=	0.673	A(17,26)=	-0.1206	A(17,36)=	-0.0291
A(18,6)=	0.0467	A(18,16)=	0.0747	A(18,26)=	-0.018	A(18,36)=	-0.0283
A(19,6)=	0.0317	A(19,16)=	0.0773	A(19,26)=	-0.0406	A(19,36)=	0.0177
A(20,6)=	-0.0057	A(20,16)=	0.0002	A(20,26)=	-0.0377	A(20,36)=	-0.0004
A(21,6)=	-0.0052	A(21,16)=	-0.047	A(21,26)=	0.0999	A(21,36)=	0.034
A(22,6)=	-0.0171	A(22,16)=	-0.0104	A(22,26)=	-0.0579	A(22,36)=	0.0053
A(23,6)=	-0.0049	A(23,16)=	0.0372	A(23,26)=	-0.329	A(23,36)=	-0.0357
A(24,6)=	-0.0053	A(24,16)=	0.0122	A(24,26)=	-0.3545	A(24,36)=	0.0022
A(25,6)=	-0.0121	A(25,16)=	0.0459	A(25,26)=	-0.3667	A(25,36)=	-0.0252
A(26,6)=	0.0098	A(26,16)=	0.0203	A(26,26)=	0.6581	A(26,36)=	-0.0041
A(27,6)=	-0.0325	A(27,16)=	0.0157	A(27,26)=	0.2284	A(27,36)=	-0.0617
A(28,6)=	0.0003	A(28,16)=	-0.0137	A(28,26)=	-0.1345	A(28,36)=	0.0179
A(29,6)=	-0.0271	A(29,16)=	-0.0418	A(29,26)=	-0.0355	A(29,36)=	0.2225
A(30,6)=	0.0029	A(30,16)=	0.0242	A(30,26)=	0.0799	A(30,36)=	-0.1092
A(31,6)=	0.0187	A(31,16)=	-0.0135	A(31,26)=	-0.0465	A(31,36)=	0.1396
A(32,6)=	-0.0199	A(32,16)=	-0.03	A(32,26)=	-0.0197	A(32,36)=	0.351
A(33,6)=	-0.0045	A(33,16)=	0.02	A(33,26)=	0.0491	A(33,36)=	-0.2681
A(34,6)=	0.0006	A(34,16)=	0.0144	A(34,26)=	0.0803	A(34,36)=	-0.281
A(35,6)=	-0.0112	A(35,16)=	0.0055	A(35,26)=	0.0208	A(35,36)=	-0.5564
A(36,6)=	-0.0179	A(36,16)=	0.0196	A(36,26)=	0.1507	A(36,36)=	-0.115
A(37,6)=	-0.0134	A(37,16)=	0.002	A(37,26)=	-0.0407	A(37,36)=	0.0071
A(38,6)=	-0.0136	A(38,16)=	0.0066	A(38,26)=	0.0282	A(38,36)=	0.2356
A(39,6)=	0.0186	A(39,16)=	-0.0061	A(39,26)=	-0.0155	A(39,36)=	-0.2263
A(40,6)=	-0.0139	A(40,16)=	0.0091	A(40,26)=	0.0405	A(40,36)=	-0.0041
A(1,7)=	0.0084	A(1,17)=	-0.0208	A(1,27)=	0.0051	A(1,37)=	0.0115
A(2,7)=	0.0011	A(2,17)=	-0.004	A(2,27)=	0.0116	A(2,37)=	0.0014
A(3,7)=	-0.0018	A(3,17)=	-0.0082	A(3,27)=	0.0486	A(3,37)=	0.0368
A(4,7)=	-0.2582	A(4,17)=	0.0141	A(4,27)=	-0.0606	A(4,37)=	-0.0282
A(5,7)=	0.0191	A(5,17)=	-0.0125	A(5,27)=	0.0203	A(5,37)=	0.0144
A(6,7)=	0.1983	A(6,17)=	0.0338	A(6,27)=	0.0033	A(6,37)=	0.0208
A(7,7)=	0.9076	A(7,17)=	-0.079	A(7,27)=	0.0487	A(7,37)=	0.041
A(8,7)=	0.0473	A(8,17)=	-0.0635	A(8,27)=	0.102	A(8,37)=	0.0318
A(9,7)=	-0.1982	A(9,17)=	0.0226	A(9,27)=	0.0839	A(9,37)=	0.0486
A(10,7)=	-0.0678	A(10,17)=	0.0113	A(10,27)=	0.0005	A(10,37)=	-0.0019
A(11,7)=	0.0471	A(11,17)=	0.0904	A(11,27)=	-0.1177	A(11,37)=	-0.0363
A(12,7)=	-0.0497	A(12,17)=	0.1111	A(12,27)=	-0.0141	A(12,37)=	0.0086
A(13,7)=	0.0124	A(13,17)=	0.0751	A(13,27)=	-0.0222	A(13,37)=	0.0118
A(14,7)=	-0.0781	A(14,17)=	0.0122	A(14,27)=	0.145	A(14,37)=	0.064
A(15,7)=	0.0607	A(15,17)=	0.0326	A(15,27)=	-0.1674	A(15,37)=	-0.0761
A(16,7)=	0.0484	A(16,17)=	-0.6665	A(16,27)=	0.0852	A(16,37)=	0.0415
A(17,7)=	0.0751	A(17,17)=	0.3145	A(17,27)=	-0.1753	A(17,37)=	-0.0738
A(18,7)=	-0.0294	A(18,17)=	-0.0575	A(18,27)=	-0.0289	A(18,37)=	-0.0159
A(19,7)=	-0.0729	A(19,17)=	-0.5259	A(19,27)=	-0.3197	A(19,37)=	-0.1111
A(20,7)=	0.0064	A(20,17)=	-0.021	A(20,27)=	0.032	A(20,37)=	0.0458

A(21,7)=	-0.0112	A(21,17)=	-0.0437	A(21,27)=	0.1503	A(21,37)=	0.0665
A(22,7)=	0.0266	A(22,17)=	0.0779	A(22,27)=	0.095	A(22,37)=	0.0568
A(23,7)=	0.0314	A(23,17)=	0.0729	A(23,27)=	-0.0273	A(23,37)=	0.0044
A(24,7)=	0.0150	A(24,17)=	-0.0204	A(24,27)=	-0.0669	A(24,37)=	-0.0465
A(25,7)=	0.0106	A(25,17)=	-0.0361	A(25,27)=	-0.4324	A(25,37)=	-0.0513
A(26,7)=	-0.0269	A(26,17)=	-0.0985	A(26,27)=	-0.3574	A(26,37)=	0.0508
A(27,7)=	0.0545	A(27,17)=	0.1254	A(27,27)=	-0.296	A(27,37)=	0.1718
A(28,7)=	-0.0098	A(28,17)=	0.004	A(28,27)=	-0.3065	A(28,37)=	0.0563
A(29,7)=	-0.0167	A(29,17)=	-0.1283	A(29,27)=	0.224	A(29,37)=	0.0806
A(30,7)=	0.0072	A(30,17)=	0.0042	A(30,27)=	0.3667	A(30,37)=	-0.2444
A(31,7)=	-0.0263	A(31,17)=	-0.0455	A(31,27)=	-0.0573	A(31,37)=	-0.1958
A(32,7)=	-0.0056	A(32,17)=	-0.0613	A(32,27)=	0.0026	A(32,37)=	-0.0206
A(33,7)=	0.0183	A(33,17)=	0.0419	A(33,27)=	0.1509	A(33,37)=	-0.2932
A(34,7)=	0.0271	A(34,17)=	0.0606	A(34,27)=	-0.0414	A(34,37)=	-0.0444
A(35,7)=	0.0211	A(35,17)=	0.0404	A(35,27)=	-0.0549	A(35,37)=	0.3502
A(36,7)=	0.0441	A(36,17)=	0.026	A(36,27)=	0.0367	A(36,37)=	-0.4877
A(37,7)=	-0.0086	A(37,17)=	-0.0297	A(37,27)=	0.1679	A(37,37)=	0.5135
A(38,7)=	0.0328	A(38,17)=	0.0632	A(38,27)=	-0.0711	A(38,37)=	0.1354
A(39,7)=	-0.0295	A(39,17)=	-0.0583	A(39,27)=	0.0045	A(39,37)=	0.0992
A(40,7)=	0.0165	A(40,17)=	-0.0015	A(40,27)=	0.0629	A(40,37)=	0.1038
A(1,8)=	-0.0233	A(1,18)=	0.0082	A(1,28)=	-0.0031	A(1,38)=	0.0054
A(2,8)=	0.0067	A(2,18)=	-0.0049	A(2,28)=	-0.0057	A(2,38)=	0.0023
A(3,8)=	-0.0035	A(3,18)=	-0.0316	A(3,28)=	-0.0103	A(3,38)=	0.0135
A(4,8)=	-0.0905	A(4,18)=	0.0077	A(4,28)=	0.0176	A(4,38)=	-0.0188
A(5,8)=	0.0199	A(5,18)=	-0.0009	A(5,28)=	0.0009	A(5,38)=	0.0055
A(6,8)=	-0.0068	A(6,18)=	-0.0369	A(6,28)=	-0.0113	A(6,38)=	0.004
A(7,8)=	-0.1872	A(7,18)=	0.0092	A(7,28)=	-0.0058	A(7,38)=	0.0183
A(8,8)=	0.8813	A(8,18)=	-0.0519	A(8,28)=	-0.036	A(8,38)=	0.0219
A(9,8)=	-0.3526	A(9,18)=	-0.0435	A(9,28)=	-0.0338	A(9,38)=	0.0268
A(10,8)=	-0.0599	A(10,18)=	0.0197	A(10,28)=	0.0035	A(10,38)=	0.0028
A(11,8)=	0.0391	A(11,18)=	0.0368	A(11,28)=	0.0317	A(11,38)=	-0.0281
A(12,8)=	-0.0559	A(12,18)=	-0.0315	A(12,28)=	-0.0067	A(12,38)=	0.001
A(13,8)=	0.0153	A(13,18)=	-0.0375	A(13,28)=	0.004	A(13,38)=	-0.0032
A(14,8)=	-0.0754	A(14,18)=	-0.1153	A(14,28)=	-0.0566	A(14,38)=	0.0375
A(15,8)=	0.0939	A(15,18)=	0.1172	A(15,28)=	0.0513	A(15,38)=	-0.0382
A(16,8)=	0.0901	A(16,18)=	-0.06	A(16,28)=	-0.017	A(16,38)=	0.0192
A(17,8)=	0.0509	A(17,18)=	0.1384	A(17,28)=	0.0681	A(17,38)=	-0.0452
A(18,8)=	0.0190	A(18,18)=	0.8396	A(18,28)=	-0.0415	A(18,38)=	0.0094
A(19,8)=	-0.0891	A(19,18)=	-0.0903	A(19,28)=	0.0206	A(19,38)=	-0.0472
A(20,8)=	0.0128	A(20,18)=	0.333	A(20,28)=	-0.0235	A(20,38)=	0.0087
A(21,8)=	-0.0181	A(21,18)=	0.2261	A(21,28)=	-0.0415	A(21,38)=	0.0236
A(22,8)=	0.0232	A(22,18)=	0.0544	A(22,28)=	0.0006	A(22,38)=	0.0082
A(23,8)=	0.0400	A(23,18)=	-0.0129	A(23,28)=	0.0256	A(23,38)=	-0.0061
A(24,8)=	-0.0017	A(24,18)=	0.0438	A(24,28)=	0.0115	A(24,38)=	-0.0233
A(25,8)=	0.0059	A(25,18)=	-0.0637	A(25,28)=	0.1427	A(25,38)=	-0.0413
A(26,8)=	-0.0074	A(26,18)=	0.0674	A(26,28)=	-0.0613	A(26,38)=	0.0015
A(27,8)=	0.0605	A(27,18)=	-0.0316	A(27,28)=	0.3167	A(27,38)=	-0.0035

A(28,8)=	-0.0060	A(28,18)=	-0.0088	A(28,28)=	-0.8548	A(28,38)=	0.0312
A(29,8)=	-0.0582	A(29,18)=	0.1144	A(29,28)=	0.0181	A(29,38)=	-0.0433
A(30,8)=	0.0074	A(30,18)=	-0.0463	A(30,28)=	-0.1837	A(30,38)=	-0.0853
A(31,8)=	-0.0281	A(31,18)=	0.0098	A(31,28)=	0.1042	A(31,38)=	0.0015
A(32,8)=	-0.0413	A(32,18)=	0.0474	A(32,28)=	-0.0201	A(32,38)=	-0.0616
A(33,8)=	0.0165	A(33,18)=	-0.0589	A(33,28)=	-0.1121	A(33,38)=	-0.0855
A(34,8)=	0.0332	A(34,18)=	-0.0217	A(34,28)=	-0.0444	A(34,38)=	-0.0417
A(35,8)=	0.0199	A(35,18)=	-0.0042	A(35,28)=	-0.0461	A(35,38)=	0.0449
A(36,8)=	0.0209	A(36,18)=	0.0179	A(36,28)=	-0.0888	A(36,38)=	-0.3081
A(37,8)=	-0.0139	A(37,18)=	-0.0196	A(37,28)=	-0.0873	A(37,38)=	-0.3318
A(38,8)=	0.0263	A(38,18)=	-0.019	A(38,28)=	-0.0738	A(38,38)=	-0.6217
A(39,8)=	-0.0244	A(39,18)=	0.0306	A(39,28)=	0.0821	A(39,38)=	-0.4654
A(40,8)=	0.0032	A(40,18)=	0.0031	A(40,28)=	-0.0574	A(40,38)=	0.3518
A(1,9)=	0.0084	A(1,19)=	-0.0147	A(1,29)=	-0.0039	A(1,39)=	0.0075
A(2,9)=	0.0011	A(2,19)=	-0.011	A(2,29)=	-0.0059	A(2,39)=	0.0064
A(3,9)=	0.0692	A(3,19)=	-0.0274	A(3,29)=	0.0309	A(3,39)=	-0.0093
A(4,9)=	-0.0226	A(4,19)=	0.1025	A(4,29)=	0.0022	A(4,39)=	-0.0143
A(5,9)=	0.0337	A(5,19)=	-0.0249	A(5,29)=	0.0109	A(5,39)=	-0.001
A(6,9)=	0.0112	A(6,19)=	0.0069	A(6,29)=	0.0116	A(6,39)=	-0.0108
A(7,9)=	0.1747	A(7,19)=	-0.0496	A(7,29)=	0.022	A(7,39)=	0.0049
A(8,9)=	0.3861	A(8,19)=	-0.0757	A(8,29)=	0.0007	A(8,39)=	0.0218
A(9,9)=	0.7965	A(9,19)=	-0.1784	A(9,29)=	-0.0048	A(9,39)=	0.0156
A(10,9)=	0.1772	A(10,19)=	-0.0386	A(10,29)=	0.001	A(10,39)=	-0.0007
A(11,9)=	0.2453	A(11,19)=	0.1606	A(11,29)=	-0.008	A(11,39)=	-0.0213
A(12,9)=	0.1163	A(12,19)=	-0.0198	A(12,29)=	-0.0004	A(12,39)=	-0.008
A(13,9)=	0.0082	A(13,19)=	0.054	A(13,29)=	0.0188	A(13,39)=	-0.016
A(14,9)=	-0.0805	A(14,19)=	-0.2557	A(14,29)=	0.0082	A(14,39)=	0.0177
A(15,9)=	0.1130	A(15,19)=	0.2784	A(15,29)=	-0.0204	A(15,39)=	-0.0148
A(16,9)=	-0.1484	A(16,19)=	0.0387	A(16,29)=	0.0488	A(16,39)=	-0.0001
A(17,9)=	0.0289	A(17,19)=	0.5327	A(17,29)=	-0.0006	A(17,39)=	-0.0229
A(18,9)=	0.0132	A(18,19)=	-0.2231	A(18,29)=	-0.0332	A(18,39)=	0.0064
A(19,9)=	0.1600	A(19,19)=	0.0355	A(19,29)=	-0.1291	A(19,39)=	-0.0223
A(20,9)=	-0.0118	A(20,19)=	-0.1671	A(20,29)=	0.0472	A(20,39)=	-0.0162
A(21,9)=	-0.0086	A(21,19)=	0.2968	A(21,29)=	0.057	A(21,39)=	-0.0117
A(22,9)=	-0.0400	A(22,19)=	-0.1475	A(22,29)=	0.0808	A(22,39)=	-0.014
A(23,9)=	-0.0329	A(23,19)=	-0.2712	A(23,29)=	0.0722	A(23,39)=	-0.0136
A(24,9)=	0.0084	A(24,19)=	-0.1512	A(24,29)=	-0.0225	A(24,39)=	-0.0019
A(25,9)=	0.0194	A(25,19)=	-0.2346	A(25,29)=	0.0347	A(25,39)=	-0.0412
A(26,9)=	0.0292	A(26,19)=	0.0019	A(26,29)=	-0.0048	A(26,39)=	-0.0453
A(27,9)=	-0.0611	A(27,19)=	-0.2051	A(27,29)=	0.6592	A(27,39)=	-0.0541
A(28,9)=	-0.0027	A(28,19)=	0.0696	A(28,29)=	0.2848	A(28,39)=	0.0069
A(29,9)=	0.0488	A(29,19)=	0.0571	A(29,29)=	0.1495	A(29,39)=	-0.0806
A(30,9)=	0.0144	A(30,19)=	-0.0721	A(30,29)=	0.3764	A(30,39)=	0.0265
A(31,9)=	0.0299	A(31,19)=	0.0892	A(31,29)=	0.2999	A(31,39)=	0.0795
A(32,9)=	0.0262	A(32,19)=	0.0365	A(32,29)=	0.0745	A(32,39)=	-0.0327
A(33,9)=	-0.0080	A(33,19)=	-0.072	A(33,29)=	0.1208	A(33,39)=	0.068
A(34,9)=	-0.0265	A(34,19)=	-0.0767	A(34,29)=	-0.1128	A(34,39)=	-0.0072

A(35,9)=	-0.0288	A(35,19)=	-0.0459	A(35,29)=	-0.1574	A(35,39)=	-0.0921
A(36,9)=	-0.0227	A(36,19)=	-0.1442	A(36,29)=	-0.1518	A(36,39)=	-0.2603
A(37,9)=	0.0191	A(37,19)=	-0.0003	A(37,29)=	0.0002	A(37,39)=	-0.3919
A(38,9)=	-0.0344	A(38,19)=	-0.057	A(38,29)=	-0.1211	A(38,39)=	0.3269
A(39,9)=	0.0273	A(39,19)=	0.058	A(39,29)=	0.0881	A(39,39)=	0.5022
A(40,9)=	-0.0044	A(40,19)=	-0.0587	A(40,29)=	-0.0589	A(40,39)=	0.6046
A(1,10)=	0.0170	A(1,20)=	-0.0036	A(1,30)=	0.0025	A(1,40)=	0.0046
A(2,10)=	0.0024	A(2,20)=	-0.0031	A(2,30)=	-0.0015	A(2,40)=	0.0028
A(3,10)=	-0.0248	A(3,20)=	0.0017	A(3,30)=	-0.0025	A(3,40)=	0.0169
A(4,10)=	0.0073	A(4,20)=	0.0053	A(4,30)=	-0.0096	A(4,40)=	-0.0136
A(5,10)=	-0.0186	A(5,20)=	0.0061	A(5,30)=	0.009	A(5,40)=	0.0076
A(6,10)=	-0.0184	A(6,20)=	-0.0041	A(6,30)=	-0.0117	A(6,40)=	0.0028
A(7,10)=	0.0334	A(7,20)=	-0.0032	A(7,30)=	0.006	A(7,40)=	0.0197
A(8,10)=	0.0157	A(8,20)=	-0.0242	A(8,30)=	-0.0178	A(8,40)=	0.025
A(9,10)=	-0.2323	A(9,20)=	-0.0109	A(9,30)=	0.0093	A(9,40)=	0.0179
A(10,10)=	0.9567	A(10,20)=	-0.0002	A(10,30)=	0.0061	A(10,40)=	-0.0041
A(11,10)=	0.0112	A(11,20)=	0.0239	A(11,30)=	0.0045	A(11,40)=	-0.024
A(12,10)=	0.0496	A(12,20)=	-0.0006	A(12,30)=	-0.0019	A(12,40)=	-0.0049
A(13,10)=	0.0323	A(13,20)=	0.0122	A(13,30)=	-0.0014	A(13,40)=	0.0007
A(14,10)=	0.0301	A(14,20)=	-0.0351	A(14,30)=	-0.0112	A(14,40)=	0.0282
A(15,10)=	-0.0763	A(15,20)=	0.0104	A(15,30)=	-0.0062	A(15,40)=	-0.0381
A(16,10)=	-0.0286	A(16,20)=	-0.0341	A(16,30)=	-0.0303	A(16,40)=	0.0264
A(17,10)=	-0.0040	A(17,20)=	0.0574	A(17,30)=	0.0047	A(17,40)=	-0.0276
A(18,10)=	-0.0355	A(18,20)=	-0.3494	A(18,30)=	-0.0699	A(18,40)=	-0.0239
A(19,10)=	0.0195	A(19,20)=	0.0904	A(19,30)=	0.0161	A(19,40)=	-0.085
A(20,10)=	0.0029	A(20,20)=	0.9023	A(20,30)=	-0.0191	A(20,40)=	0.0165
A(21,10)=	0.0185	A(21,20)=	-0.0472	A(21,30)=	0.0068	A(21,40)=	0.0245
A(22,10)=	0.0037	A(22,20)=	-0.0861	A(22,30)=	0.0007	A(22,40)=	0.0331
A(23,10)=	-0.0114	A(23,20)=	0.0231	A(23,30)=	-0.0484	A(23,40)=	0.0111
A(24,10)=	0.0040	A(24,20)=	-0.0257	A(24,30)=	-0.0136	A(24,40)=	-0.0057
A(25,10)=	0.0057	A(25,20)=	-0.0924	A(25,30)=	0.0489	A(25,40)=	-0.0315
A(26,10)=	0.0009	A(26,20)=	0.0184	A(26,30)=	-0.0403	A(26,40)=	-0.0289
A(27,10)=	-0.0083	A(27,20)=	-0.0469	A(27,30)=	0.0341	A(27,40)=	0.0886
A(28,10)=	0.0025	A(28,20)=	-0.0016	A(28,30)=	0.1173	A(28,40)=	0.0128
A(29,10)=	0.0407	A(29,20)=	-0.089	A(29,30)=	0.7015	A(29,40)=	0.0148
A(30,10)=	-0.0095	A(30,20)=	-0.0011	A(30,30)=	-0.182	A(30,40)=	-0.0713
A(31,10)=	0.0016	A(31,20)=	0.0103	A(31,30)=	-0.0575	A(31,40)=	-0.0601
A(32,10)=	0.0269	A(32,20)=	-0.0454	A(32,30)=	-0.564	A(32,40)=	0.0103
A(33,10)=	-0.0105	A(33,20)=	0.0063	A(33,30)=	0.0507	A(33,40)=	-0.0558
A(34,10)=	-0.0117	A(34,20)=	-0.0037	A(34,30)=	0.0706	A(34,40)=	0.0996
A(35,10)=	0.0003	A(35,20)=	-0.0038	A(35,30)=	0.0241	A(35,40)=	0.1192
A(36,10)=	0.0071	A(36,20)=	-0.0253	A(36,30)=	0.0472	A(36,40)=	0.1032
A(37,10)=	0.0099	A(37,20)=	-0.0265	A(37,30)=	-0.1606	A(37,40)=	-0.2026
A(38,10)=	-0.0024	A(38,20)=	-0.0072	A(38,30)=	-0.0096	A(38,40)=	0.5288
A(39,10)=	0.0025	A(39,20)=	0.0151	A(39,30)=	0.0545	A(39,40)=	-0.5562
A(40,10)=	0.0084	A(40,20)=	-0.0192	A(40,30)=	-0.0301	A(40,40)=	0.1682

Matrix B:

B(1,1)=	3.92E-05	B(31,4)=	5.52E-05	B(21,8)=	-0.00069	B(11,12)=	-0.00033
B(2,1)=	-3.92E-05	B(32,4)=	3.65E-06	B(22,8)=	8.45E-05	B(12,12)=	0.000223
B(3,1)=	-4.38E-06	B(33,4)=	-2.41E-05	B(23,8)=	0.000783	B(13,12)=	0.000597
B(4,1)=	-2.19E-05	B(34,4)=	7.24E-05	B(24,8)=	-0.00058	B(14,12)=	-0.00034
B(5,1)=	-9.26E-05	B(35,4)=	2.53E-05	B(25,8)=	-0.00037	B(15,12)=	-1.40E-05
B(6,1)=	0.000123	B(36,4)=	0.00012	B(26,8)=	0.00151	B(16,12)=	0.000845
B(7,1)=	0.000175	B(37,4)=	-3.53E-06	B(27,8)=	-0.00061	B(17,12)=	-0.00044
B(8,1)=	-0.00011	B(38,4)=	-1.79E-05	B(28,8)=	0.002645	B(18,12)=	-0.00098
B(9,1)=	7.55E-05	B(39,4)=	2.51E-05	B(29,8)=	-9.92E-05	B(19,12)=	0.000365
B(10,1)=	-0.00011	B(40,4)=	-2.77E-06	B(30,8)=	-0.00083	B(20,12)=	-7.95E-05
B(11,1)=	-5.47E-05	B(1,5)=	0.691703	B(31,8)=	5.84E-05	B(21,12)=	-0.00136
B(12,1)=	2.89E-05	B(2,5)=	-0.16828	B(32,8)=	-1.76E-05	B(22,12)=	-0.00062
B(13,1)=	4.33E-05	B(3,5)=	-0.48166	B(33,8)=	0.000408	B(23,12)=	-0.00059
B(14,1)=	1.28E-05	B(4,5)=	-0.28449	B(34,8)=	-0.00195	B(24,12)=	-0.00086
B(15,1)=	-6.22E-05	B(5,5)=	-0.10351	B(35,8)=	-0.00104	B(25,12)=	0.000371
B(16,1)=	-6.47E-06	B(6,5)=	-0.40464	B(36,8)=	-0.00211	B(26,12)=	-0.00041
B(17,1)=	-1.54E-05	B(7,5)=	0.247401	B(37,8)=	0.000345	B(27,12)=	-0.00069
B(18,1)=	-0.00011	B(8,5)=	-0.18893	B(38,8)=	-0.00081	B(28,12)=	-0.00205
B(19,1)=	7.16E-06	B(9,5)=	-0.05264	B(39,8)=	-0.00081	B(29,12)=	-0.00088
B(20,1)=	-0.0003	B(10,5)=	0.243294	B(40,8)=	-0.00194	B(30,12)=	0.00035
B(21,1)=	-0.00016	B(11,5)=	-0.15663	B(1,9)=	-0.0017	B(31,12)=	0.001718
B(22,1)=	-5.76E-05	B(12,5)=	-0.10219	B(2,9)=	-0.0002	B(32,12)=	-0.00193
B(23,1)=	5.76E-05	B(13,5)=	-0.18385	B(3,9)=	0.000258	B(33,12)=	-0.00043
B(24,1)=	0.000228	B(14,5)=	-0.038	B(4,9)=	-0.00092	B(34,12)=	0.00073
B(25,1)=	0.000153	B(15,5)=	0.142046	B(5,9)=	0.000724	B(35,12)=	0.000926
B(26,1)=	-4.62E-05	B(16,5)=	-0.00337	B(6,9)=	-0.00125	B(36,12)=	0.001115
B(27,1)=	4.46E-05	B(17,5)=	-0.14343	B(7,9)=	0.000848	B(37,12)=	0.000315
B(28,1)=	-0.0003	B(18,5)=	0.293837	B(8,9)=	-0.00152	B(38,12)=	0.001108
B(29,1)=	0.000248	B(19,5)=	0.044812	B(9,9)=	0.000126	B(39,12)=	-0.00039
B(30,1)=	0.000269	B(20,5)=	-0.11063	B(10,9)=	0.001056	B(40,12)=	-0.00073
B(31,1)=	0.000197	B(21,5)=	-0.14292	B(11,9)=	0.000226	B(1,13)=	-0.00011
B(32,1)=	-0.0002	B(22,5)=	-0.12105	B(12,9)=	0.000571	B(2,13)=	-2.36E-06
B(33,1)=	-0.00013	B(23,5)=	-0.00597	B(13,9)=	0.001124	B(3,13)=	-0.00014
B(34,1)=	0.000278	B(24,5)=	-0.06436	B(14,9)=	-0.00019	B(4,13)=	-0.00018
B(35,1)=	1.61E-05	B(25,5)=	-0.08731	B(15,9)=	-0.00024	B(5,13)=	0.000384
B(36,1)=	2.26E-05	B(26,5)=	-0.06036	B(16,9)=	-0.00019	B(6,13)=	-0.00076
B(37,1)=	0.00011	B(27,5)=	-0.1594	B(17,9)=	0.000145	B(7,13)=	0.000246
B(38,1)=	0.000102	B(28,5)=	0.013462	B(18,9)=	-0.00068	B(8,13)=	-0.00064
B(39,1)=	-5.78E-06	B(29,5)=	-0.40659	B(19,9)=	0.000776	B(9,13)=	0.000266
B(40,1)=	-6.80E-05	B(30,5)=	0.100563	B(20,9)=	-0.00155	B(10,13)=	0.000372
B(1,2)=	-0.70121	B(31,5)=	0.170412	B(21,9)=	0.000127	B(11,13)=	-0.00035
B(2,2)=	0.170909	B(32,5)=	-0.28263	B(22,9)=	-0.00018	B(12,13)=	0.000337
B(3,2)=	0.487791	B(33,5)=	0.031646	B(23,9)=	-0.00033	B(13,13)=	0.000494
B(4,2)=	0.288244	B(34,5)=	0.153523	B(24,9)=	-5.27E-05	B(14,13)=	-0.00012
B(5,2)=	0.104919	B(35,5)=	-0.09292	B(25,9)=	0.000243	B(15,13)=	-0.00012

B(6,2)=	0.410617	B(36,5)=	-0.15958	B(26,9)=	-0.00094	B(16,13)=	0.000508
B(7,2)=	-0.25085	B(37,5)=	-0.15278	B(27,9)=	0.000205	B(17,13)=	-0.00029
B(8,2)=	0.191907	B(38,5)=	-0.02876	B(28,9)=	-0.00143	B(18,13)=	-0.00065
B(9,2)=	0.053753	B(39,5)=	0.070325	B(29,9)=	0.000409	B(19,13)=	0.000453
B(10,2)=	-0.24742	B(40,5)=	-0.15907	B(30,9)=	0.000426	B(20,13)=	-0.00021
B(11,2)=	0.158554	B(1,6)=	-0.59483	B(31,9)=	0.000226	B(21,13)=	-0.00075
B(12,2)=	0.103629	B(2,6)=	0.181786	B(32,9)=	2.43E-05	B(22,13)=	-0.00027
B(13,2)=	0.186428	B(3,6)=	0.505113	B(33,9)=	-0.00019	B(23,13)=	-0.00042
B(14,2)=	0.038604	B(4,6)=	0.12024	B(34,9)=	0.00105	B(24,13)=	-0.00072
B(15,2)=	-0.14388	B(5,6)=	0.047866	B(35,9)=	0.000476	B(25,13)=	0.000243
B(16,2)=	0.003361	B(6,6)=	0.098155	B(36,9)=	0.001186	B(26,13)=	-0.00013
B(17,2)=	0.145303	B(7,6)=	-0.16444	B(37,9)=	-0.00015	B(27,13)=	-0.00051
B(18,2)=	-0.29901	B(8,6)=	0.054364	B(38,9)=	0.000495	B(28,13)=	-0.00161
B(19,2)=	-0.04528	B(9,6)=	-0.01788	B(39,9)=	0.000386	B(29,13)=	-0.00058
B(20,2)=	0.112039	B(10,6)=	-0.14121	B(40,9)=	0.000642	B(30,13)=	0.000215
B(21,2)=	0.144758	B(11,6)=	0.02113	B(1,10)=	0.000328	B(31,13)=	0.00137
B(22,2)=	0.122682	B(12,6)=	0.02394	B(2,10)=	-0.00019	B(32,13)=	-0.00145
B(23,2)=	0.006546	B(13,6)=	0.172489	B(3,10)=	0.000306	B(33,13)=	-0.00051
B(24,2)=	0.064986	B(14,6)=	0.034721	B(4,10)=	9.02E-05	B(34,13)=	0.000597
B(25,2)=	0.088552	B(15,6)=	-0.16204	B(5,10)=	-8.57E-05	B(35,13)=	0.000794
B(26,2)=	0.060627	B(16,6)=	-0.00356	B(6,10)=	0.000186	B(36,13)=	0.000905
B(27,2)=	0.16172	B(17,6)=	0.072219	B(7,10)=	0.000422	B(37,13)=	0.00021
B(28,2)=	-0.01347	B(18,6)=	-0.25089	B(8,10)=	-0.00014	B(38,13)=	0.000955
B(29,2)=	0.412522	B(19,6)=	-0.02146	B(9,10)=	0.000163	B(39,13)=	-0.00031
B(30,2)=	-0.10241	B(20,6)=	0.169645	B(10,10)=	-0.00013	B(40,13)=	-0.00047
B(31,2)=	-0.17379	B(21,6)=	0.108378	B(11,10)=	3.11E-05	B(1,14)=	0.000223
B(32,2)=	0.286396	B(22,6)=	0.083041	B(12,10)=	-0.00014	B(2,14)=	-0.0017
B(33,2)=	-0.03243	B(23,6)=	0.000769	B(13,10)=	0.000115	B(3,14)=	-0.00127
B(34,2)=	-0.15595	B(24,6)=	0.160888	B(14,10)=	0.000123	B(4,14)=	-0.00043
B(35,2)=	0.093686	B(25,6)=	0.035023	B(15,10)=	3.35E-05	B(5,14)=	0.001224
B(36,2)=	0.161884	B(26,6)=	-0.03123	B(16,10)=	-7.75E-07	B(6,14)=	0.000357
B(37,2)=	0.1549	B(27,6)=	0.07514	B(17,10)=	4.84E-06	B(7,14)=	-0.00093
B(38,2)=	0.028271	B(28,6)=	-0.06477	B(18,10)=	0.000509	B(8,14)=	0.000458
B(39,2)=	-0.07158	B(29,6)=	0.48356	B(19,10)=	-8.00E-05	B(9,14)=	0.000144
B(40,2)=	0.161181	B(30,6)=	-0.00165	B(20,10)=	-5.28E-05	B(10,14)=	-0.00012
B(1,3)=	0.603245	B(31,6)=	0.089197	B(21,10)=	0.00015	B(11,14)=	0.000662
B(2,3)=	-0.18458	B(32,6)=	0.230387	B(22,10)=	0.000369	B(12,14)=	0.000377
B(3,3)=	-0.51176	B(33,6)=	-0.1805	B(23,10)=	0.000224	B(13,14)=	0.000222
B(4,3)=	-0.12172	B(34,6)=	0.141941	B(24,10)=	-9.06E-05	B(14,14)=	0.000927
B(5,3)=	-0.04845	B(35,6)=	-0.05873	B(25,10)=	0.000126	B(15,14)=	0.000329
B(6,3)=	-0.10007	B(36,6)=	0.22935	B(26,10)=	-9.31E-06	B(16,14)=	-0.00055
B(7,3)=	0.166576	B(37,6)=	-0.06829	B(27,10)=	0.000165	B(17,14)=	0.001006
B(8,3)=	-0.05539	B(38,6)=	0.026427	B(28,10)=	0.00021	B(18,14)=	-0.00038
B(9,3)=	0.017731	B(39,6)=	0.009009	B(29,10)=	0.000197	B(19,14)=	0.000336
B(10,3)=	0.143827	B(40,6)=	0.052558	B(30,10)=	-7.86E-06	B(20,14)=	0.000135
B(11,3)=	-0.0212	B(1,7)=	-0.00181	B(31,10)=	-4.98E-05	B(21,14)=	0.000384
B(12,3)=	-0.02439	B(2,7)=	3.48E-05	B(32,10)=	-0.00024	B(22,14)=	0.000406

B(13,3)=	-0.17495	B(3,7)=	0.000327	B(33,10)=	-0.0001	B(23,14)=	-3.98E-05
B(14,3)=	-0.0352	B(4,7)=	-0.00101	B(34,10)=	3.35E-05	B(24,14)=	-0.00141
B(15,3)=	0.164302	B(5,7)=	0.000539	B(35,10)=	-2.12E-05	B(25,14)=	7.38E-05
B(16,3)=	0.003563	B(6,7)=	-0.00095	B(36,10)=	1.36E-05	B(26,14)=	-0.00068
B(17,3)=	-0.07309	B(7,7)=	0.001091	B(37,10)=	0.000174	B(27,14)=	0.000221
B(18,3)=	0.255341	B(8,7)=	-0.00149	B(38,10)=	-0.00028	B(28,14)=	0.001759
B(19,3)=	0.021606	B(9,7)=	0.000128	B(39,10)=	-0.00027	B(29,14)=	0.000149
B(20,3)=	-0.17153	B(10,7)=	0.001211	B(40,10)=	-1.55E-05	B(30,14)=	-0.00057
B(21,3)=	-0.10961	B(11,7)=	0.00036	B(1,11)=	-0.00031	B(31,14)=	-0.00102
B(22,3)=	-0.08404	B(12,7)=	0.000515	B(2,11)=	4.84E-05	B(32,14)=	0.00117
B(23,3)=	-0.00121	B(13,7)=	0.000905	B(3,11)=	-0.0004	B(33,14)=	-0.00067
B(24,3)=	-0.16313	B(14,7)=	3.61E-05	B(4,11)=	-1.58E-05	B(34,14)=	-0.00056
B(25,3)=	-0.03572	B(15,7)=	-0.00017	B(5,11)=	0.000179	B(35,14)=	0.000358
B(26,3)=	0.032202	B(16,7)=	-0.00029	B(6,11)=	-0.00036	B(36,14)=	-0.00082
B(27,3)=	-0.07645	B(17,7)=	0.00024	B(7,11)=	-0.00048	B(37,14)=	-0.00038
B(28,3)=	0.065574	B(18,7)=	-0.00011	B(8,11)=	7.01E-05	B(38,14)=	-0.0008
B(29,3)=	-0.49084	B(19,7)=	0.000815	B(9,11)=	-0.00025	B(39,14)=	0.001305
B(30,3)=	0.001941	B(20,7)=	-0.00194	B(10,11)=	0.000312	B(40,14)=	-0.00035
B(31,3)=	-0.08982	B(21,7)=	0.000581	B(11,11)=	-5.19E-05	B(1,15)=	-0.0004
B(32,3)=	-0.23337	B(22,7)=	5.65E-05	B(12,11)=	0.00021	B(2,15)=	0.001644
B(33,3)=	0.183405	B(23,7)=	-0.00043	B(13,11)=	-8.88E-05	B(3,15)=	0.001568
B(34,3)=	-0.1438	B(24,7)=	0.000686	B(14,11)=	-0.00013	B(4,15)=	0.000497
B(35,3)=	0.059845	B(25,7)=	9.18E-05	B(15,11)=	-0.00013	B(5,15)=	-0.00127
B(36,3)=	-0.23291	B(26,7)=	-0.00063	B(16,11)=	2.81E-05	B(6,15)=	0.000358
B(37,3)=	0.068889	B(27,7)=	0.000445	B(17,11)=	2.34E-05	B(7,15)=	0.000677
B(38,3)=	-0.02619	B(28,7)=	-0.0013	B(18,11)=	-0.00067	B(8,15)=	4.60E-05
B(39,3)=	-0.00892	B(29,7)=	-0.00026	B(19,11)=	0.000245	B(9,15)=	-0.00035
B(40,3)=	-0.05326	B(30,7)=	0.000392	B(20,11)=	0.000163	B(10,15)=	-9.02E-05
B(1,4)=	-0.00011	B(31,7)=	-0.00031	B(21,11)=	-0.00025	B(11,15)=	-0.00041
B(2,4)=	-4.13E-06	B(32,7)=	8.28E-05	B(22,11)=	-0.00048	B(12,15)=	-0.0006
B(3,4)=	8.03E-05	B(33,7)=	-0.00015	B(23,11)=	-0.00034	B(13,15)=	-0.00053
B(4,4)=	-6.68E-05	B(34,7)=	0.000806	B(24,11)=	-9.22E-05	B(14,15)=	-0.00079
B(5,4)=	1.75E-06	B(35,7)=	0.000529	B(25,11)=	-8.93E-05	B(15,15)=	-0.00031
B(6,4)=	-4.84E-05	B(36,7)=	0.000914	B(26,11)=	2.31E-05	B(16,15)=	0.000149
B(7,4)=	1.21E-05	B(37,7)=	-0.00011	B(27,11)=	-0.00038	B(17,15)=	-0.00064
B(8,4)=	5.77E-06	B(38,7)=	0.000342	B(28,11)=	-0.00027	B(18,15)=	0.000899
B(9,4)=	-9.07E-06	B(39,7)=	0.000505	B(29,11)=	-0.00041	B(19,15)=	-0.0005
B(10,4)=	2.14E-05	B(40,7)=	0.001336	B(30,11)=	-4.39E-05	B(20,15)=	-4.28E-05
B(11,4)=	-1.01E-05	B(1,8)=	0.003366	B(31,11)=	0.000162	B(21,15)=	0.000433
B(12,4)=	1.42E-05	B(2,8)=	0.000272	B(32,11)=	0.000168	B(22,15)=	-3.06E-05
B(13,4)=	2.87E-05	B(3,8)=	-0.00061	B(33,11)=	2.42E-05	B(23,15)=	0.000479
B(14,4)=	-1.98E-05	B(4,8)=	0.00186	B(34,11)=	8.92E-05	B(24,15)=	0.001904
B(15,4)=	2.87E-06	B(5,8)=	-0.00124	B(35,11)=	0.00012	B(25,15)=	-0.00028
B(16,4)=	2.49E-05	B(6,8)=	0.002194	B(36,11)=	0.000124	B(26,15)=	0.000685
B(17,4)=	-1.62E-05	B(7,8)=	-0.00197	B(37,11)=	-0.00035	B(27,15)=	0.000235
B(18,4)=	1.68E-05	B(8,8)=	0.003047	B(38,11)=	0.000358	B(28,15)=	-0.00056
B(19,4)=	3.22E-05	B(9,8)=	-0.00021	B(39,11)=	0.000191	B(29,15)=	0.000531

B(20,4)=	-6.28E-06	B(10,8)=	-0.0023	B(40,11)=	-1.63E-05	B(30,15)=	0.000363
B(21,4)=	-7.42E-06	B(11,8)=	-0.0006	B(1,12)=	-2.02E-05	B(31,15)=	-4.56E-05
B(22,4)=	-3.78E-06	B(12,8)=	-0.00108	B(2,12)=	9.87E-05	B(32,15)=	9.62E-06
B(23,4)=	-2.06E-05	B(13,8)=	-0.00202	B(3,12)=	-0.00044	B(33,15)=	0.000963
B(24,4)=	-2.76E-05	B(14,8)=	0.000124	B(4,12)=	-0.00014	B(34,15)=	-7.69E-05
B(25,4)=	-7.69E-06	B(15,8)=	0.00044	B(5,12)=	0.000382	B(35,15)=	-0.00084
B(26,4)=	-4.32E-05	B(16,8)=	0.000491	B(6,12)=	-0.00102	B(36,15)=	0.000134
B(27,4)=	1.32E-05	B(17,8)=	-0.00041	B(7,12)=	0.000238	B(37,15)=	0.000279
B(28,4)=	9.93E-05	B(18,8)=	0.000716	B(8,12)=	-0.0007	B(38,15)=	4.49E-05
B(29,4)=	2.82E-05	B(19,8)=	-0.00164	B(9,12)=	0.000297	B(39,15)=	-0.001
B(30,4)=	3.78E-05	B(20,8)=	0.003433	B(10,12)=	0.000273	B(40,15)=	0.000731

Matrix C:

C(1,1)=	-0.5602	C(1,11)=	-0.1864	C(1,21)=	-0.1174	C(1,31)=	0.1269
C(2,1)=	-0.5599	C(2,11)=	-0.1865	C(2,21)=	-0.1174	C(2,31)=	0.1269
C(3,1)=	-0.5596	C(3,11)=	-0.1866	C(3,21)=	-0.1174	C(3,31)=	0.127
C(4,1)=	0.5998	C(4,11)=	-0.0760	C(4,21)=	0.0221	C(4,31)=	0.092
C(5,1)=	0.6060	C(5,11)=	-0.0726	C(5,21)=	0.0202	C(5,31)=	0.0913
C(1,2)=	-0.1596	C(1,12)=	0.0819	C(1,22)=	0.0812	C(1,32)=	-0.314
C(2,2)=	-0.1596	C(2,12)=	0.0819	C(2,22)=	0.0813	C(2,32)=	-0.3142
C(3,2)=	-0.1595	C(3,12)=	0.0820	C(3,22)=	0.0815	C(3,32)=	-0.3144
C(4,2)=	0.2871	C(4,12)=	0.0223	C(4,22)=	0.0221	C(4,32)=	-0.0038
C(5,2)=	0.2925	C(5,12)=	0.0115	C(5,22)=	0.0254	C(5,32)=	0.0004
C(1,3)=	0.4746	C(1,13)=	-0.1809	C(1,23)=	-0.0105	C(1,33)=	-0.0989
C(2,3)=	0.4750	C(2,13)=	-0.1809	C(2,23)=	-0.0106	C(2,33)=	-0.0989
C(3,3)=	0.4755	C(3,13)=	-0.1809	C(3,23)=	-0.0107	C(3,33)=	-0.0989
C(4,3)=	-0.2995	C(4,13)=	-0.1326	C(4,23)=	-0.0080	C(4,33)=	-0.1441
C(5,3)=	-0.3142	C(5,13)=	-0.1080	C(5,23)=	-0.0006	C(5,33)=	-0.1157
C(1,4)=	0.0961	C(1,14)=	0.0964	C(1,24)=	0.1521	C(1,34)=	0.138
C(2,4)=	0.0960	C(2,14)=	0.0965	C(2,24)=	0.1523	C(2,34)=	0.1381
C(3,4)=	0.0958	C(3,14)=	0.0966	C(3,24)=	0.1527	C(3,34)=	0.1382
C(4,4)=	0.1209	C(4,14)=	0.0429	C(4,24)=	0.2090	C(4,34)=	0.1406
C(5,4)=	0.1089	C(5,14)=	0.0304	C(5,24)=	0.1920	C(5,34)=	0.1311
C(1,5)=	-0.0833	C(1,15)=	-0.0168	C(1,25)=	-0.1557	C(1,35)=	0.1144
C(2,5)=	-0.0836	C(2,15)=	-0.0167	C(2,25)=	-0.1557	C(2,35)=	0.1143
C(3,5)=	-0.0840	C(3,15)=	-0.0167	C(3,25)=	-0.1556	C(3,35)=	0.1142
C(4,5)=	-0.2752	C(4,15)=	0.0747	C(4,25)=	-0.0520	C(4,35)=	0.1185
C(5,5)=	-0.2504	C(5,15)=	0.0701	C(5,25)=	-0.0506	C(5,35)=	0.1056
C(1,6)=	0.3850	C(1,16)=	0.0688	C(1,26)=	0.1189	C(1,36)=	-0.0388
C(2,6)=	0.3850	C(2,16)=	0.0689	C(2,26)=	0.1190	C(2,36)=	-0.0387
C(3,6)=	0.3851	C(3,16)=	0.0692	C(3,26)=	0.1190	C(3,36)=	-0.0386
C(4,6)=	0.1586	C(4,16)=	0.1187	C(4,26)=	0.0925	C(4,36)=	0.1621
C(5,6)=	0.1663	C(5,16)=	0.0987	C(5,26)=	0.0633	C(5,36)=	0.1377
C(1,7)=	-0.1425	C(1,17)=	-0.2104	C(1,27)=	-0.1159	C(1,37)=	-0.0764
C(2,7)=	-0.1424	C(2,17)=	-0.2106	C(2,27)=	-0.1159	C(2,37)=	-0.0764
C(3,7)=	-0.1421	C(3,17)=	-0.2108	C(3,27)=	-0.1159	C(3,37)=	-0.0765

C(4,7)=	-0.0602	C(4,17)=	-0.0593	C(4,27)=	0.0854	C(4,37)=	-0.0603
C(5,7)=	-0.0763	C(5,17)=	-0.0428	C(5,27)=	0.0705	C(5,37)=	-0.0553
C(1,8)=	0.0247	C(1,18)=	0.2688	C(1,28)=	0.1325	C(1,38)=	-0.0418
C(2,8)=	0.0248	C(2,18)=	0.2690	C(2,28)=	0.1325	C(2,38)=	-0.0417
C(3,8)=	0.0248	C(3,18)=	0.2691	C(3,28)=	0.1325	C(3,38)=	-0.0415
C(4,8)=	0.3198	C(4,18)=	0.1496	C(4,28)=	0.1695	C(4,38)=	-0.0336
C(5,8)=	0.2973	C(5,18)=	0.1400	C(5,28)=	0.1339	C(5,38)=	-0.0175
C(1,9)=	-0.0757	C(1,19)=	-0.0314	C(1,29)=	-0.0790	C(1,39)=	0.0735
C(2,9)=	-0.0757	C(2,19)=	-0.0315	C(2,29)=	-0.0790	C(2,39)=	0.0733
C(3,9)=	-0.0757	C(3,19)=	-0.0316	C(3,29)=	-0.0789	C(3,39)=	0.0731
C(4,9)=	0.0975	C(4,19)=	-0.1086	C(4,29)=	0.1400	C(4,39)=	-0.0591
C(5,9)=	0.1000	C(5,19)=	-0.0947	C(5,29)=	0.1215	C(5,39)=	-0.0639
C(1,10)=	0.0140	C(1,20)=	0.1054	C(1,30)=	0.1951	C(1,40)=	0.0051
C(2,10)=	0.0139	C(2,20)=	0.1055	C(2,30)=	0.1952	C(2,40)=	0.005
C(3,10)=	0.0137	C(3,20)=	0.1055	C(3,30)=	0.1953	C(3,40)=	0.0048
C(4,10)=	-0.2596	C(4,20)=	0.1587	C(4,30)=	0.2016	C(4,40)=	0.0184
C(5,10)=	-0.2508	C(5,20)=	0.1481	C(5,30)=	0.1660	C(5,40)=	0.0096

Matrix D:

D(1,1)=	-0.0006	D(5,4)=	-0.0001	D(4,8)=	0.0177	D(3,12)=	0.0002
D(2,1)=	-0.0006	D(1,5)=	0.7743	D(5,8)=	0.0142	D(4,12)=	0.0003
D(3,1)=	-0.0006	D(2,5)=	0.7740	D(1,9)=	-0.0077	D(5,12)=	0.0002
D(4,1)=	-0.0012	D(3,5)=	0.7735	D(2,9)=	-0.0077	D(1,13)=	0.0001
D(5,1)=	-0.0009	D(4,5)=	-0.2170	D(3,9)=	-0.0077	D(2,13)=	0.0001
D(1,2)=	-0.7867	D(5,5)=	-0.2178	D(4,9)=	-0.0090	D(3,13)=	0.0001
D(2,2)=	-0.7865	D(1,6)=	-0.6661	D(5,9)=	-0.0071	D(4,13)=	0.0000
D(3,2)=	-0.7859	D(2,6)=	-0.6657	D(1,10)=	-0.0014	D(5,13)=	0.0000
D(4,2)=	0.2177	D(3,6)=	-0.6648	D(2,10)=	-0.0014	D(1,14)=	-0.0014
D(5,2)=	0.2187	D(4,6)=	0.1978	D(3,10)=	-0.0014	D(2,14)=	-0.0014
D(1,3)=	0.6778	D(5,6)=	0.1854	D(4,10)=	-0.0013	D(3,14)=	-0.0014
D(2,3)=	0.6774	D(1,7)=	-0.0068	D(5,10)=	-0.0011	D(4,14)=	-0.0008
D(3,3)=	0.6765	D(2,7)=	-0.0068	D(1,11)=	0.0018	D(5,14)=	-0.0007
D(4,3)=	-0.1969	D(3,7)=	-0.0068	D(2,11)=	0.0018	D(1,15)=	0.0012
D(5,3)=	-0.1850	D(4,7)=	-0.0089	D(3,11)=	0.0018	D(2,15)=	0.0012
D(1,4)=	-0.0001	D(5,7)=	-0.0073	D(4,11)=	0.0014	D(3,15)=	0.0012
D(2,4)=	-0.0001	D(1,8)=	0.0141	D(5,11)=	0.0012	D(4,15)=	0.0007
D(3,4)=	-0.0001	D(2,8)=	0.0141	D(1,12)=	0.0002	D(5,15)=	0.0006
D(4,4)=	-0.0001	D(3,8)=	0.0141	D(2,12)=	0.0002		

Table J.31: Tests of residuals from voltages predictions using DMDc technique and raw training dataset

Evaluation	ΔV S85C	ΔV S84C	ΔV S81C	ΔV S60C	ΔV S57C
Anderson-Darling test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Lilliefors test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
One-sample Kolmogorov-Smirnov test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Durbin-Watson test	Reject H_1	Reject H_1	Reject H_1	Reject H_1	Reject H_1
Durbin-Watson coefficient d	2.44	2.44	2.43	2.40	2.39
Ljung-Box Q-test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Engle's ARCH test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Ljung-Box Q-test using squared residuals	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1

Table J.32: Tests of residuals from voltages predictions using DMDc technique and raw validation dataset

Evaluation	ΔV S85C	ΔV S84C	ΔV S81C	ΔV S60C	ΔV S57C
Anderson-Darling test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Lilliefors test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
One-sample Kolmogorov-Smirnov test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Durbin-Watson test	Reject H_1	Reject H_1	Reject H_1	Reject H_1	Reject H_1
Durbin-Watson coefficient d	2.44	2.44	2.43	2.40	2.39
Ljung-Box Q-test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Engle's ARCH test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Ljung-Box Q-test using squared residuals	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1

Table J.33: Tests of residuals from voltages predictions using NARX technique and raw training dataset

Evaluation	ΔV S85C	ΔV S84C	ΔV S81C	ΔV S60C	ΔV S57C
Anderson-Darling test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Lilliefors test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
One-sample Kolmogorov-Smirnov test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Durbin-Watson test	Reject H_1	Reject H_1	Reject H_1	Reject H_1	Reject H_1
Ljung-Box Q-test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Engle's ARCH test	Reject H_1	Reject H_1	Reject H_1	Reject H_1	Reject H_1
Ljung-Box Q-test using squared residuals	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1

Table J.34: Tests of residuals from voltages predictions using NARX technique and raw validation dataset

Evaluation	ΔV S85C	ΔV S84C	ΔV S81C	ΔV S60C	ΔV S57C
Anderson-Darling test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Lilliefors test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
One-sample Kolmogorov-Smirnov test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Durbin-Watson test	Reject H_1	Reject H_1	Reject H_1	Reject H_1	Reject H_1
Ljung-Box Q-test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Engle's ARCH test	Reject H_1	Reject H_1	Reject H_1	Reject H_1	Reject H_1
Ljung-Box Q-test using squared residuals	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1

Table J.35: Normality test results for selected observed voltages and exogenous regressors using only critical values

Test	ΔV S85C	ΔV S60C	ΔAv. norm. cov. S81C	ΔAv. norm. cov. S60C	ΔP_D S85C	ΔP_D S84C	Irrad.
KS Lilliefors Modification	Reject H_1	Reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Anderson-Darling Test	Reject H_1	Reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Cramer- Von Mises Test	Reject H_1	Reject H_1	Reject H_1	Reject H_1	Reject H_1	Reject H_1	Reject H_1
Shapiro-Wilk Test	Reject H_1	Reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
D'Agostino & Pearson Test	Reject H_1	Reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1

Table J.36: Normality test results for selected input control regressors using only critical values

Test	ΔM^P 60C-57C	ΔM^P 84C-85C	ΔM^P 81C-84C	ΔM^Q 60C-57C	ΔM^Q 84C-85C	ΔM^Q 81C-84C
KS Lilliefors Modification	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Anderson-Darling Test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Cramer- Von Mises Test	Reject H_1	Reject H_1	Reject H_1	Reject H_1	Reject H_1	Reject H_1
Shapiro-Wilk Test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
DAgostino & Pearson Test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1

J.1 Evaluating the residuals after first regressions

J.2 Data processing and selection

J.3 Creation of LTI model using revised data

J.3.1 MISO representations

J.3.1.1 ARX (State-Space representation) - node S85C

Matrix A: [-0.1576]

Matrix B:

B(1,1)=	0.0019	B(1,4)=	-0.0037	B(1,7)=	-0.0034	B(1,10)=	-0.0271
B(1,2)=	0.0330	B(1,5)=	0.0233	B(1,8)=	0.0111	B(1,11)=	-0.0023
B(1,3)=	-0.0002	B(1,6)=	-0.0004	B(1,9)=	-0.0018		

Matrix C: [0.0625]

Matrix D:

D(1,1)=	-0.0008	D(1,4)=	0.0015	D(1,7)=	0.0014	D(1,10)=	0.0107
D(1,2)=	-0.0131	D(1,5)=	-0.0092	D(1,8)=	-0.0044	D(1,11)=	0.0009
D(1,3)=	0.0001	D(1,6)=	0.0002	D(1,9)=	0.0007		

J.3.1.2 ARX (State-Space representation) - node S81A

Matrix A: [-0.1881]

Matrix B:

B(1,1)=	0.0114	B(1,3)=	0.0146	B(1,5)=	0.0262	B(1,6)=	0.0053
B(1,2)=	-0.0046	B(1,4)=	-0.0009				

Matrix C: [0.0625]
Matrix D:

D(1,1)=	-0.0038	D(1,3)=	-0.0048	D(1,5)=	-0.0087	D(1,6)=	-0.0018
D(1,2)=	0.0015	D(1,4)=	0.0003				

J.3.1.3 ARX (State-Space representation) - node S81B

Matrix A: [-0.1361]
Matrix B:

B(1,1)=	-0.0040	B(1,3)=	-0.0012	B(1,5)=	-0.0178	B(1,6)=	0.0002
B(1,2)=	0.0109	B(1,4)=	0.0071				

Matrix C: [0.0625]
Matrix D:

D(1,1)=	0.0019	D(1,3)=	0.0006	D(1,5)=	0.0082	D(1,6)=	-0.0001
D(1,2)=	-0.005	D(1,4)=	-0.0033				

J.3.1.4 ARX (State-Space representation) - node S60A

Matrix A: [-0.1543]
Matrix B:

B(1,1)=	0.0029	B(1,3)=	0.0232	B(1,5)=	-0.0289	B(1,6)=	-0.0038
B(1,2)=	0.0204	B(1,4)=	-0.0068				

Matrix C: [0.0625]
Matrix D:

D(1,1)=	-0.0012	D(1,3)=	-0.0094	D(1,5)=	0.0117	D(1,6)=	0.0016
D(1,2)=	-0.0083	D(1,4)=	0.0028				

J.3.1.5 ARX (State-Space representation) - node S60B

Matrix A: [-0.1395]
Matrix B:

B(1,1)=	0.0011	B(1,3)=	0.0118	B(1,5)=	0.0068	B(1,7)=	-0.0009
B(1,2)=	0.0019	B(1,4)=	0.0099	B(1,6)=	-0.0137		

Matrix C: [0.0625]
Matrix D:

D(1,1)=	-0.0005	D(1,3)=	-0.0053	D(1,5)=	-0.003	D(1,7)=	0.0004
D(1,2)=	-0.0008	D(1,4)=	-0.0044	D(1,6)=	0.0062		

J.3.1.6 ARX (State-Space representation) - node S60C

Matrix A: [-0.1321]

Matrix B:

B(1,1)=	0.0025	B(1,4)=	0.0013	B(1,7)=	-0.0009	B(1,10)=	0.0006
B(1,2)=	0.0006	B(1,5)=	0.0211	B(1,8)=	0.0189	B(1,11)=	-0.0108
B(1,3)=	0.0009	B(1,6)=	0.0021	B(1,9)=	0.012		

Matrix C: [0.0625]

Matrix D:

D(1,1)=	-0.0012	D(1,4)=	-0.0006	D(1,7)=	0.0004	D(1,10)=	-0.0003
D(1,2)=	-0.0003	D(1,5)=	-0.0100	D(1,8)=	-0.0090	D(1,11)=	0.0051
D(1,3)=	-0.0004	D(1,6)=	-0.0010	D(1,9)=	-0.0057		

J.3.1.7 ARMAX (State-Space representation) - node S85C

Matrix A: [0.6387]

Matrix B:

B(1,1)=	-0.0011	B(1,4)=	0.0003	B(1,7)=	0.0018	B(1,10)=	0.0272
B(1,2)=	-0.0323	B(1,5)=	-0.0221	B(1,8)=	-0.0099	B(1,11)=	-0.0195
B(1,3)=	0.0280	B(1,6)=	0.0205	B(1,9)=	0.0113		

Matrix C: [0.25]

Matrix D:

D(1,1)=	-0.0004	D(1,4)=	0.0001	D(1,7)=	0.0007	D(1,10)=	0.0107
D(1,2)=	-0.0126	D(1,5)=	-0.0087	D(1,8)=	-0.0039	D(1,11)=	-0.0076
D(1,3)=	0.0110	D(1,6)=	0.0080	D(1,9)=	0.0044		

J.3.1.8 ARMAX (State-Space representation) - node S81A

Matrix A: [0.5124]

Matrix B:

B(1,1)=	-0.0141	B(1,3)=	-0.0201	B(1,5)=	-0.0175	B(1,6)=	-0.0083
B(1,2)=	0.0237	B(1,4)=	0.0252				

Matrix C: [0.125]

Matrix D:

D(1,1)=	-0.0034	D(1,3)=	-0.0049	D(1,5)=	-0.0043	D(1,6)=	-0.0020
D(1,2)=	0.0058	D(1,4)=	0.0061				

J.3.1.9 ARMAX (State-Space representation) - node S81B

Matrix A: [0.7364]
Matrix B:

B(1,1)=	0.0210	B(1,3)=	0.0357	B(1,5)=	0.0467	B(1,6)=	-0.0435
B(1,2)=	-0.0268	B(1,4)=	-0.0032				

Matrix C: [0.125]
Matrix D:

D(1,1)=	0.0036	D(1,3)=	0.0061	D(1,5)=	0.0079	D(1,6)=	-0.0074
D(1,2)=	-0.0045	D(1,4)=	-0.0005				

J.3.1.10 ARMAX (State-Space representation) - node S60A

Matrix A: [0.3091]
Matrix B:

B(1,1)=	-0.0031	B(1,3)=	-0.0222	B(1,5)=	0.0286	B(1,6)=	-0.0104
B(1,2)=	-0.0189	B(1,4)=	0.0059				

Matrix C: [0.125]
Matrix D:

D(1,1)=	-0.0012	D(1,3)=	-0.0090	D(1,5)=	0.0116	D(1,6)=	-0.0042
D(1,2)=	-0.0076	D(1,4)=	0.0024				

J.3.1.11 ARMAX (State-Space representation) - node S60B

Matrix A: [0.2060]
Matrix B:

B(1,1)=	-0.0023	B(1,3)=	-0.0168	B(1,5)=	-0.0085	B(1,7)=	-0.0064
B(1,2)=	-0.0031	B(1,4)=	-0.0144	B(1,6)=	0.0200		

Matrix C: [0.0625]
Matrix D:

D(1,1)=	-0.0007	D(1,3)=	-0.0051	D(1,5)=	-0.0026	D(1,7)=	-0.0019
D(1,2)=	-0.0009	D(1,4)=	-0.0044	D(1,6)=	0.0061		

J.3.1.12 ARMAX (State-Space representation) - node S60C

Matrix A: [0.1434]
Matrix B:

B(1,1)=	-0.0031	B(1,4)=	-0.0015	B(1,7)=	0.0009	B(1,10)=	0.0043
B(1,2)=	-0.0010	B(1,5)=	-0.0228	B(1,8)=	-0.0206	B(1,11)=	0.0114

B(1,3)=	-0.0009	B(1,6)=	0.0057	B(1,9)=	-0.0131

Matrix C: [0.0625]
Matrix D:

D(1,1)=	-0.0013	D(1,4)=	-0.0006	D(1,7)=	0.0004	D(1,10)=	0.0019
D(1,2)=	-0.0004	D(1,5)=	-0.0099	D(1,8)=	-0.0090	D(1,11)=	0.0050
D(1,3)=	-0.0004	D(1,6)=	0.0025	D(1,9)=	-0.0057		

J.3.1.13 DMDc - node S85C

Matrix A: [-0.1606]
Matrix B:

B(1,1)=	0.0001	B(1,4)=	0.0030	B(1,7)=	0.0025	B(1,10)=	-0.0014
B(1,2)=	0.0039	B(1,5)=	0.0031	B(1,8)=	0.0015	B(1,11)=	-0.0018
B(1,3)=	0.0053	B(1,6)=	0.0040	B(1,9)=	0.0011		

Matrix C: [1]
Matrix D: All zero sparse 1x11

J.3.1.14 DMDc - node S81A

Matrix A: [-0.2189]
Matrix B:

B(1,1)=	0.0024	B(1,3)=	0.0018	B(1,5)=	0.0025	B(1,6)=	-0.0021
B(1,2)=	0.0032	B(1,4)=	0.0032				

Matrix C: [1]
Matrix D: All zero sparse 1x6

J.3.1.15 DMDc - node S81B

Matrix A: [-0.1481]
Matrix B:

B(1,1)=	0.0019	B(1,3)=	0.0023	B(1,5)=	-0.0019	B(1,6)=	-0.0019
B(1,2)=	0.0023	B(1,4)=	0.0019				

Matrix C: [1]
Matrix D: All zero sparse 1x6

J.3.1.16 DMDc - node S60A

Matrix A: [-0.1691]
Matrix B:

B(1,1)=	-0.0001	B(1,3)=	0.0005	B(1,5)=	-0.0009	B(1,6)=	-0.0020
B(1,2)=	0.0007	B(1,4)=	0.0020				

Matrix C: [1]
Matrix D: All zero sparse 1x6

J.3.1.17 DMDc - node S60B

Matrix A: [-0.15]
Matrix B:

B(1,1)=	-0.0003	B(1,3)=	0.0007	B(1,5)=	0.0008	B(1,7)=	-0.0011
B(1,2)=	0.0001	B(1,4)=	0.0004	B(1,6)=	-0.0009		

Matrix C: [1]
Matrix D: All zero sparse 1x7

J.3.1.18 DMDc - node S60C

Matrix A: [-0.1601]
Matrix B:

B(1,1)=	-0.0002	B(1,4)=	0.0001	B(1,7)=	0.0025	B(1,10)=	0.0015
B(1,2)=	-0.0003	B(1,5)=	0.0020	B(1,8)=	0.0005	B(1,11)=	-0.0005
B(1,3)=	0.0003	B(1,6)=	0.0039	B(1,9)=	0.0010		

Matrix C: [1]
Matrix D: All zero sparse 1x11

J.3.1.19 OKID-ERA - node S85C

Matrix A:

A(1,1)=	-0.9923	A(4,2)=	0.0905	A(1,4)=	-0.1138	A(4,5)=	0.2186
A(2,1)=	-0.0726	A(5,2)=	0.1020	A(2,4)=	0.1252	A(5,5)=	-0.1821
A(3,1)=	0.0356	A(6,2)=	0.0065	A(3,4)=	-0.5413	A(6,5)=	-0.7490
A(4,1)=	0.1240	A(1,3)=	0.0161	A(4,4)=	-0.6983	A(1,6)=	-0.0105
A(5,1)=	-0.0094	A(2,3)=	0.3730	A(5,4)=	-0.4473	A(2,6)=	0.0453
A(6,1)=	0.0300	A(3,3)=	-0.7113	A(6,4)=	-0.0668	A(3,6)=	-0.0141
A(1,2)=	0.0587	A(4,3)=	0.6001	A(1,5)=	-0.0089	A(4,6)=	-0.1229
A(2,2)=	-0.9072	A(5,3)=	0.0292	A(2,5)=	-0.0490	A(5,6)=	0.2990
A(3,2)=	-0.4032	A(6,3)=	0.0347	A(3,5)=	0.0716	A(6,6)=	-0.1149

Sparse matrix B:

B(1,1)=	0.0001	B(6,3)=	-0.0071	B(5,6)=	0.0003	B(4,9)=	0.0001
B(2,1)=	0.0000	B(1,4)=	-0.0106	B(6,6)=	0.0003	B(5,9)=	-0.0001
B(3,1)=	0.0001	B(2,4)=	-0.0029	B(1,7)=	0.0005	B(6,9)=	0.0000
B(4,1)=	-0.0001	B(3,4)=	-0.0092	B(2,7)=	0.0001	B(1,10)=	0.0001
B(5,1)=	0.0000	B(4,4)=	0.0154	B(3,7)=	0.0003	B(2,10)=	-0.0001
B(6,1)=	-0.0001	B(5,4)=	-0.0372	B(4,7)=	-0.0004	B(3,10)=	0.0001
B(1,2)=	0.0051	B(6,4)=	-0.0214	B(5,7)=	0.0012	B(4,10)=	0.0000
B(2,2)=	0.0024	B(1,5)=	-0.0001	B(6,7)=	0.0007	B(5,10)=	0.0000
B(3,2)=	-0.0007	B(2,5)=	0.0000	B(1,8)=	-0.0002	B(6,10)=	-0.0002
B(4,2)=	0.0106	B(3,5)=	0.0000	B(2,8)=	0.0001	B(1,11)=	0.0000
B(5,2)=	0.0063	B(4,5)=	-0.0003	B(3,8)=	0.0001	B(2,11)=	-0.0001
B(6,2)=	-0.0128	B(5,5)=	-0.0005	B(4,8)=	0.0000	B(3,11)=	0.0000
B(1,3)=	-0.0066	B(6,5)=	0.0006	B(5,8)=	0.0000	B(4,11)=	0.0001
B(2,3)=	-0.0013	B(1,6)=	0.0001	B(6,8)=	0.0001	B(5,11)=	-0.0001
B(3,3)=	-0.0065	B(2,6)=	0.0001	B(1,9)=	0.0002	B(6,11)=	0.0000
B(4,3)=	-0.0066	B(3,6)=	0.0003	B(2,9)=	0.0000		
B(5,3)=	-0.0088	B(4,6)=	0.0001	B(3,9)=	0.0000		

Sparse matrix C:

C(1,1)=	-0.0139	C(1,3)=	-0.0109	C(1,5)=	-0.0528	C(1,6)=	0.0376
C(1,2)=	0.0064	C(1,4)=	0.0125				

Sparse matrix D:

D(1,1)=	-0.0007	D(1,4)=	0.0048	D(1,7)=	-0.0001	D(1,10)=	0.0107
D(1,2)=	-0.0127	D(1,5)=	-0.0087	D(1,8)=	-0.0040	D(1,11)=	0.0009
D(1,3)=	-0.0004	D(1,6)=	-0.0001	D(1,9)=	0.0004		

J.3.1.20 OKID-ERA - node S81A

Matrix A:

A(1,1)=	-0.6502	A(4,2)=	0.0794	A(1,4)=	-0.0943	A(4,5)=	-0.3252
A(2,1)=	0.7674	A(5,2)=	0.0074	A(2,4)=	-0.1310	A(5,5)=	-0.5691
A(3,1)=	0.0175	A(6,2)=	-0.1070	A(3,4)=	0.8042	A(6,5)=	-0.6726
A(4,1)=	-0.0603	A(1,3)=	0.0126	A(4,4)=	-0.2231	A(1,6)=	0.0684
A(5,1)=	0.0321	A(2,3)=	-0.0488	A(5,4)=	0.4862	A(2,6)=	0.0899
A(6,1)=	0.0505	A(3,3)=	-0.3681	A(6,4)=	0.0400	A(3,6)=	-0.1677
A(1,2)=	-0.7633	A(4,3)=	-0.9104	A(1,5)=	-0.0308	A(4,6)=	0.0169
A(2,2)=	-0.6463	A(5,3)=	0.1333	A(2,5)=	0.0035	A(5,6)=	0.6187
A(3,2)=	-0.1601	A(6,3)=	0.1463	A(3,5)=	0.3160	A(6,6)=	-0.5432

Sparse matrix B:

B(1,1)=	0.0121	B(4,2)=	-0.0168	B(1,4)=	-0.0007	B(4,5)=	0.0003
B(2,1)=	0.0137	B(5,2)=	0.0036	B(2,4)=	0.0001	B(5,5)=	-0.0002
B(3,1)=	-0.0093	B(6,2)=	-0.0366	B(3,4)=	-0.0005	B(6,5)=	-0.0004

B(4,1)=	-0.0347	B(1,3)=	-0.0003	B(4,4)=	0.0005	B(1,6)=	0.0001
B(5,1)=	-0.0306	B(2,3)=	-0.0006	B(5,4)=	-0.0002	B(2,6)=	0.0000
B(6,1)=	0.0058	B(3,3)=	0.0003	B(6,4)=	0.0012	B(3,6)=	0.0000
B(1,2)=	0.0204	B(4,3)=	0.0013	B(1,5)=	0.0000	B(4,6)=	0.0001
B(2,2)=	-0.0012	B(5,3)=	0.0011	B(2,5)=	0.0003	B(5,6)=	-0.0001
B(3,2)=	0.0231	B(6,3)=	-0.0002	B(3,5)=	-0.0003	B(6,6)=	0.0000

Sparse matrix C:

C(1,1)	-0.0205	C(1,3)	-0.0210	C(1,5)	-0.0275	C(1,6)	0.0093
C(1,2)	0.0180	C(1,4)	0.0527				

Sparse matrix D:

D(1,1)=	-0.0032	D(1,3)=	-0.0043	D(1,5)=	-0.0076	D(1,6)=	-0.0017
D(1,2)=	0.0711	D(1,4)=	-0.0021				

J.3.1.21 OKID-ERA - node S81B

Matrix A:

A(1,1)=	-0.9031	A(4,2)=	0.0305	A(1,4)=	0.0173	A(4,5)=	0.3317
A(2,1)=	0.4273	A(5,2)=	0.0251	A(2,4)=	0.0601	A(5,5)=	-0.3533
A(3,1)=	0.0337	A(6,2)=	-0.0330	A(3,4)=	0.2460	A(6,5)=	0.2757
A(4,1)=	0.0724	A(1,3)=	-0.0291	A(4,4)=	0.3633	A(1,6)=	0.0054
A(5,1)=	-0.0443	A(2,3)=	0.0630	A(5,4)=	0.8879	A(2,6)=	0.0359
A(6,1)=	0.0053	A(3,3)=	0.5062	A(6,4)=	0.0296	A(3,6)=	0.0729
A(1,2)=	-0.4202	A(4,3)=	-0.8215	A(1,5)=	0.0889	A(4,6)=	0.1673
A(2,2)=	-0.9044	A(5,3)=	0.1717	A(2,5)=	0.0257	A(5,6)=	-0.1454
A(3,2)=	0.1150	A(6,3)=	-0.0618	A(3,5)=	0.7509	A(6,6)=	-0.7313

Sparse matrix B:

B(1,1)=	0.0000	B(4,2)=	-0.1052	B(1,4)=	0.0000	B(4,5)=	0.0000
B(2,1)=	0.0000	B(5,2)=	0.1909	B(2,4)=	0.0000	B(5,5)=	0.0000
B(3,1)=	0.0000	B(6,2)=	0.0317	B(3,4)=	0.0000	B(6,5)=	0.0000
B(4,1)=	0.0000	B(1,3)=	-0.0813	B(4,4)=	0.0000	B(1,6)=	0.0000
B(5,1)=	0.0000	B(2,3)=	-0.0374	B(5,4)=	0.0001	B(2,6)=	0.0000
B(6,1)=	0.0000	B(3,3)=	-0.1659	B(6,4)=	0.0000	B(3,6)=	0.0000
B(1,2)=	-0.0648	B(4,3)=	0.1661	B(1,5)=	0.0000	B(4,6)=	0.0000
B(2,2)=	-0.0831	B(5,3)=	0.1118	B(2,5)=	0.0000	B(5,6)=	0.0000
B(3,2)=	0.1892	B(6,3)=	0.0016	B(3,5)=	0.0000	B(6,6)=	0.0000

Matrix C:

C(1,1)=	0.1068	C(1,3)=	0.2727	C(1,5)=	0.2410	C(1,6)=	-0.0300
C(1,2)=	-0.0876	C(1,4)=	-0.1477				

Sparse matrix D:

D(1,1)=	0.0026	D(1,3)=	0.4102	D(1,5)=	0.0079	D(1,6)=	0.0002
D(1,2)=	-0.0044	D(1,4)=	-0.0026				

J.3.1.22 OKID-ERA - node S60A

Matrix A:

A(1,1)=	0.9683	A(4,2)=	-0.0392	A(1,4)=	-0.0478	A(4,5)=	-0.8488
A(2,1)=	-0.0121	A(5,2)=	0.0739	A(2,4)=	-0.1526	A(5,5)=	0.0897
A(3,1)=	0.0682	A(6,2)=	0.0151	A(3,4)=	0.2379	A(6,5)=	0.3757
A(4,1)=	-0.0159	A(1,3)=	0.0518	A(4,4)=	0.2646	A(1,6)=	-0.0327
A(5,1)=	0.0011	A(2,3)=	0.2180	A(5,4)=	0.0298	A(2,6)=	-0.0356
A(6,1)=	0.0045	A(3,3)=	0.8051	A(6,4)=	0.7892	A(3,6)=	0.1483
A(1,2)=	-0.095	A(4,3)=	0.1478	A(1,5)=	0.0273	A(4,6)=	-0.1798
A(2,2)=	0.8851	A(5,3)=	0.0400	A(2,5)=	0.0671	A(5,6)=	-0.8635
A(3,2)=	0.0509	A(6,3)=	-0.0854	A(3,5)=	-0.0304	A(6,6)=	-0.1490

Sparse matrix B:

B(1,1)=	0.0039	B(4,2)=	0.0058	B(1,4)=	0.0214	B(4,5)=	-0.0061
B(2,1)=	0.0029	B(5,2)=	-0.0069	B(2,4)=	0.0140	B(5,5)=	0.0094
B(3,1)=	0.0052	B(6,2)=	0.0012	B(3,4)=	-0.0129	B(6,5)=	-0.0035
B(4,1)=	-0.0016	B(1,3)=	0.0038	B(4,4)=	0.0027	B(1,6)=	-0.0026
B(5,1)=	0.0010	B(2,3)=	-0.0068	B(5,4)=	0.0053	B(2,6)=	0.0107
B(6,1)=	-0.0001	B(3,3)=	-0.0078	B(6,4)=	-0.0061	B(3,6)=	-0.0075
B(1,2)=	-0.0028	B(4,3)=	0.0068	B(1,5)=	-0.0174	B(4,6)=	0.0077
B(2,2)=	0.0057	B(5,3)=	-0.0042	B(2,5)=	-0.0201	B(5,6)=	-0.0050
B(3,2)=	-0.0044	B(6,3)=	0.0076	B(3,5)=	0.0196	B(6,6)=	0.0096

Matrix C:

C(1,1)=	0.0271	C(1,3)=	-0.0299	C(1,5)=	-0.0118	C(1,6)=	0.0100
C(1,2)=	0.0353	C(1,4)=	0.0172				

Matrix D:

D(1,1)=	-0.0013	D(1,3)=	-0.0097	D(1,5)=	0.0114	D(1,6)=	0.0014
D(1,2)=	-0.0085	D(1,4)=	0.0010				

J.3.1.23 OKID-ERA - node S60B

Matrix A:

A(1,1)=	0.9948	A(4,2)=	-0.1107	A(1,4)=	0.0599	A(4,5)=	0.4107
A(2,1)=	-0.0322	A(5,2)=	0.0392	A(2,4)=	-0.1499	A(5,5)=	0.3938
A(3,1)=	-0.0370	A(6,2)=	-0.0298	A(3,4)=	0.3811	A(6,5)=	-0.7154
A(4,1)=	-0.0115	A(1,3)=	-0.0141	A(4,4)=	0.3441	A(1,6)=	-0.0039
A(5,1)=	0.0039	A(2,3)=	0.2117	A(5,4)=	-0.0019	A(2,6)=	-0.0616

A(6,1)=	-0.0070	A(3,3)=	0.8606	A(6,4)=	-0.0043	A(3,6)=	-0.0004
A(1,2)=	0.0599	A(4,3)=	0.0411	A(1,5)=	-0.0086	A(4,6)=	-0.1896
A(2,2)=	0.9523	A(5,3)=	0.0613	A(2,5)=	0.0164	A(5,6)=	0.8514
A(3,2)=	-0.0217	A(6,3)=	-0.0106	A(3,5)=	-0.0879	A(6,6)=	0.3762

Matrix B:

B(1,1)=	0.0020	B(6,2)=	0.0008	B(5,4)=	-0.0007	B(4,6)=	0.0066
B(2,1)=	-0.0008	B(1,3)=	0.0007	B(6,4)=	0.0028	B(5,6)=	0.0020
B(3,1)=	-0.0013	B(2,3)=	-0.0103	B(1,5)=	-0.0033	B(6,6)=	-0.0016
B(4,1)=	0.0096	B(3,3)=	0.0072	B(2,5)=	-0.0076	B(1,7)=	-0.0049
B(5,1)=	0.0012	B(4,3)=	-0.0031	B(3,5)=	0.0061	B(2,7)=	-0.0008
B(6,1)=	-0.0030	B(5,3)=	0.0049	B(4,5)=	-0.0185	B(3,7)=	0.0012
B(1,2)=	-0.0034	B(6,3)=	-0.0032	B(5,5)=	-0.0045	B(4,7)=	-0.0072
B(2,2)=	0.0006	B(1,4)=	0.0071	B(6,5)=	-0.0069	B(5,7)=	0.0005
B(3,2)=	-0.0039	B(2,4)=	-0.0021	B(1,6)=	-0.0112	B(6,7)=	-0.0005
B(4,2)=	-0.0014	B(3,4)=	0.0064	B(2,6)=	0.0133		
B(5,2)=	-0.0013	B(4,4)=	0.0000	B(3,6)=	-0.0163		

Matrix C:

C(1,1)=	0.0136	C(1,3)=	0.0299	C(1,5)=	0.0035	C(1,6)=	-0.0039
C(1,2)=	-0.0192	C(1,4)=	-0.0317				

Matrix D:

D(1,1)=	-0.0006	D(1,3)=	-0.0052	D(1,5)=	-0.0029	D(1,7)=	0.0003
D(1,2)=	-0.0017	D(1,4)=	-0.0043	D(1,6)=	0.0059		

J.3.1.24 OKID-ERA - node S60C

Matrix A:

A(1,1)=	-0.5111	A(4,2)=	0.2260	A(1,4)=	-0.2997	A(4,5)=	0.0411
A(2,1)=	0.8559	A(5,2)=	0.0890	A(2,4)=	-0.1439	A(5,5)=	-0.9587
A(3,1)=	0.0509	A(6,2)=	-0.0054	A(3,4)=	-0.5615	A(6,5)=	0.2475
A(4,1)=	-0.0430	A(1,3)=	-0.0328	A(4,4)=	-0.5147	A(1,6)=	-0.1364
A(5,1)=	-0.0054	A(2,3)=	0.0656	A(5,4)=	0.1609	A(2,6)=	-0.1030
A(6,1)=	-0.0434	A(3,3)=	-0.5046	A(6,4)=	0.4676	A(3,6)=	-0.4003
A(1,2)=	-0.7710	A(4,3)=	0.8166	A(1,5)=	-0.0771	A(4,6)=	-0.0111
A(2,2)=	-0.4701	A(5,3)=	0.1064	A(2,5)=	-0.0353	A(5,6)=	-0.1450
A(3,2)=	0.3687	A(6,3)=	0.2175	A(3,5)=	-0.0105	A(6,6)=	-0.7553

Sparse matrix B:

B(1,1)=	-0.0067	B(6,3)=	0.0000	B(5,6)=	-0.0061	B(4,9)=	0.0003
B(2,1)=	0.0017	B(1,4)=	0.0000	B(6,6)=	-0.0086	B(5,9)=	0.0000
B(3,1)=	0.0064	B(2,4)=	-0.0001	B(1,7)=	-0.0040	B(6,9)=	0.0002

B(4,1)=	-0.0034	B(3,4)=	0.0000	B(2,7)=	0.0220	B(1,10)=	0.0001
B(5,1)=	-0.0028	B(4,4)=	0.0000	B(3,7)=	0.0030	B(2,10)=	-0.0001
B(6,1)=	-0.0026	B(5,4)=	-0.0001	B(4,7)=	-0.0299	B(3,10)=	-0.0001
B(1,2)=	-0.0001	B(6,4)=	0.0000	B(5,7)=	-0.0101	B(4,10)=	-0.0002
B(2,2)=	0.0000	B(1,5)=	0.0106	B(6,7)=	-0.0033	B(5,10)=	0.0001
B(3,2)=	-0.0129	B(2,5)=	0.0044	B(1,8)=	0.0000	B(6,10)=	0.0000
B(4,2)=	-0.0025	B(3,5)=	-0.0143	B(2,8)=	0.0004	B(1,11)=	0.0000
B(5,2)=	-0.0030	B(4,5)=	0.0006	B(3,8)=	0.0000	B(2,11)=	0.0000
B(6,2)=	0.0029	B(5,5)=	0.0052	B(4,8)=	-0.0001	B(3,11)=	0.0002
B(1,3)=	-0.0001	B(6,5)=	0.0022	B(5,8)=	-0.0002	B(4,11)=	-0.0001
B(2,3)=	0.0001	B(1,6)=	-0.0102	B(6,8)=	0.0000	B(5,11)=	0.0000
B(3,3)=	0.0000	B(2,6)=	0.0057	B(1,9)=	-0.0002	B(6,11)=	-0.0001
B(4,3)=	-0.0001	B(3,6)=	0.0098	B(2,9)=	-0.0001		
B(5,3)=	0.0000	B(4,6)=	-0.0116	B(3,9)=	-0.0002		

Matrix C:

C(1,1)=	-0.0106	C(1,3)=	-0.0291	C(1,5)=	-0.0066	C(1,6)=	0.0181
C(1,2)=	0.0286	C(1,4)=	0.0336				

Matrix D:

D(1,1)=	-0.0012	D(1,4)=	-0.0007	D(1,7)=	0.0020	D(1,10)=	-0.0004
D(1,2)=	0.0134	D(1,5)=	-0.0099	D(1,8)=	-0.0089	D(1,11)=	0.0050
D(1,3)=	-0.0005	D(1,6)=	-0.0009	D(1,9)=	-0.0057		

J.3.2 MIMO representations

J.3.2.1 ARX (State-Space representation)

Matrix A:

A(1,1)=	-0.0980	A(4,2)=	0.0933	A(1,4)=	-0.0800	A(4,5)=	0.0450
A(2,1)=	-0.0249	A(5,2)=	0.0277	A(2,4)=	-0.3006	A(5,5)=	-0.1942
A(3,1)=	-0.0248	A(6,2)=	0.0368	A(3,4)=	-0.0867	A(6,5)=	0.0555
A(4,1)=	-0.0487	A(1,3)=	0.0246	A(4,4)=	-0.2773	A(1,6)=	-0.1740
A(5,1)=	-0.0408	A(2,3)=	0.0619	A(5,4)=	-0.0575	A(2,6)=	0.0458
A(6,1)=	0.0110	A(3,3)=	-0.0392	A(6,4)=	-0.0520	A(3,6)=	0.0327
A(1,2)=	0.0725	A(4,3)=	0.0088	A(1,5)=	0.0007	A(4,6)=	0.0946
A(2,2)=	-0.0336	A(5,3)=	0.0495	A(2,5)=	-0.0098	A(5,6)=	0.0662
A(3,2)=	0.0623	A(6,3)=	-0.0158	A(3,5)=	-0.2440	A(6,6)=	-0.1631

Matrix B:

B(1,1)=	0.0039	B(3,1)=	0.0023	B(5,1)=	0.0011	B(6,1)=	0.0021
B(2,1)=	0.0033	B(4,1)=	0.0016				

Sparse matrix C:

C(1,1)=	1.0000	C(3,3)=	1.0000	C(5,5)=	1.0000	C(6,6)=	1.0000
C(2,2)=	1.0000	C(4,4)=	1.0000				

Matrix D:

D(1,1)=	-0.0138	D(3,1)=	-0.0059	D(5,1)=	-0.0067	D(6,1)=	-0.0134
D(2,1)=	-0.0077	D(4,1)=	-0.0119				

J.3.2.2 ARMAX (State-Space representation)

Matrix A:

A(1,1)=	0.6274	A(4,2)=	-0.0001	A(1,4)=	-0.0423	A(4,5)=	0.1448
A(2,1)=	0.0126	A(5,2)=	0.0113	A(2,4)=	-0.3081	A(5,5)=	0.4738
A(3,1)=	-0.0417	A(6,2)=	0.0367	A(3,4)=	-0.0643	A(6,5)=	0.1195
A(4,1)=	-0.0356	A(1,3)=	0.0057	A(4,4)=	0.4406	A(1,6)=	-0.4093
A(5,1)=	-0.0644	A(2,3)=	0.0338	A(5,4)=	-0.0447	A(2,6)=	-0.0413
A(6,1)=	-0.0351	A(3,3)=	0.7261	A(6,4)=	-0.0519	A(3,6)=	0.0213
A(1,2)=	0.0354	A(4,3)=	-0.0183	A(1,5)=	0.0759	A(4,6)=	-0.0029
A(2,2)=	0.6255	A(5,3)=	0.0242	A(2,5)=	0.0670	A(5,6)=	0.0572
A(3,2)=	0.0247	A(6,3)=	-0.0267	A(3,5)=	-0.2989	A(6,6)=	0.3006

Matrix B:

B(1,1)=	-0.0020	B(3,1)=	-0.0003	B(5,1)=	-0.0024	B(6,1)=	-0.0037
B(2,1)=	-0.0004	B(4,1)=	-0.0047				

Sparse matrix C:

C(1,1)=	1.0000	C(3,3)=	1.0000	C(5,5)=	1.0000	C(6,6)=	1.0000
C(2,2)=	1.0000	C(4,4)=	1.0000				

Matrix D:

D(1,1)=	-0.0111	D(3,1)=	-0.0037	D(5,1)=	-0.0057	D(6,1)=	-0.0127
D(2,1)=	-0.0054	D(4,1)=	-0.0100				

J.3.2.3 DMDc

Matrix A:

A(1,1)=	-0.2203	A(4,2)=	0.0232	A(1,4)=	-0.1792	A(4,5)=	-0.0455
A(2,1)=	0.0024	A(5,2)=	0.0479	A(2,4)=	0.0360	A(5,5)=	-0.0866
A(3,1)=	0.0468	A(6,2)=	-0.0110	A(3,4)=	0.1246	A(6,5)=	-0.0071
A(4,1)=	0.0315	A(1,3)=	-0.2606	A(4,4)=	-0.1203	A(1,6)=	-0.0480
A(5,1)=	0.0161	A(2,3)=	0.0294	A(5,4)=	-0.0048	A(2,6)=	0.0222
A(6,1)=	-0.0017	A(3,3)=	-0.0958	A(6,4)=	0.0306	A(3,6)=	0.2078
A(1,2)=	-0.0814	A(4,3)=	0.0835	A(1,5)=	-0.1490	A(4,6)=	-0.1638

A(2,2)=	-0.2122	A(5,3)=	0.0005	A(2,5)=	-0.2132	A(5,6)=	-0.0076
A(3,2)=	0.0445	A(6,3)=	-0.0188	A(3,5)=	0.0325	A(6,6)=	-0.0983

Matrix B:

B(1,1)=	-0.0014	B(3,1)=	-0.0001	B(5,1)=	-0.0001	B(6,1)=	0.0000
B(2,1)=	0.0002	B(4,1)=	-0.0003				

Matrix C:

C(1,1)=	-0.4863	C(4,2)=	-0.5231	C(1,4)=	0.5260	C(4,5)=	-0.5079
C(2,1)=	-0.4805	C(5,2)=	0.2112	C(2,4)=	0.3848	C(5,5)=	0.3641
C(3,1)=	-0.3346	C(6,2)=	0.1918	C(3,4)=	-0.2739	C(6,5)=	0.5362
C(4,1)=	-0.4872	C(1,3)=	-0.2059	C(4,4)=	-0.3792	C(1,6)=	-0.3520
C(5,1)=	-0.2543	C(2,3)=	0.4536	C(5,4)=	-0.5959	C(2,6)=	-0.0554
C(6,1)=	-0.3445	C(3,3)=	0.5981	C(6,4)=	-0.0371	C(3,6)=	0.4702
C(1,2)=	0.4620	C(4,3)=	-0.2891	C(1,5)=	-0.3272	C(4,6)=	0.0610
C(2,2)=	-0.4907	C(5,3)=	0.0548	C(2,5)=	0.4141	C(5,6)=	-0.6325
C(3,2)=	0.4368	C(6,3)=	-0.5546	C(3,5)=	-0.2084	C(6,6)=	0.4981

Matrix D: All zero sparse: 6×1

J.3.2.4 OKID-ERA

Matrix A:

A(1,1)=	0.9176	A(4,2)=	0.0322	A(1,4)=	0.0652	A(4,5)=	-0.2472
A(2,1)=	-0.0962	A(5,2)=	-0.0384	A(2,4)=	0.0394	A(5,5)=	-0.2333
A(3,1)=	-0.0606	A(6,2)=	0.0375	A(3,4)=	0.0034	A(6,5)=	-0.7969
A(4,1)=	0.0813	A(1,3)=	-0.1324	A(4,4)=	0.8245	A(1,6)=	-0.0009
A(5,1)=	-0.0321	A(2,3)=	0.0448	A(5,4)=	0.2181	A(2,6)=	0.0195
A(6,1)=	0.0551	A(3,3)=	0.9151	A(6,4)=	-0.3830	A(3,6)=	0.1165
A(1,2)=	0.0019	A(4,3)=	0.2160	A(1,5)=	0.0473	A(4,6)=	-0.1925
A(2,2)=	0.9710	A(5,3)=	-0.0906	A(2,5)=	0.0043	A(5,6)=	0.9282
A(3,2)=	-0.1617	A(6,3)=	0.1042	A(3,5)=	0.1288	A(6,6)=	-0.0421

Matrix B:

B(1,1)=	-0.0503	B(3,1)=	-0.0373	B(5,1)=	-0.0081	B(6,1)=	0.0089
B(2,1)=	-0.0320	B(4,1)=	0.0258				

Matrix C:

C(1,1)=	-0.0325	C(4,2)=	0.0081	C(1,4)=	0.0085	C(4,5)=	0.0130
C(2,1)=	-0.0319	C(5,2)=	0.0003	C(2,4)=	0.0135	C(5,5)=	0.0040
C(3,1)=	-0.0261	C(6,2)=	0.0047	C(3,4)=	0.0074	C(6,5)=	0.0077
C(4,1)=	-0.0054	C(1,3)=	-0.0190	C(4,4)=	0.0114	C(1,6)=	0.0000
C(5,1)=	-0.0057	C(2,3)=	-0.0202	C(5,4)=	0.0063	C(2,6)=	0.0034

C(6,1)=	-0.0064	C(3,3)=	-0.0236	C(6,4)=	0.0029	C(3,6)=	-0.0056
C(1,2)=	-0.0135	C(4,3)=	-0.0020	C(1,5)=	0.0048	C(4,6)=	0.0038
C(2,2)=	-0.0121	C(5,3)=	-0.0022	C(2,5)=	0.0060	C(5,6)=	0.0011
C(3,2)=	-0.0119	C(6,3)=	0.0004	C(3,5)=	0.0016	C(6,6)=	0.0022

Matrix D:

D(1,1)=	-0.0136	D(3,1)=	-0.0054	D(5,1)=	-0.0067	D(6,1)=	-0.0138
D(2,1)=	-0.0073	D(4,1)=	-0.0122				

J.4 Checking validity of assumptions

Table J.106: Tests of residuals from voltages predictions using DMDc technique and training dataset of selected regressors in MISO structure

Evaluation	ΔV S85C	ΔV S81A	ΔV S81B	ΔV S60A	ΔV S60B	ΔV S60C
Anderson-Darling test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Lilliefors test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
One-sample Kolmogorov-Smirnov test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Durbin-Watson test	Reject H_1	Reject H_1	Reject H_1	Reject H_1	Reject H_1	Reject H_1
Durbin-Watson coefficient d	2.29	2.40	2.30	2.32	2.32	2.31
Ljung-Box Q-test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Engle's ARCH test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Ljung-Box Q-test using squared residuals	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1

Table J.107: Tests of residuals from voltages predictions using DMDc technique and validation dataset of selected regressors in MISO structure

Evaluation	ΔV S85C	ΔV S81A	ΔV S81B	ΔV S60A	ΔV S60B	ΔV S60C
Anderson-Darling test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Lilliefors test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
One-sample Kolmogorov-Smirnov test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Durbin-Watson test	Reject H_1	Reject H_1	Reject H_1	Reject H_1	Reject H_1	Reject H_1
Durbin-Watson coefficient d	2.28	2.41	2.34	2.36	2.32	2.27
Ljung-Box Q-test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Engle's ARCH test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Ljung-Box Q-test using squared residuals	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1

Table J.108: Tests of residuals from voltages predictions using NARX technique and training dataset of selected regressors in MISO structure

Evaluation	ΔV S85C	ΔV S81A	ΔV S81B	ΔV S60A	ΔV S60B	ΔV S60C
Anderson-Darling test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Lilliefors test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
One-sample Kolmogorov-Smirnov test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Durbin-Watson test	Reject H_1	Reject H_1	Reject H_1	Reject H_1	Reject H_1	Reject H_1
Durbin-Watson coefficient d	2.36	2.40	2.32	2.29	2.32	2.29
Ljung-Box Q-test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Engle's ARCH test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Ljung-Box Q-test using squared residuals	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1

Table J.109: Tests of residuals from voltages predictions using NARX technique and validation dataset of selected regressors in MISO structure

Evaluation	ΔV S85C	ΔV S81A	ΔV S81B	ΔV S60A	ΔV S60B	ΔV S60C
Anderson-Darling test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Lilliefors test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
One-sample Kolmogorov-Smirnov test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Durbin-Watson test	Reject H_1	Reject H_1	Reject H_1	Reject H_1	Reject H_1	Reject H_1
Durbin-Watson coefficient d	2.36	2.42	2.36	2.33	2.31	2.27
Ljung-Box Q-test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Engle's ARCH test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Ljung-Box Q-test using squared residuals	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1

Table J.110: Tests of residuals from voltages predictions using DMDc technique and training dataset of selected regressors in MIMO structure

Evaluation	ΔV S85C	ΔV S81A	ΔV S81B	ΔV S60A	ΔV S60B	ΔV S60C
Anderson-Darling test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Lilliefors test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
One-sample Kolmogorov-Smirnov test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Durbin-Watson test	Reject H_1	Reject H_1	Reject H_1	Reject H_1	Reject H_1	Reject H_1
Durbin-Watson coefficient d	2.43	2.47	2.40	2.35	2.35	2.37
Ljung-Box Q-test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Engle's ARCH test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Ljung-Box Q-test using squared residuals	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1

Table J.111: Tests of residuals from voltages predictions using DMDc technique and validation dataset of selected regressors in MIMO structure

Evaluation	ΔV S85C	ΔV S81A	ΔV S81B	ΔV S60A	ΔV S60B	ΔV S60C
Anderson-Darling test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Lilliefors test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
One-sample Kolmogorov-Smirnov test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Durbin-Watson test	Reject H_1	Reject H_1	Reject H_1	Reject H_1	Reject H_1	Reject H_1
Durbin-Watson coefficient d	2.41	2.49	2.43	2.39	2.34	2.34
Ljung-Box Q-test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Engle's ARCH test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Ljung-Box Q-test using squared residuals	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1

Table J.112: Tests of residuals from voltages predictions using NARX technique and training dataset of selected regressors in MIMO structure

Evaluation	ΔV S85C	ΔV S81A	ΔV S81B	ΔV S60A	ΔV S60B	ΔV S60C
Anderson-Darling test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Lilliefors test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
One-sample Kolmogorov-Smirnov test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Durbin-Watson test	Reject H_1	Reject H_1	Reject H_1	Reject H_1	Reject H_1	Reject H_1
Durbin-Watson coefficient d	2.43	2.48	2.41	2.34	2.35	2.36
Ljung-Box Q-test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Engle's ARCH test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Ljung-Box Q-test using squared residuals	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1

Table J.113: Tests of residuals from voltages predictions using NARX technique and validation dataset of selected regressors in MIMO structure

Evaluation	ΔV S85C	ΔV S81A	ΔV S81B	ΔV S60A	ΔV S60B	ΔV S60C
Anderson-Darling test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Lilliefors test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
One-sample Kolmogorov-Smirnov test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Durbin-Watson test	Reject H_1	Reject H_1	Reject H_1	Reject H_1	Reject H_1	Reject H_1
Durbin-Watson coefficient d	2.41	2.49	2.44	2.38	2.34	2.33
Ljung-Box Q-test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Engle's ARCH test	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1
Ljung-Box Q-test using squared residuals	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1	Failure to reject H_1

Appendix K

Results of simulations scenarios presented on Chapter 3 - Obtained M^P and M^Q values

K.0.1 Considering On-Load Tap Changers (OLTCs) connected without capacitors compensation

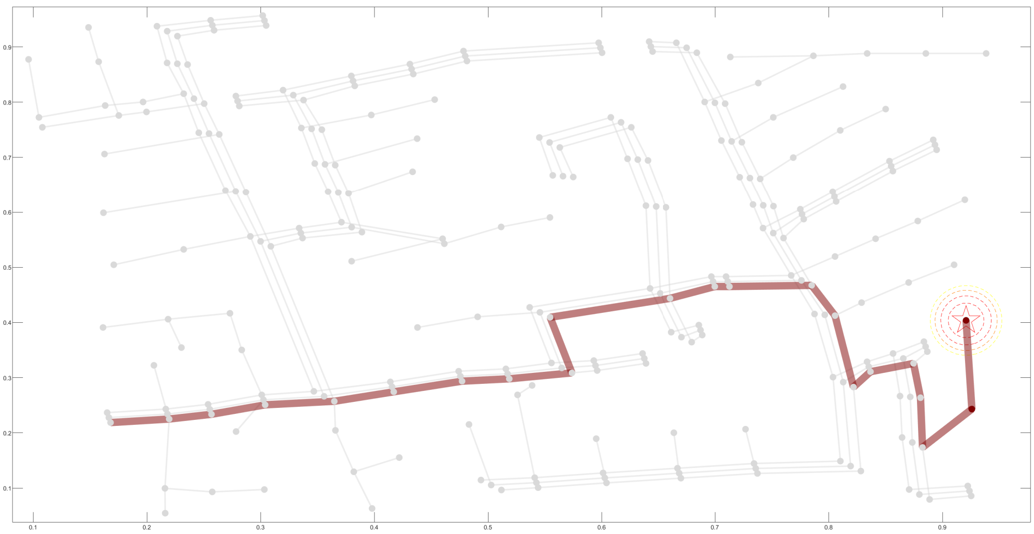

Figure K.1: Representation of M^P and M^Q values obtained for values higher than 0.5 when there is a single-phase perturbation at node 85, phase C. Load consumption with a rated power of 400 kW and 200 kVAr. (Scenario S1)

Table K.1: M^P values obtained for Scenario S1

Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
149.A	1.A	-0.0002	-0.0002	-0.0003	-0.0003	-0.0003	-0.0004	-0.0004	0.000
149.B	1.B	-0.0002	-0.0002	0.0000	0.0000	0.0000	0.0002	0.0002	0.000
149.C	1.C	0.6792	0.5842	0.1399	0.1414	0.1414	0.0011	0.0015	2.981
1.B	2.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
1.C	3.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
1.A	7.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0003	-0.0003	0.001
1.B	7.B	-0.0002	-0.0001	0.0000	0.0000	0.0000	0.0001	0.0001	0.002
1.C	7.C	0.5095	0.4382	0.1049	0.1060	0.1060	0.0008	0.0011	4.568
3.C	4.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
3.C	5.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
5.C	6.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
7.A	8.A	-0.0001	-0.0001	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.001
7.B	8.B	-0.0001	-0.0001	0.0000	0.0000	0.0000	0.0001	0.0001	0.002

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
7.C	8.C	0.3396	0.2921	0.0700	0.0707	0.0707	0.0006	0.0007	3.209
8.B	12.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
8.A	9.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
8.A	13.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0003	- 0.0003	0.001
8.B	13.B	-0.0002	-0.0001	0.0000	0.0000	0.0000	0.0001	0.0001	0.002
8.C	13.C	0.5094	0.4382	0.1049	0.1060	0.1060	0.0008	0.0011	4.564
9r.A	14.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
13.C	34.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
13.A	18.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
13.B	18.B	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
13.C	18.C	-0.0008	-0.0008	-0.0007	-0.0008	-0.0008	-0.0007	- 0.0007	0.000
14.A	11.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
14.A	10.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
15.C	16.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
15.C	17.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
18.A	19.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
18.A	21.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
18.B	21.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
18.C	21.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	- 0.0003	0.000
19.A	20.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
21.B	22.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
21.A	23.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
21.B	23.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
21.C	23.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	- 0.0002	0.000
23.C	24.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
23.A	25.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
23.B	25.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
23.C	25.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	- 0.0002	0.000
25r.A	26.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
25r.C	26.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	- 0.0003	0.000
25.A	28.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
25.B	28.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
25.C	28.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	- 0.0002	0.000
26.A	27.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
26.C	27.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
26.C	31.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
27.A	33.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
28.A	29.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
28.B	29.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
28.C	29.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
29.A	30.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
29.B	30.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
29.C	30.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
30.A	250.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
30.B	250.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
30.C	250.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
31.C	32.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
34.C	15.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
35.A	36.A	-0.0006	-0.0006	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	0.000
35.B	36.B	0.0006	0.0006	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
35.A	40.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
35.B	40.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
35.C	40.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
36.A	37.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
36.B	38.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
38.B	39.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
40.C	41.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
40.A	42.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
40.B	42.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
40.C	42.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
42.B	43.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
42.A	44.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
42.B	44.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
42.C	44.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
44.A	45.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
44.A	47.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
44.B	47.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
44.C	47.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
45.A	46.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
47.A	48.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
47.B	48.B	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	- 0.0004	0.000
47.C	48.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
47.A	49.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
47.B	49.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	- 0.0006	0.000
47.C	49.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
49.A	50.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
49.B	50.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	- 0.0006	0.000
49.C	50.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
50.A	51.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
50.B	51.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	- 0.0006	0.000
50.C	51.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
51.A	151.A	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.000
51.B	151.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	- 0.0012	0.000
51.C	151.C	0.0004	0.0004	0.0004	0.0004	0.0004	0.0005	0.0005	0.000
52.A	53.A	-0.0001	-0.0001	-0.0002	-0.0002	-0.0002	-0.0002	- 0.0002	0.001
52.B	53.B	-0.0001	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.001
52.C	53.C	0.3396	0.2921	0.0700	0.0707	0.0707	0.0006	0.0007	3.186
53.A	54.A	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	- 0.0001	0.000
53.B	54.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.001
53.C	54.C	0.2122	0.1826	0.0437	0.0442	0.0442	0.0003	0.0005	2.083
54.A	55.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	- 0.0002	0.000
54.B	55.B	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.000
54.C	55.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
54.A	57.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.001
54.B	57.B	-0.0006	-0.0006	-0.0005	-0.0005	-0.0005	-0.0003	- 0.0003	0.002
54.C	57.C	0.6010	0.5170	0.1239	0.1251	0.1251	0.0010	0.0013	5.233
55.A	56.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	- 0.0002	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
55.B	56.B	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.000
55.C	56.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
57.B	58.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
57.A	60.A	0.0005	0.0004	0.0004	0.0004	0.0004	0.0003	0.0003	0.002
57.B	60.B	-0.0013	-0.0012	-0.0010	-0.0010	-0.0010	-0.0007	- 0.0007	0.004
57.C	60.C	1.2878	1.1077	0.2654	0.2682	0.2682	0.0022	0.0029	10.272
58.B	59.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
60.A	61.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	- 0.0003	0.000
60.B	61.B	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
60.C	61.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	- 0.0002	0.000
60.A	62.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
60.B	62.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
60.C	62.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
62.A	63.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
62.B	63.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
62.C	63.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
63.A	64.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
63.B	64.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
63.C	64.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
64.A	65.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
64.B	65.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
64.C	65.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
65.A	66.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
65.B	66.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
65.C	66.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
67.A	68.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
67.A	72.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
67.B	72.B	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	- 0.0002	0.000
67.C	72.C	0.4549	0.3819	0.0949	0.0959	0.0959	0.0008	0.0011	1.211
67.A	97.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
67.B	97.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	- 0.0002	0.000
67.C	97.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
68.A	69.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
69.A	70.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
70.A	71.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
72.C	73.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
72.A	76.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
72.B	76.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	- 0.0002	0.000
72.C	76.C	0.3309	0.2777	0.0690	0.0697	0.0697	0.0006	0.0008	1.055
73.C	74.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
74.C	75.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
76.A	77.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
76.B	77.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0002	- 0.0002	0.000
76.C	77.C	0.6613	0.5551	0.1376	0.1391	0.1391	0.0008	0.0011	1.820
76.A	86.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
76.B	86.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	- 0.0006	0.000
76.C	86.C	0.0003	0.0003	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
77.A	78.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
77.B	78.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
77.C	78.C	0.1653	0.1388	0.0344	0.0348	0.0348	0.0002	0.0003	0.719
78.A	79.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
78.B	79.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	- 0.0001	0.000
78.C	79.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	- 0.0001	0.000
78.A	80.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
78.B	80.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	- 0.0002	0.000
78.C	80.C	0.7853	0.6591	0.1634	0.1651	0.1651	0.0009	0.0013	2.361
80.A	81.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
80.B	81.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	- 0.0001	0.000
80.C	81.C	0.2893	0.2428	0.0602	0.0608	0.0608	0.0003	0.0005	1.227
81.A	82.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
81.B	82.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	- 0.0001	0.000
81.C	82.C	-0.0002	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	- 0.0001	0.000
81.C	84.C	3.1801	2.6694	0.6627	0.6696	0.6696	0.0047	0.0064	8.356
82.A	83.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
82.B	83.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	- 0.0001	0.000
82.C	83.C	-0.0002	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	- 0.0001	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
84.C	85.C	2.2379	1.8785	0.4663	0.4712	0.4712	0.0033	0.0045	7.991
86.A	87.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
86.B	87.B	-0.0001	-0.0001	-0.0002	-0.0002	-0.0002	-0.0002	- 0.0002	0.000
86.C	87.C	-0.0003	-0.0003	-0.0002	-0.0002	-0.0002	-0.0002	- 0.0002	0.000
87.A	88.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
87.A	89.A	0.0002	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
87.B	89.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	- 0.0001	0.000
87.C	89.C	-0.0002	-0.0002	-0.0001	-0.0001	-0.0001	-0.0001	- 0.0001	0.000
89.B	90.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
89.A	91.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
89.B	91.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	- 0.0001	0.000
89.C	91.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	- 0.0001	0.000
91.C	92.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
91.A	93.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
91.B	93.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	- 0.0001	0.000
91.C	93.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	- 0.0001	0.000
93.A	94.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
93.A	95.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
93.B	95.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	- 0.0001	0.000
93.C	95.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	- 0.0002	0.000
95.B	96.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
97.A	98.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
97.B	98.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	- 0.0002	0.000
97.C	98.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
98.A	99.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
98.B	99.B	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	- 0.0005	0.001
98.C	99.C	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.001
99.A	100.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
99.B	100.B	-0.0002	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
99.C	100.C	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
100.A	450.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
100.B	450.B	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.001
100.C	450.C	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.001
197.A	101.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
197.B	101.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
197.C	101.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
101.C	102.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
101.A	105.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
101.B	105.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
101.C	105.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
102.C	103.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
103.C	104.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
105.B	106.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
105.A	108.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
105.B	108.B	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
105.C	108.C	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
106.B	107.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
108.A	109.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
108.A	300.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
108.B	300.B	-0.0008	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.001
108.C	300.C	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.001
109.A	110.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
110.A	111.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
110.A	112.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
112.A	113.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
113.A	114.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
135.A	35.A	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.000
135.B	35.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
135.C	35.C	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
152.A	52.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0004	-0.0004	0.001
152.B	52.B	-0.0001	-0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.002

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
152.C	52.C	0.6792	0.5843	0.1399	0.1414	0.1414	0.0011	0.0015	5.877
160r.A	67.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
160r.B	67.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0001	- 0.0001	0.001
160r.C	67.C	0.5786	0.4857	0.1204	0.1217	0.1217	0.0007	0.0010	1.252

Table K.2: M^Q values obtained for Scenario S1

Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
149.A	1.A	-0.0021	-0.0022	-0.0024	-0.0024	-0.0024	-0.0025	- 0.003	0.000
149.B	1.B	-0.0028	-0.0028	-0.0028	-0.0028	-0.0028	-0.0028	- 0.003	0.000
149.C	1.C	1.5639	1.3448	0.3198	0.3232	0.3232	-0.0001	0.001	6.876
1.B	2.B	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	- 0.001	0.000
1.C	3.C	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	- 0.001	0.000
1.A	7.A	-0.0016	-0.0016	-0.0018	-0.0018	-0.0018	-0.0019	- 0.002	0.003
1.B	7.B	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	- 0.002	0.000
1.C	7.C	1.1730	1.0086	0.2399	0.2424	0.2424	-0.0001	0.000	10.537
3.C	4.C	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	- 0.001	0.000
3.C	5.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0014	- 0.001	0.000
5.C	6.C	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	- 0.001	0.000
7.A	8.A	-0.0011	-0.0011	-0.0012	-0.0012	-0.0012	-0.0013	- 0.001	0.002
7.B	8.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	- 0.001	0.000
7.C	8.C	0.7820	0.6724	0.1599	0.1616	0.1616	-0.0001	0.000	7.402
8.B	12.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	- 0.001	0.000
8.A	9.A	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	- 0.001	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
8.A	13.A	-0.0016	-0.0017	-0.0018	-0.0018	-0.0018	-0.0019	- 0.002	0.003
8.B	13.B	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	- 0.002	0.000
8.C	13.C	1.1730	1.0086	0.2399	0.2424	0.2424	-0.0001	0.000	10.528
9r.A	14.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	- 0.002	0.000
13.C	34.C	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	- 0.001	0.000
13.A	18.A	-0.0057	-0.0057	-0.0057	-0.0057	-0.0057	-0.0057	- 0.006	0.000
13.B	18.B	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	- 0.005	0.000
13.C	18.C	-0.0052	-0.0052	-0.0052	-0.0052	-0.0052	-0.0053	- 0.005	0.001
14.A	11.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	- 0.001	0.000
14.A	10.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	- 0.001	0.000
15.C	16.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0016	- 0.002	0.000
15.C	17.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0015	- 0.001	0.000
18.A	19.A	-0.0011	-0.0011	-0.0010	-0.0010	-0.0010	-0.0010	- 0.001	0.000
18.A	21.A	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	- 0.002	0.000
18.B	21.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	- 0.002	0.000
18.C	21.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	- 0.002	0.000
19.A	20.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	- 0.001	0.000
21.B	22.B	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	- 0.002	0.000
21.A	23.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	- 0.002	0.000
21.B	23.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	- 0.001	0.000
21.C	23.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	- 0.002	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
23.C	24.C	-0.0022	-0.0022	-0.0023	-0.0023	-0.0023	-0.0023	- 0.002	0.000
23.A	25.A	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	- 0.002	0.000
23.B	25.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	- 0.002	0.000
23.C	25.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0018	- 0.002	0.000
25r.A	26.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	- 0.002	0.000
25r.C	26.C	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	- 0.002	0.000
25.A	28.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	- 0.001	0.000
25.B	28.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	- 0.001	0.000
25.C	28.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	- 0.001	0.000
26.A	27.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	- 0.001	0.000
26.C	27.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	- 0.001	0.000
26.C	31.C	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	- 0.001	0.000
27.A	33.A	-0.0021	-0.0021	-0.0020	-0.0020	-0.0020	-0.0021	- 0.002	0.000
28.A	29.A	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	- 0.002	0.000
28.B	29.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	- 0.002	0.000
28.C	29.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	- 0.002	0.000
29.A	30.A	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	- 0.002	0.000
29.B	30.B	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	- 0.002	0.000
29.C	30.C	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	- 0.002	0.001
30.A	250.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	- 0.001	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
30.B	250.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	- 0.001	0.000
30.C	250.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	- 0.001	0.000
31.C	32.C	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	- 0.001	0.000
34.C	15.C	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	0.000	0.000
35.A	36.A	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	- 0.003	0.000
35.B	36.B	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	- 0.003	0.000
35.A	40.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	- 0.002	0.000
35.B	40.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	- 0.002	0.000
35.C	40.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0015	- 0.001	0.000
36.A	37.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	- 0.001	0.000
36.B	38.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	- 0.001	0.000
38.B	39.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	- 0.001	0.000
40.C	41.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0014	- 0.001	0.000
40.A	42.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	- 0.002	0.000
40.B	42.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	- 0.002	0.000
40.C	42.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0015	- 0.001	0.000
42.B	43.B	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	- 0.002	0.000
42.A	44.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	- 0.001	0.000
42.B	44.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	- 0.001	0.000
42.C	44.C	-0.0011	-0.0011	-0.0012	-0.0012	-0.0012	-0.0012	- 0.001	0.000
44.A	45.A	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	- 0.001	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
44.A	47.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	- 0.002	0.000
44.B	47.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	- 0.002	0.000
44.C	47.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0015	- 0.001	0.000
45.A	46.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	- 0.001	0.000
47.A	48.A	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	- 0.001	0.000
47.B	48.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	- 0.001	0.000
47.C	48.C	-0.0009	-0.0009	-0.0010	-0.0010	-0.0010	-0.0010	- 0.001	0.000
47.A	49.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	- 0.001	0.000
47.B	49.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	- 0.001	0.000
47.C	49.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	- 0.002	0.000
49.A	50.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	- 0.001	0.000
49.B	50.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	- 0.001	0.000
49.C	50.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	- 0.002	0.000
50.A	51.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	- 0.001	0.000
50.B	51.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	- 0.001	0.000
50.C	51.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	- 0.002	0.000
51.A	151.A	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	- 0.002	0.000
51.B	151.B	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	- 0.003	0.000
51.C	151.C	-0.0031	-0.0031	-0.0032	-0.0032	-0.0032	-0.0032	- 0.003	0.001
52.A	53.A	-0.0011	-0.0011	-0.0012	-0.0012	-0.0012	-0.0013	- 0.001	0.002

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
52.B	53.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
52.C	53.C	0.7821	0.6725	0.1600	0.1617	0.1617	-0.0001	0.000	7.350
53.A	54.A	-0.0007	-0.0007	-0.0008	-0.0008	-0.0008	-0.0008	-0.001	0.001
53.B	54.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
53.C	54.C	0.4888	0.4203	0.1000	0.1010	0.1010	0.0000	0.000	4.805
54.A	55.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000
54.B	55.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
54.C	55.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.001
54.A	57.A	-0.0018	-0.0018	-0.0019	-0.0019	-0.0019	-0.0020	-0.002	0.003
54.B	57.B	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.0022	-0.002	0.000
54.C	57.C	1.3466	1.1579	0.2751	0.2780	0.2780	-0.0005	0.000	11.751
55.A	56.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000
55.B	56.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
55.C	56.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.001
57.B	58.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
57.A	60.A	-0.0038	-0.0039	-0.0041	-0.0041	-0.0041	-0.0044	-0.004	0.005
57.B	60.B	-0.0049	-0.0049	-0.0049	-0.0049	-0.0049	-0.0048	-0.005	0.001
57.C	60.C	2.8857	2.4813	0.5896	0.5958	0.5958	-0.0011	0.000	23.066
58.B	59.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
60.A	61.A	-0.0038	-0.0038	-0.0038	-0.0038	-0.0038	-0.0038	-0.004	0.001
60.B	61.B	-0.0035	-0.0035	-0.0035	-0.0035	-0.0035	-0.0035	-0.004	0.000
60.C	61.C	-0.0030	-0.0030	-0.0031	-0.0031	-0.0031	-0.0032	-0.003	0.002

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
60.A	62.A	-0.0159	-0.0159	-0.0157	-0.0157	-0.0157	-0.0155	-0.016	0.005
60.B	62.B	-0.0154	-0.0154	-0.0154	-0.0154	-0.0154	-0.0155	-0.015	0.001
60.C	62.C	-0.0146	-0.0146	-0.0151	-0.0151	-0.0151	-0.0155	-0.015	0.012
62.A	63.A	-0.0111	-0.0111	-0.0110	-0.0110	-0.0110	-0.0109	-0.011	0.000
62.B	63.B	-0.0108	-0.0108	-0.0108	-0.0108	-0.0108	-0.0108	-0.011	0.001
62.C	63.C	-0.0102	-0.0102	-0.0106	-0.0106	-0.0106	-0.0108	-0.011	0.008
63.A	64.A	-0.0223	-0.0222	-0.0220	-0.0220	-0.0220	-0.0217	-0.022	0.007
63.B	64.B	-0.0216	-0.0216	-0.0216	-0.0216	-0.0216	-0.0217	-0.022	0.000
63.C	64.C	-0.0204	-0.0205	-0.0211	-0.0211	-0.0211	-0.0216	-0.022	0.017
64.A	65.A	-0.0270	-0.0270	-0.0267	-0.0267	-0.0267	-0.0264	-0.026	0.000
64.B	65.B	-0.0262	-0.0262	-0.0263	-0.0263	-0.0263	-0.0263	-0.026	0.002
64.C	65.C	-0.0248	-0.0249	-0.0256	-0.0256	-0.0256	-0.0263	-0.026	0.000
65.A	66.A	-0.0207	-0.0206	-0.0204	-0.0204	-0.0204	-0.0202	-0.020	0.007
65.B	66.B	-0.0200	-0.0200	-0.0201	-0.0201	-0.0201	-0.0201	-0.020	0.001
65.C	66.C	-0.0189	-0.0190	-0.0196	-0.0196	-0.0196	-0.0201	-0.020	0.015
67.A	68.A	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.001	0.000
67.A	72.A	-0.0016	-0.0015	-0.0015	-0.0015	-0.0015	-0.0016	-0.002	0.000
67.B	72.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
67.C	72.C	1.0197	0.8556	0.2110	0.2132	0.2132	-0.0004	0.000	2.721
67.A	97.A	-0.0015	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
67.B	97.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
67.C	97.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	- 0.002	0.000
68.A	69.A	-0.0012	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	- 0.001	0.000
69.A	70.A	-0.0014	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	- 0.001	0.000
70.A	71.A	-0.0012	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	- 0.001	0.000
72.C	73.C	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	- 0.001	0.000
72.A	76.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	- 0.001	0.000
72.B	76.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	- 0.001	0.000
72.C	76.C	0.7417	0.6223	0.1534	0.1551	0.1551	-0.0003	0.000	2.371
73.C	74.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0015	- 0.001	0.001
74.C	75.C	-0.0016	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	- 0.002	0.001
76.A	77.A	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025	- 0.003	0.000
76.B	77.B	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	- 0.002	0.000
76.C	77.C	1.4834	1.2447	0.3069	0.3102	0.3102	-0.0005	0.000	4.089
76.A	86.A	-0.0041	-0.0040	-0.0040	-0.0040	-0.0040	-0.0040	- 0.004	0.000
76.B	86.B	-0.0044	-0.0044	-0.0044	-0.0044	-0.0044	-0.0044	- 0.004	0.000
76.C	86.C	-0.0047	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	- 0.005	0.000
77.A	78.A	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	- 0.001	0.000
77.B	78.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	- 0.001	0.000
77.C	78.C	0.3709	0.3112	0.0767	0.0775	0.0775	-0.0001	0.000	1.615
78.A	79.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	- 0.001	0.000
78.B	79.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	- 0.001	0.000
78.C	79.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	- 0.002	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
78.A	80.A	-0.0030	-0.0030	-0.0030	-0.0030	-0.0030	-0.0030	- 0.003	0.000
78.B	80.B	-0.0027	-0.0027	-0.0027	-0.0027	-0.0027	-0.0027	- 0.003	0.000
78.C	80.C	1.7616	1.4781	0.3645	0.3683	0.3683	-0.0006	0.000	5.304
80.A	81.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	- 0.001	0.000
80.B	81.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	- 0.001	0.000
80.C	81.C	0.6490	0.5446	0.1343	0.1357	0.1357	-0.0002	0.000	2.757
81.A	82.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	- 0.002	0.001
81.B	82.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	- 0.001	0.000
81.C	82.C	-0.0016	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	- 0.002	0.000
81.C	84.C	3.2213	2.7035	0.6691	0.6760	0.6760	0.0020	0.004	8.472
82.A	83.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	- 0.002	0.000
82.B	83.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	- 0.001	0.000
82.C	83.C	-0.0016	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	- 0.002	0.001
84.C	85.C	2.2669	1.9025	0.4708	0.4758	0.4758	0.0014	0.003	8.102
86.A	87.A	-0.0029	-0.0028	-0.0028	-0.0028	-0.0028	-0.0028	- 0.003	0.001
86.B	87.B	-0.0026	-0.0026	-0.0026	-0.0026	-0.0026	-0.0026	- 0.003	0.000
86.C	87.C	-0.0030	-0.0031	-0.0031	-0.0031	-0.0031	-0.0031	- 0.003	0.001
87.A	88.A	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	- 0.001	0.000
87.A	89.A	-0.0018	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	- 0.002	0.001
87.B	89.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	- 0.002	0.000
87.C	89.C	-0.0018	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	- 0.002	0.001
89.B	90.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	- 0.001	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
89.A	91.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	- 0.001	0.000
89.B	91.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	- 0.001	0.000
89.C	91.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	- 0.002	0.000
91.C	92.C	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	- 0.001	0.000
91.A	93.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	- 0.001	0.000
91.B	93.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	- 0.001	0.000
91.C	93.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	- 0.002	0.000
93.A	94.A	-0.0012	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	- 0.001	0.001
93.A	95.A	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	- 0.002	0.001
93.B	95.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	- 0.002	0.000
93.C	95.C	-0.0020	-0.0021	-0.0020	-0.0020	-0.0020	-0.0021	- 0.002	0.000
95.B	96.B	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	- 0.001	0.000
97.A	98.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	- 0.002	0.000
97.B	98.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	- 0.002	0.000
97.C	98.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	- 0.002	0.001
98.A	99.A	-0.0032	-0.0032	-0.0031	-0.0031	-0.0031	-0.0031	- 0.003	0.000
98.B	99.B	-0.0035	-0.0035	-0.0035	-0.0035	-0.0035	-0.0035	- 0.003	0.000
98.C	99.C	-0.0037	-0.0038	-0.0038	-0.0038	-0.0038	-0.0038	- 0.004	0.002
99.A	100.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	- 0.002	0.000
99.B	100.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	- 0.002	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
99.C	100.C	-0.0020	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	- 0.002	0.001
100.A	450.A	-0.0047	-0.0046	-0.0045	-0.0045	-0.0045	-0.0046	- 0.005	0.001
100.B	450.B	-0.0051	-0.0051	-0.0051	-0.0051	-0.0051	-0.0051	- 0.005	0.000
100.C	450.C	-0.0054	-0.0055	-0.0055	-0.0055	-0.0055	-0.0055	- 0.005	0.002
197.A	101.A	-0.0015	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	- 0.001	0.000
197.B	101.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	- 0.002	0.000
197.C	101.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	- 0.002	0.001
101.C	102.C	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	- 0.001	0.000
101.A	105.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	- 0.002	0.000
101.B	105.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	- 0.002	0.000
101.C	105.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	- 0.002	0.001
102.C	103.C	-0.0013	-0.0014	-0.0013	-0.0013	-0.0013	-0.0014	- 0.001	0.000
103.C	104.C	-0.0028	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	- 0.003	0.001
105.B	106.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	- 0.001	0.000
105.A	108.A	-0.0019	-0.0019	-0.0018	-0.0018	-0.0018	-0.0019	- 0.002	0.001
105.B	108.B	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	- 0.002	0.000
105.C	108.C	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	- 0.002	0.000
106.B	107.B	-0.0023	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	- 0.002	0.000
108.A	109.A	-0.0019	-0.0019	-0.0018	-0.0018	-0.0018	-0.0018	- 0.002	0.001
108.A	300.A	-0.0058	-0.0057	-0.0057	-0.0057	-0.0057	-0.0057	- 0.006	0.002

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
108.B	300.B	-0.0063	-0.0063	-0.0063	-0.0063	-0.0063	-0.0063	- 0.006	0.000
108.C	300.C	-0.0067	-0.0069	-0.0069	-0.0069	-0.0069	-0.0069	- 0.007	0.002
109.A	110.A	-0.0013	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	- 0.001	0.000
110.A	111.A	-0.0024	-0.0024	-0.0023	-0.0023	-0.0023	-0.0023	- 0.002	0.001
110.A	112.A	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	- 0.001	0.000
112.A	113.A	-0.0022	-0.0022	-0.0021	-0.0021	-0.0021	-0.0021	- 0.002	0.001
113.A	114.A	-0.0014	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	- 0.001	0.000
135.A	35.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	- 0.002	0.000
135.B	35.B	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	- 0.002	0.000
135.C	35.C	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	- 0.002	0.001
152.A	52.A	-0.0023	-0.0023	-0.0024	-0.0024	-0.0024	-0.0025	- 0.003	0.003
152.B	52.B	-0.0028	-0.0028	-0.0028	-0.0028	-0.0028	-0.0028	- 0.003	0.000
152.C	52.C	1.5642	1.3451	0.3199	0.3233	0.3233	-0.0001	0.001	13.559
160r.A	67.A	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0022	- 0.002	0.000
160r.B	67.B	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	- 0.002	0.000
160r.C	67.C	1.2978	1.0889	0.2685	0.2713	0.2713	-0.0005	0.000	2.813

Table K.3: M^P values obtained for Scenario S2

Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
149.A	1.A	-0.0005	-0.0005	-0.0005	-0.0004	-0.0004	-0.0005	-0.0005	0.000
149.B	1.B	0.0007	0.0007	0.0007	0.0005	0.0004	0.0007	0.0007	0.000
149.C	1.C	0.9940	0.8236	0.9988	0.3091	0.0927	0.9940	0.9940	2.742
1.B	2.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
1.C	3.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
1.A	7.A	-0.0004	-0.0003	-0.0004	-0.0003	-0.0003	-0.0004	-0.0004	0.001
1.B	7.B	0.0005	0.0005	0.0005	0.0004	0.0003	0.0005	0.0005	0.002
1.C	7.C	0.7455	0.6177	0.7491	0.2318	0.0696	0.7455	0.7455	5.813
3.C	4.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
3.C	5.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
5.C	6.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
7.A	8.A	-0.0003	-0.0002	-0.0002	-0.0002	-0.0002	-0.0003	-0.0003	0.001
7.B	8.B	0.0004	0.0003	0.0004	0.0002	0.0002	0.0004	0.0004	0.001
7.C	8.C	0.4970	0.4118	0.4994	0.1546	0.0464	0.4970	0.4970	4.074
8.B	12.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
8.A	9.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
8.A	13.A	-0.0004	-0.0003	-0.0004	-0.0003	-0.0003	-0.0004	-0.0004	0.001
8.B	13.B	0.0005	0.0005	0.0005	0.0004	0.0003	0.0005	0.0005	0.002
8.C	13.C	0.7455	0.6177	0.7491	0.2318	0.0696	0.7455	0.7455	5.848
9r.A	14.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
13.C	34.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
13.A	18.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
13.B	18.B	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
13.C	18.C	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.000
14.A	11.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
14.A	10.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
15.C	16.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
15.C	17.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
18.A	19.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
18.A	21.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
18.B	21.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
18.C	21.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
19.A	20.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
21.B	22.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
21.A	23.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
21.B	23.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
21.C	23.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
23.C	24.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
23.A	25.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
23.B	25.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
23.C	25.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
25r.A	26.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
25r.C	26.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
25.A	28.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
25.B	28.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
25.C	28.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
26.A	27.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
26.C	27.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
26.C	31.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
27.A	33.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
28.A	29.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
28.B	29.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
28.C	29.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
29.A	30.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
29.B	30.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
29.C	30.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
30.A	250.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
30.B	250.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
30.C	250.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
31.C	32.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
34.C	15.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
35.A	36.A	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	0.000
35.B	36.B	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
35.A	40.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
35.B	40.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
35.C	40.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
36.A	37.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
36.B	38.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
38.B	39.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
40.C	41.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
40.A	42.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
40.B	42.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
40.C	42.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
42.B	43.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
42.A	44.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
42.B	44.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
42.C	44.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
44.A	45.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
44.A	47.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
44.B	47.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
44.C	47.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
45.A	46.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
47.A	48.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
47.B	48.B	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	0.000
47.C	48.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
47.A	49.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
47.B	49.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
47.C	49.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
49.A	50.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
49.B	50.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
49.C	50.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
50.A	51.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
50.B	51.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
50.C	51.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
51.A	151.A	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.000
51.B	151.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
51.C	151.C	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
52.A	53.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
52.B	53.B	0.0003	0.0003	0.0003	0.0002	0.0002	0.0003	0.0003	0.001
52.C	53.C	0.4970	0.4118	0.4994	0.1546	0.0464	0.4970	0.4970	4.108
53.A	54.A	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
53.B	54.B	0.0002	0.0002	0.0002	0.0001	0.0001	0.0002	0.0002	0.001
53.C	54.C	0.3106	0.2574	0.3121	0.0966	0.0290	0.3106	0.3106	2.695
54.A	55.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
54.B	55.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
54.C	55.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
54.A	57.A	0.0000	0.0001	0.0001	0.0001	0.0001	0.0000	0.0000	0.001
54.B	57.B	0.0000	0.0000	0.0000	-0.0001	-0.0002	0.0000	0.0000	0.001
54.C	57.C	0.8794	0.7287	0.8836	0.2735	0.0821	0.8794	0.8794	6.536
55.A	56.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
55.B	56.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
55.C	56.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
57.B	58.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
57.A	60.A	0.0001	0.0001	0.0001	0.0002	0.0002	0.0001	0.0001	0.001
57.B	60.B	0.0000	0.0000	0.0000	-0.0003	-0.0005	0.0000	0.0000	0.002
57.C	60.C	1.8844	1.5614	1.8935	0.5861	0.1759	1.8844	1.8844	12.937
58.B	59.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
60.A	61.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
60.B	61.B	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
60.C	61.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
60.A	62.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
60.B	62.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
60.C	62.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
62.A	63.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
62.B	63.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
62.C	63.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
63.A	64.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
63.B	64.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
63.C	64.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
64.A	65.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
64.B	65.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
64.C	65.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
65.A	66.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
65.B	66.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
65.C	66.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
67.A	68.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
67.A	72.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
67.B	72.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
67.C	72.C	0.7459	0.6181	0.7495	0.2290	0.0679	0.7459	0.7459	3.026
67.A	97.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
67.B	97.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
67.C	97.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
68.A	69.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
69.A	70.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
70.A	71.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
72.C	73.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
72.A	76.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
72.B	76.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
72.C	76.C	0.5424	0.4495	0.5451	0.1666	0.0494	0.5424	0.5424	2.477
73.C	74.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
74.C	75.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
76.A	77.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
76.B	77.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
76.C	77.C	1.0845	0.8986	1.0898	0.3327	0.0983	1.0845	1.0845	4.523
76.A	86.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
76.B	86.B	-0.0007	-0.0007	-0.0007	-0.0006	-0.0006	-0.0007	-0.0007	0.000
76.C	86.C	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.001
77.A	78.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
77.B	78.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
77.C	78.C	0.2711	0.2246	0.2724	0.0832	0.0246	0.2711	0.2711	1.524
78.A	79.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
78.B	79.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
78.C	79.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
78.A	80.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
78.B	80.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
78.C	80.C	1.2878	1.0671	1.2941	0.3951	0.1167	1.2878	1.2878	5.638
80.A	81.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
80.B	81.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
80.C	81.C	0.4745	0.3932	0.4768	0.1456	0.0430	0.4745	0.4745	2.603
81.A	82.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
81.B	82.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
81.C	82.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
81.C	84.C	5.2142	4.3206	5.2395	1.6003	0.4735	5.2142	5.2142	19.321
82.A	83.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
82.B	83.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
82.C	83.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
84.C	85.C	3.6692	3.0404	3.6870	1.1261	0.3332	3.6692	3.6692	16.514
86.A	87.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
86.B	87.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
86.C	87.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
87.A	88.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
87.A	89.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
87.B	89.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
87.C	89.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
89.B	90.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
89.A	91.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
89.B	91.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
89.C	91.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
91.C	92.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
91.A	93.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
91.B	93.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
91.C	93.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
93.A	94.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
93.A	95.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
93.B	95.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
93.C	95.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0002	-0.0001	-0.0001	0.000
95.B	96.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
97.A	98.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
97.B	98.B	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	-0.0003	-0.0003	0.000
97.C	98.C	0.0002	0.0002	0.0002	0.0002	0.0001	0.0002	0.0002	0.000
98.A	99.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
98.B	99.B	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	0.000
98.C	99.C	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
99.A	100.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
99.B	100.B	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
99.C	100.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
100.A	450.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
100.B	450.B	-0.0008	-0.0008	-0.0008	-0.0007	-0.0007	-0.0008	-0.0008	0.001
100.C	450.C	0.0005	0.0005	0.0005	0.0004	0.0004	0.0005	0.0005	0.001

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
197.A	101.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
197.B	101.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
197.C	101.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
101.C	102.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
101.A	105.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
101.B	105.B	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	-0.0003	-0.0003	0.000
101.C	105.C	0.0002	0.0002	0.0002	0.0002	0.0001	0.0002	0.0002	0.000
102.C	103.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
103.C	104.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
105.B	106.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
105.A	108.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
105.B	108.B	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
105.C	108.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
106.B	107.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
108.A	109.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
108.A	300.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
108.B	300.B	-0.0010	-0.0009	-0.0010	-0.0009	-0.0009	-0.0010	-0.0010	0.001
108.C	300.C	0.0006	0.0006	0.0006	0.0006	0.0005	0.0006	0.0006	0.001
109.A	110.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
110.A	111.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
110.A	112.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
112.A	113.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
113.A	114.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
135.A	35.A	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.000
135.B	35.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
135.C	35.C	0.0004	0.0004	0.0004	0.0003	0.0003	0.0004	0.0004	0.000
152.A	52.A	-0.0005	-0.0004	-0.0004	-0.0004	-0.0004	-0.0005	-0.0005	0.001
152.B	52.B	0.0006	0.0006	0.0006	0.0004	0.0003	0.0006	0.0006	0.002
152.C	52.C	0.9940	0.8236	0.9988	0.3091	0.0927	0.9940	0.9940	7.572
160r.A	67.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
160r.B	67.B	0.0000	0.0000	0.0000	-0.0001	-0.0001	0.0000	0.0000	0.001
160r.C	67.C	0.9489	0.7863	0.9535	0.2911	0.0860	0.9489	0.9489	3.324

Table K.4: M^Q values obtained for Scenario S2

Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
149.A	1.A	-0.0031	-0.0030	-0.0031	-0.0028	-0.0027	-0.0031	-0.003	0.000
149.B	1.B	-0.0026	-0.0026	-0.0026	-0.0027	-0.0027	-0.0026	-0.003	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
149.C	1.C	2.2926	1.8993	2.3037	0.7114	0.2117	2.2926	2.293	6.331
1.B	2.B	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.001	0.000
1.C	3.C	-0.0011	-0.0010	-0.0011	-0.0010	-0.0010	-0.0011	-0.001	0.000
1.A	7.A	-0.0023	-0.0023	-0.0023	-0.0021	-0.0020	-0.0023	-0.002	0.003
1.B	7.B	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.002	0.001
1.C	7.C	1.7194	1.4245	1.7277	0.5336	0.1588	1.7194	1.719	13.422
3.C	4.C	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.001	0.000
3.C	5.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
5.C	6.C	-0.0011	-0.0010	-0.0011	-0.0010	-0.0010	-0.0011	-0.001	0.000
7.A	8.A	-0.0015	-0.0015	-0.0015	-0.0014	-0.0014	-0.0015	-0.002	0.002
7.B	8.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0014	-0.0013	-0.001	0.000
7.C	8.C	1.1463	0.9496	1.1518	0.3557	0.1059	1.1463	1.146	9.407
8.B	12.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
8.A	9.A	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
8.A	13.A	-0.0023	-0.0022	-0.0023	-0.0021	-0.0020	-0.0023	-0.002	0.003
8.B	13.B	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.002	0.001
8.C	13.C	1.7194	1.4244	1.7277	0.5335	0.1588	1.7194	1.719	13.503
9r.A	14.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
13.C	34.C	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.001	0.000
13.A	18.A	-0.0057	-0.0057	-0.0057	-0.0057	-0.0057	-0.0057	-0.006	0.000
13.B	18.B	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	-0.005	0.000
13.C	18.C	-0.0054	-0.0054	-0.0054	-0.0054	-0.0053	-0.0054	-0.005	0.000
14.A	11.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
14.A	10.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
15.C	16.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
15.C	17.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.001	0.000
18.A	19.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
18.A	21.A	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.002	0.000
18.B	21.B	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000
18.C	21.C	-0.0020	-0.0020	-0.0020	-0.0019	-0.0019	-0.0020	-0.002	0.000
19.A	20.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
21.B	22.B	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.002	0.000
21.A	23.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
21.B	23.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.001	0.000
21.C	23.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
23.C	24.C	-0.0024	-0.0023	-0.0024	-0.0023	-0.0023	-0.0024	-0.002	0.001
23.A	25.A	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
23.B	25.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
23.C	25.C	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000
25r.A	26.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000
25r.C	26.C	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
25.A	28.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
25.B	28.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
25.C	28.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
26.A	27.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
26.C	27.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
26.C	31.C	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
27.A	33.A	-0.0021	-0.0021	-0.0021	-0.0021	-0.0020	-0.0021	-0.002	0.000
28.A	29.A	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.002	0.000
28.B	29.B	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000
28.C	29.C	-0.0020	-0.0020	-0.0020	-0.0019	-0.0019	-0.0020	-0.002	0.000
29.A	30.A	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.002	0.000
29.B	30.B	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.002	0.000
29.C	30.C	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.002	0.000
30.A	250.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
30.B	250.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
30.C	250.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
31.C	32.C	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
34.C	15.C	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	0.000	0.000
35.A	36.A	-0.0033	-0.0033	-0.0033	-0.0034	-0.0034	-0.0033	-0.003	0.000
35.B	36.B	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.003	0.000
35.A	40.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
35.B	40.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
35.C	40.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.001	0.000
36.A	37.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
36.B	38.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
38.B	39.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
40.C	41.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
40.A	42.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
40.B	42.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
40.C	42.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.001	0.000
42.B	43.B	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.002	0.000
42.A	44.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
42.B	44.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
42.C	44.C	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
44.A	45.A	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.001	0.000
44.A	47.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
44.B	47.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
44.C	47.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.001	0.000
45.A	46.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
47.A	48.A	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.001	0.000
47.B	48.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
47.C	48.C	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
47.A	49.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
47.B	49.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.001	0.000
47.C	49.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
49.A	50.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
49.B	50.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.001	0.000
49.C	50.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
50.A	51.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
50.B	51.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.001	0.000
50.C	51.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
51.A	151.A	-0.0024	-0.0024	-0.0023	-0.0024	-0.0024	-0.0024	-0.002	0.000
51.B	151.B	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.003	0.000
51.C	151.C	-0.0033	-0.0033	-0.0033	-0.0032	-0.0032	-0.0033	-0.003	0.001
52.A	53.A	-0.0015	-0.0014	-0.0015	-0.0014	-0.0013	-0.0015	-0.001	0.001
52.B	53.B	-0.0013	-0.0013	-0.0013	-0.0014	-0.0014	-0.0013	-0.001	0.000
52.C	53.C	1.1461	0.9495	1.1517	0.3556	0.1058	1.1461	1.146	9.483
53.A	54.A	-0.0009	-0.0009	-0.0009	-0.0009	-0.0008	-0.0009	-0.001	0.001
53.B	54.B	-0.0008	-0.0008	-0.0008	-0.0008	-0.0009	-0.0008	-0.001	0.000
53.C	54.C	0.7163	0.5934	0.7198	0.2223	0.0661	0.7163	0.716	6.223
54.A	55.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0018	-0.0017	-0.002	0.000
54.B	55.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
54.C	55.C	-0.0017	-0.0017	-0.0017	-0.0016	-0.0016	-0.0017	-0.002	0.001
54.A	57.A	-0.0024	-0.0023	-0.0024	-0.0022	-0.0021	-0.0024	-0.002	0.002
54.B	57.B	-0.0021	-0.0021	-0.0021	-0.0022	-0.0022	-0.0021	-0.002	0.000
54.C	57.C	1.9734	1.6348	1.9830	0.6120	0.1818	1.9734	1.973	14.687
55.A	56.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0018	-0.0017	-0.002	0.000
55.B	56.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
55.C	56.C	-0.0017	-0.0017	-0.0017	-0.0016	-0.0016	-0.0017	-0.002	0.000
57.B	58.B	-0.0010	-0.0010	-0.0011	-0.0010	-0.0010	-0.0010	-0.001	0.000
57.A	60.A	-0.0050	-0.0050	-0.0050	-0.0047	-0.0046	-0.0050	-0.005	0.004
57.B	60.B	-0.0046	-0.0046	-0.0046	-0.0047	-0.0047	-0.0046	-0.005	0.001
57.C	60.C	4.2287	3.5031	4.2492	1.3115	0.3896	4.2287	4.229	29.071
58.B	59.B	-0.0010	-0.0010	-0.0011	-0.0010	-0.0010	-0.0010	-0.001	0.000
60.A	61.A	-0.0037	-0.0037	-0.0037	-0.0038	-0.0038	-0.0037	-0.004	0.001
60.B	61.B	-0.0036	-0.0036	-0.0036	-0.0035	-0.0035	-0.0036	-0.004	0.000
60.C	61.C	-0.0034	-0.0034	-0.0034	-0.0033	-0.0033	-0.0034	-0.003	0.000
60.A	62.A	-0.0150	-0.0150	-0.0150	-0.0152	-0.0153	-0.0150	-0.015	0.004
60.B	62.B	-0.0157	-0.0157	-0.0157	-0.0156	-0.0155	-0.0157	-0.016	0.003
60.C	62.C	-0.0166	-0.0165	-0.0166	-0.0161	-0.0158	-0.0166	-0.017	0.011
62.A	63.A	-0.0105	-0.0105	-0.0105	-0.0106	-0.0107	-0.0105	-0.010	0.000
62.B	63.B	-0.0110	-0.0110	-0.0110	-0.0109	-0.0109	-0.0110	-0.011	0.001

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
62.C	63.C	-0.0116	-0.0115	-0.0116	-0.0113	-0.0111	-0.0116	-0.012	0.007
63.A	64.A	-0.0210	-0.0210	-0.0210	-0.0213	-0.0215	-0.0210	-0.021	0.000
63.B	64.B	-0.0219	-0.0219	-0.0220	-0.0218	-0.0218	-0.0219	-0.022	0.002
63.C	64.C	-0.0233	-0.0230	-0.0232	-0.0225	-0.0222	-0.0233	-0.023	0.015
64.A	65.A	-0.0255	-0.0255	-0.0255	-0.0259	-0.0261	-0.0255	-0.025	0.000
64.B	65.B	-0.0266	-0.0266	-0.0267	-0.0265	-0.0264	-0.0266	-0.027	0.003
64.C	65.C	-0.0282	-0.0280	-0.0282	-0.0274	-0.0269	-0.0282	-0.028	0.018
65.A	66.A	-0.0195	-0.0195	-0.0195	-0.0198	-0.0199	-0.0195	-0.019	0.006
65.B	66.B	-0.0203	-0.0204	-0.0204	-0.0203	-0.0202	-0.0203	-0.020	0.002
65.C	66.C	-0.0216	-0.0214	-0.0215	-0.0209	-0.0206	-0.0216	-0.022	0.014
67.A	68.A	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.001	0.000
67.A	72.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
67.B	72.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
67.C	72.C	1.6735	1.3864	1.6816	0.5124	0.1503	1.6735	1.673	6.798
67.A	97.A	-0.0014	-0.0014	-0.0014	-0.0015	-0.0015	-0.0014	-0.001	0.000
67.B	97.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
67.C	97.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
68.A	69.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.001	0.000
69.A	70.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0014	-0.0013	-0.001	0.000
70.A	71.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.001	0.000
72.C	73.C	-0.0012	-0.0011	-0.0012	-0.0011	-0.0011	-0.0012	-0.001	0.001
72.A	76.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
72.B	76.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
72.C	76.C	1.2170	1.0083	1.2230	0.3726	0.1093	1.2170	1.217	5.564
73.C	74.C	-0.0015	-0.0015	-0.0015	-0.0014	-0.0014	-0.0015	-0.001	0.001
74.C	75.C	-0.0017	-0.0017	-0.0017	-0.0016	-0.0016	-0.0017	-0.002	0.001
76.A	77.A	-0.0025	-0.0025	-0.0025	-0.0026	-0.0026	-0.0025	-0.003	0.000
76.B	77.B	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.002	0.000
76.C	77.C	2.4339	2.0164	2.4458	0.7452	0.2186	2.4339	2.434	10.160
76.A	86.A	-0.0040	-0.0040	-0.0040	-0.0041	-0.0041	-0.0040	-0.004	0.001
76.B	86.B	-0.0044	-0.0044	-0.0044	-0.0044	-0.0044	-0.0044	-0.004	0.000
76.C	86.C	-0.0048	-0.0048	-0.0048	-0.0047	-0.0047	-0.0048	-0.005	0.002
77.A	78.A	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.001	0.000
77.B	78.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.001	0.000
77.C	78.C	0.6085	0.5041	0.6115	0.1863	0.0546	0.6085	0.608	3.424
78.A	79.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
78.B	79.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
78.C	79.C	-0.0016	-0.0016	-0.0016	-0.0015	-0.0015	-0.0016	-0.002	0.001
78.A	80.A	-0.0030	-0.0030	-0.0030	-0.0030	-0.0030	-0.0030	-0.003	0.000
78.B	80.B	-0.0027	-0.0027	-0.0027	-0.0027	-0.0027	-0.0027	-0.003	0.000
78.C	80.C	2.8902	2.3944	2.9043	0.8848	0.2596	2.8902	2.890	12.665

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
80.A	81.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.001	0.000
80.B	81.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
80.C	81.C	1.0648	0.8821	1.0700	0.3260	0.0956	1.0648	1.065	5.846
81.A	82.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
81.B	82.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
81.C	82.C	-0.0018	-0.0018	-0.0018	-0.0017	-0.0017	-0.0018	-0.002	0.002
81.C	84.C	5.2830	4.3771	5.3087	1.6195	0.4772	5.2830	5.283	19.586
82.A	83.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.001
82.B	83.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
82.C	83.C	-0.0018	-0.0018	-0.0018	-0.0017	-0.0017	-0.0018	-0.002	0.002
84.C	85.C	3.7176	3.0801	3.7357	1.1396	0.3358	3.7176	3.718	16.740
86.A	87.A	-0.0028	-0.0028	-0.0028	-0.0029	-0.0029	-0.0028	-0.003	0.001
86.B	87.B	-0.0026	-0.0026	-0.0026	-0.0026	-0.0026	-0.0026	-0.003	0.000
86.C	87.C	-0.0031	-0.0031	-0.0031	-0.0031	-0.0030	-0.0031	-0.003	0.000
87.A	88.A	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.001	0.000
87.A	89.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0018	-0.0017	-0.002	0.000
87.B	89.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
87.C	89.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.001
89.B	90.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
89.A	91.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
89.B	91.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
89.C	91.C	-0.0016	-0.0015	-0.0016	-0.0015	-0.0015	-0.0016	-0.002	0.001
91.C	92.C	-0.0013	-0.0013	-0.0013	-0.0012	-0.0012	-0.0013	-0.001	0.001
91.A	93.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
91.B	93.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
91.C	93.C	-0.0016	-0.0015	-0.0016	-0.0015	-0.0015	-0.0016	-0.002	0.001
93.A	94.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.001	0.001
93.A	95.A	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.001
93.B	95.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
93.C	95.C	-0.0021	-0.0021	-0.0021	-0.0020	-0.0020	-0.0021	-0.002	0.001
95.B	96.B	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.001	0.000
97.A	98.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
97.B	98.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
97.C	98.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0018	-0.0019	-0.002	0.000
98.A	99.A	-0.0032	-0.0032	-0.0032	-0.0032	-0.0032	-0.0032	-0.003	0.000
98.B	99.B	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.003	0.000
98.C	99.C	-0.0038	-0.0037	-0.0038	-0.0037	-0.0037	-0.0038	-0.004	0.001
99.A	100.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0018	-0.0017	-0.002	0.000
99.B	100.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
99.C	100.C	-0.0021	-0.0020	-0.0020	-0.0020	-0.0020	-0.0021	-0.002	0.001
100.A	450.A	-0.0046	-0.0046	-0.0046	-0.0046	-0.0047	-0.0046	-0.005	0.001

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
100.B	450.B	-0.0050	-0.0050	-0.0050	-0.0050	-0.0050	-0.0050	-0.005	0.000
100.C	450.C	-0.0055	-0.0054	-0.0055	-0.0054	-0.0054	-0.0055	-0.005	0.001
197.A	101.A	-0.0014	-0.0014	-0.0014	-0.0015	-0.0015	-0.0014	-0.001	0.000
197.B	101.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
197.C	101.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
101.C	102.C	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
101.A	105.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
101.B	105.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
101.C	105.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0018	-0.0019	-0.002	0.000
102.C	103.C	-0.0014	-0.0013	-0.0014	-0.0013	-0.0013	-0.0014	-0.001	0.000
103.C	104.C	-0.0029	-0.0029	-0.0029	-0.0029	-0.0028	-0.0029	-0.003	0.001
105.B	106.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
105.A	108.A	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
105.B	108.B	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.002	0.000
105.C	108.C	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.002	0.000
106.B	107.B	-0.0024	-0.0024	-0.0024	-0.0024	-0.0023	-0.0024	-0.002	0.000
108.A	109.A	-0.0018	-0.0018	-0.0018	-0.0019	-0.0019	-0.0018	-0.002	0.001
108.A	300.A	-0.0057	-0.0057	-0.0057	-0.0058	-0.0058	-0.0057	-0.006	0.001
108.B	300.B	-0.0063	-0.0063	-0.0063	-0.0062	-0.0062	-0.0063	-0.006	0.000
108.C	300.C	-0.0068	-0.0068	-0.0068	-0.0067	-0.0067	-0.0068	-0.007	0.002
109.A	110.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0013	-0.0012	-0.001	0.000
110.A	111.A	-0.0023	-0.0023	-0.0023	-0.0024	-0.0024	-0.0023	-0.002	0.000
110.A	112.A	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.001	0.000
112.A	113.A	-0.0021	-0.0021	-0.0021	-0.0022	-0.0022	-0.0021	-0.002	0.001
113.A	114.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0014	-0.0013	-0.001	0.000
135.A	35.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000
135.B	35.B	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.002	0.000
135.C	35.C	-0.0025	-0.0024	-0.0024	-0.0024	-0.0024	-0.0025	-0.002	0.000
152.A	52.A	-0.0029	-0.0029	-0.0029	-0.0028	-0.0027	-0.0029	-0.003	0.003
152.B	52.B	-0.0027	-0.0027	-0.0027	-0.0027	-0.0027	-0.0027	-0.003	0.001
152.C	52.C	2.2923	1.8990	2.3033	0.7113	0.2116	2.2923	2.292	17.481
160r.A	67.A	-0.0024	-0.0024	-0.0024	-0.0023	-0.0023	-0.0024	-0.002	0.001
160r.B	67.B	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.002	0.000
160r.C	67.C	2.1300	1.7645	2.1403	0.6521	0.1913	2.1299	2.130	7.468

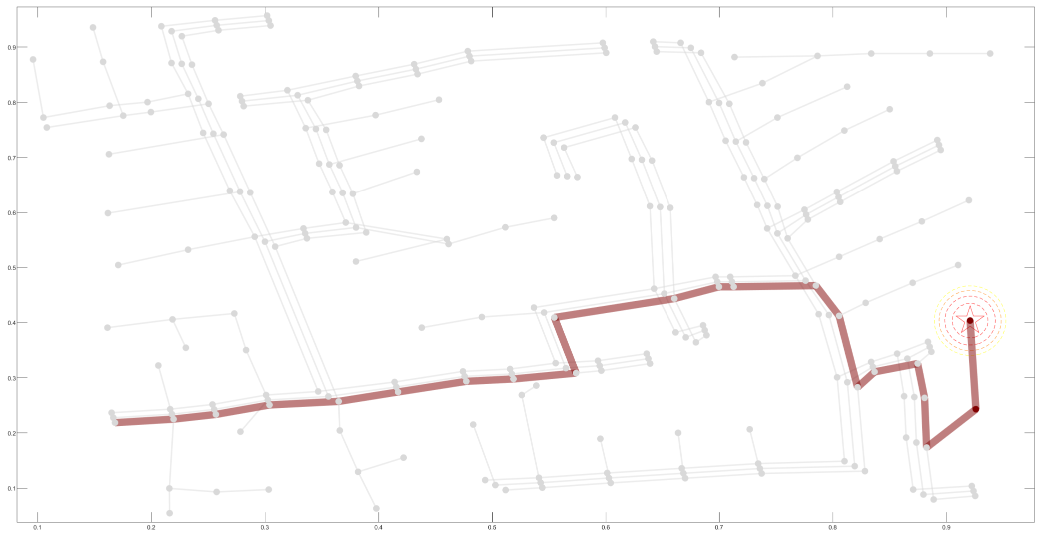

Figure K.2: Representation of M^P and M^Q values obtained for values higher than 0.5 when there is a single-phase perturbation at node 85, phase C. Photovoltaic generation with a rated power of 400 kVA at unity power factor. (Scenario S2)

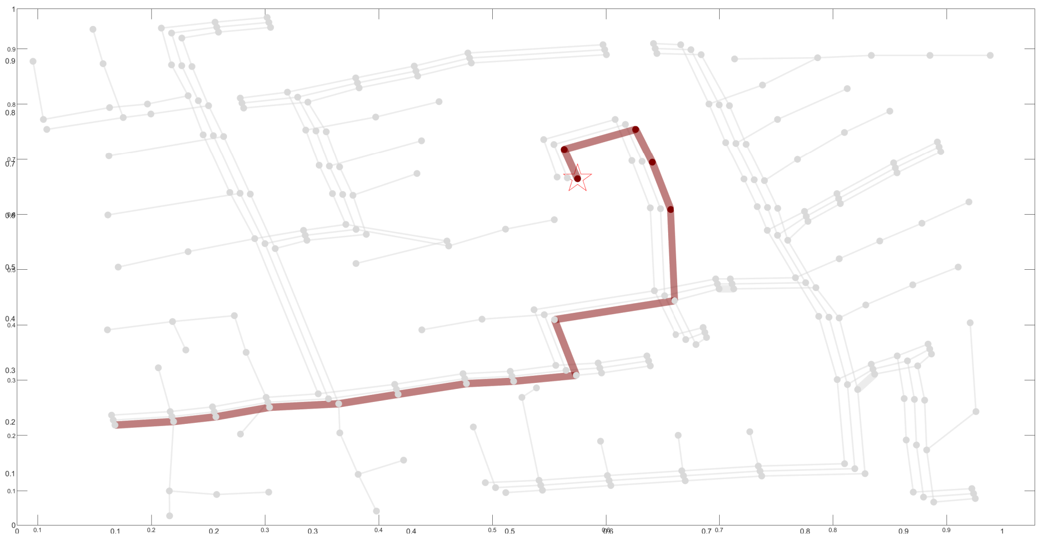

Figure K.3: Representation of M^P and M^Q values obtained for values higher than 0.5 when there is a single-phase perturbation at node 66, phase C. Load consumption with a rated power of 400 kW and 200 kVAr. (Scenario S3)

Table K.5: M^P values obtained for Scenario S3

Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
149.A	1.A	-0.0002	-0.0002	-0.0003	-0.0003	-0.0003	-0.0004	-0.0004	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
149.B	1.B	-0.0002	-0.0002	0.0000	0.0000	0.0000	0.0002	0.0002	0.000
149.C	1.C	0.6587	0.5703	0.1382	0.1397	0.1397	0.0011	0.0015	3.453
1.B	2.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
1.C	3.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
1.A	7.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0003	-0.0003	0.001
1.B	7.B	-0.0002	-0.0001	0.0000	0.0000	0.0000	0.0001	0.0001	0.002
1.C	7.C	0.4940	0.4277	0.1037	0.1048	0.1048	0.0008	0.0011	4.399
3.C	4.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
3.C	5.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
5.C	6.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
7.A	8.A	-0.0001	-0.0001	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.001
7.B	8.B	-0.0001	-0.0001	0.0000	0.0000	0.0000	0.0001	0.0001	0.002
7.C	8.C	0.3293	0.2852	0.0691	0.0698	0.0698	0.0006	0.0007	3.037
8.B	12.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
8.A	9.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
8.A	13.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0003	-0.0003	0.001
8.B	13.B	-0.0001	-0.0001	0.0000	0.0000	0.0000	0.0001	0.0001	0.002
8.C	13.C	0.4940	0.4277	0.1037	0.1048	0.1048	0.0008	0.0011	4.385
9r.A	14.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
13.C	34.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
13.A	18.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
13.B	18.B	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
13.C	18.C	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0007	-0.0007	0.000
14.A	11.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
14.A	10.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
15.C	16.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
15.C	17.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
18.A	19.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
18.A	21.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
18.B	21.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
18.C	21.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
19.A	20.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
21.B	22.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
21.A	23.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
21.B	23.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
21.C	23.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
23.C	24.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
23.A	25.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
23.B	25.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
23.C	25.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	-0.0002	0.000
25r.A	26.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
25r.C	26.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
25.A	28.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
25.B	28.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
25.C	28.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
26.A	27.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
26.C	27.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
26.C	31.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
27.A	33.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
28.A	29.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
28.B	29.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
28.C	29.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
29.A	30.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
29.B	30.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
29.C	30.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
30.A	250.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
30.B	250.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
30.C	250.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
31.C	32.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
34.C	15.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
35.A	36.A	-0.0006	-0.0006	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	0.000
35.B	36.B	0.0006	0.0006	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
35.A	40.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
35.B	40.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
35.C	40.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
36.A	37.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
36.B	38.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
38.B	39.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
40.C	41.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
40.A	42.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
40.B	42.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
40.C	42.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
42.B	43.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
42.A	44.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
42.B	44.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
42.C	44.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
44.A	45.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
44.A	47.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
44.B	47.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
44.C	47.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
45.A	46.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
47.A	48.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
47.B	48.B	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	0.000
47.C	48.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
47.A	49.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
47.B	49.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
47.C	49.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
49.A	50.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
49.B	50.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
49.C	50.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
50.A	51.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
50.B	51.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
50.C	51.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
51.A	151.A	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.000
51.B	151.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
51.C	151.C	0.0004	0.0004	0.0004	0.0004	0.0004	0.0005	0.0005	0.000
52.A	53.A	-0.0001	-0.0001	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
52.B	53.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.001
52.C	53.C	0.3293	0.2852	0.0691	0.0698	0.0698	0.0006	0.0007	3.046
53.A	54.A	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
53.B	54.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.001
53.C	54.C	0.2058	0.1782	0.0432	0.0436	0.0436	0.0003	0.0005	1.998
54.A	55.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	-0.0002	0.000
54.B	55.B	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.000
54.C	55.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
54.A	57.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.001
54.B	57.B	-0.0006	-0.0006	-0.0005	-0.0005	-0.0005	-0.0003	-0.0003	0.002
54.C	57.C	0.5829	0.5046	0.1224	0.1236	0.1236	0.0010	0.0013	5.050
55.A	56.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	-0.0002	0.000
55.B	56.B	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.000
55.C	56.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
57.B	58.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
57.A	60.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0003	0.0003	0.002
57.B	60.B	-0.0013	-0.0012	-0.0010	-0.0010	-0.0010	-0.0007	-0.0007	0.005
57.C	60.C	1.2489	1.0812	0.2622	0.2649	0.2649	0.0022	0.0029	9.865
58.B	59.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
60.A	61.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
60.B	61.B	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
60.C	61.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
60.A	62.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0000	0.001
60.B	62.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.0000	0.0000	0.001
60.C	62.C	1.3562	1.1741	0.2843	0.2872	0.2872	0.0020	0.0027	11.528
62.A	63.A	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.001

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
62.B	63.B	-0.0001	-0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
62.C	63.C	0.9494	0.8219	0.1990	0.2011	0.2011	0.0014	0.0019	8.626
63.A	64.A	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.001
63.B	64.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.0000	0.0000	0.000
63.C	64.C	1.8988	1.6438	0.3981	0.4022	0.4022	0.0028	0.0038	16.417
64.A	65.A	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.001
64.B	65.B	-0.0001	-0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
64.C	65.C	2.3058	1.9961	0.4834	0.4884	0.4884	0.0034	0.0046	20.229
65.A	66.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
65.B	66.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
65.C	66.C	1.7633	1.5265	0.3697	0.3735	0.3735	0.0026	0.0035	16.434
67.A	68.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
67.A	72.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
67.B	72.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
67.C	72.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
67.A	97.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
67.B	97.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
67.C	97.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
68.A	69.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
69.A	70.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
70.A	71.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
72.C	73.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
72.A	76.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
72.B	76.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
72.C	76.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
73.C	74.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
74.C	75.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
76.A	77.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
76.B	77.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
76.C	77.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
76.A	86.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
76.B	86.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
76.C	86.C	0.0003	0.0003	0.0004	0.0004	0.0004	0.0004	0.0004	0.001
77.A	78.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
77.B	78.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
77.C	78.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
78.A	79.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
78.B	79.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
78.C	79.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
78.A	80.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
78.B	80.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
78.C	80.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	-0.0002	0.000
80.A	81.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
80.B	81.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
80.C	81.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
81.A	82.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
81.B	82.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
81.C	82.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
81.C	84.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
82.A	83.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
82.B	83.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
82.C	83.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
84.C	85.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
86.A	87.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
86.B	87.B	-0.0001	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
86.C	87.C	-0.0003	-0.0003	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
87.A	88.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
87.A	89.A	0.0002	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
87.B	89.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
87.C	89.C	-0.0002	-0.0002	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
89.B	90.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
89.A	91.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
89.B	91.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
89.C	91.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
91.C	92.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
91.A	93.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
91.B	93.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
91.C	93.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
93.A	94.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
93.A	95.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
93.B	95.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
93.C	95.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
95.B	96.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
97.A	98.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
97.B	98.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
97.C	98.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
98.A	99.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
98.B	99.B	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	0.001
98.C	99.C	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
99.A	100.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
99.B	100.B	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
99.C	100.C	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
100.A	450.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
100.B	450.B	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.001
100.C	450.C	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.001
197.A	101.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
197.B	101.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
197.C	101.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
101.C	102.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
101.A	105.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
101.B	105.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
101.C	105.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
102.C	103.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
103.C	104.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
105.B	106.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
105.A	108.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
105.B	108.B	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
105.C	108.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
106.B	107.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
108.A	109.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
108.A	300.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
108.B	300.B	-0.0008	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.001
108.C	300.C	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.001
109.A	110.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
110.A	111.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
110.A	112.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
112.A	113.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
113.A	114.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
135.A	35.A	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.000
135.B	35.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
135.C	35.C	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
152.A	52.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0004	-0.0004	0.001
152.B	52.B	-0.0001	-0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.002
152.C	52.C	0.6587	0.5703	0.1382	0.1397	0.1397	0.0011	0.0015	5.631
160r.A	67.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
160r.B	67.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
160r.C	67.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000

Table K.6: M^Q values obtained for Scenario S3

Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
149.A	1.A	-0.0002	-0.0002	-0.0003	-0.0003	-0.0003	-0.0004	0.000	0.000
149.B	1.B	-0.0002	-0.0002	0.0000	0.0000	0.0000	0.0002	0.000	0.000
149.C	1.C	0.6587	0.5703	0.1382	0.1397	0.1397	0.0011	0.001	3.453
1.B	2.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
1.C	3.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
1.A	7.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0003	0.000	0.001
1.B	7.B	-0.0002	-0.0001	0.0000	0.0000	0.0000	0.0001	0.000	0.002
1.C	7.C	0.4940	0.4277	0.1037	0.1048	0.1048	0.0008	0.001	4.399
3.C	4.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
3.C	5.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
5.C	6.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
7.A	8.A	-0.0001	-0.0001	-0.0002	-0.0002	-0.0002	-0.0002	0.000	0.001
7.B	8.B	-0.0001	-0.0001	0.0000	0.0000	0.0000	0.0001	0.000	0.002
7.C	8.C	0.3293	0.2852	0.0691	0.0698	0.0698	0.0006	0.001	3.037
8.B	12.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
8.A	9.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
8.A	13.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0003	0.000	0.001
8.B	13.B	-0.0001	-0.0001	0.0000	0.0000	0.0000	0.0001	0.000	0.002
8.C	13.C	0.4940	0.4277	0.1037	0.1048	0.1048	0.0008	0.001	4.385
9r.A	14.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
13.C	34.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
13.A	18.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000	0.000
13.B	18.B	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000	0.000
13.C	18.C	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0007	-0.001	0.000
14.A	11.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
14.A	10.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
15.C	16.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
15.C	17.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
18.A	19.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
18.A	21.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000	0.000
18.B	21.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000	0.000
18.C	21.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000	0.000
19.A	20.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
21.B	22.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
21.A	23.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000	0.000
21.B	23.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000	0.000
21.C	23.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000	0.000
23.C	24.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
23.A	25.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000	0.000
23.B	25.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
23.C	25.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	0.000	0.000
25r.A	26.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000	0.000
25r.C	26.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000	0.000
25.A	28.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000	0.000
25.B	28.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000	0.000
25.C	28.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000	0.000
26.A	27.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000	0.000
26.C	27.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000	0.000
26.C	31.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
27.A	33.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
28.A	29.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000	0.000
28.B	29.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000	0.000
28.C	29.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000	0.000
29.A	30.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000	0.000
29.B	30.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000	0.000
29.C	30.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000	0.000
30.A	250.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000	0.000
30.B	250.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000	0.000
30.C	250.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000	0.000
31.C	32.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
34.C	15.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
35.A	36.A	-0.0006	-0.0006	-0.0005	-0.0005	-0.0005	-0.0005	-0.001	0.000
35.B	36.B	0.0006	0.0006	0.0005	0.0005	0.0005	0.0005	0.001	0.000
35.A	40.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000	0.000
35.B	40.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000	0.000
35.C	40.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000	0.000
36.A	37.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
36.B	38.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
38.B	39.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
40.C	41.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
40.A	42.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000	0.000
40.B	42.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000	0.000
40.C	42.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000	0.000
42.B	43.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
42.A	44.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000	0.000
42.B	44.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000	0.000
42.C	44.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000	0.000
44.A	45.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
44.A	47.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000	0.000
44.B	47.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000	0.000
44.C	47.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
45.A	46.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
47.A	48.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000	0.000
47.B	48.B	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	0.000	0.000
47.C	48.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000	0.000
47.A	49.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000	0.000
47.B	49.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.001	0.000
47.C	49.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000	0.000
49.A	50.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000	0.000
49.B	50.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.001	0.000
49.C	50.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000	0.000
50.A	51.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000	0.000
50.B	51.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.001	0.000
50.C	51.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000	0.000
51.A	151.A	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.001	0.000
51.B	151.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
51.C	151.C	0.0004	0.0004	0.0004	0.0004	0.0004	0.0005	0.000	0.000
52.A	53.A	-0.0001	-0.0001	-0.0002	-0.0002	-0.0002	-0.0002	0.000	0.000
52.B	53.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.000	0.001
52.C	53.C	0.3293	0.2852	0.0691	0.0698	0.0698	0.0006	0.001	3.046
53.A	54.A	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000	0.000
53.B	54.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.000	0.001
53.C	54.C	0.2058	0.1782	0.0432	0.0436	0.0436	0.0003	0.000	1.998
54.A	55.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	0.000	0.000
54.B	55.B	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.000	0.000
54.C	55.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000	0.000
54.A	57.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.000	0.001
54.B	57.B	-0.0006	-0.0006	-0.0005	-0.0005	-0.0005	-0.0003	0.000	0.002
54.C	57.C	0.5829	0.5046	0.1224	0.1236	0.1236	0.0010	0.001	5.050
55.A	56.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	0.000	0.000
55.B	56.B	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.000	0.000
55.C	56.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000	0.000
57.B	58.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
57.A	60.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0003	0.000	0.002
57.B	60.B	-0.0013	-0.0012	-0.0010	-0.0010	-0.0010	-0.0007	-0.001	0.005
57.C	60.C	1.2489	1.0812	0.2622	0.2649	0.2649	0.0022	0.003	9.865
58.B	59.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
60.A	61.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000	0.000
60.B	61.B	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.000	0.000
60.C	61.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000	0.000
60.A	62.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.000	0.001
60.B	62.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.0000	0.000	0.001

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
60.C	62.C	1.3562	1.1741	0.2843	0.2872	0.2872	0.0020	0.003	11.528
62.A	63.A	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.000	0.001
62.B	63.B	-0.0001	-0.0001	0.0000	0.0000	0.0000	0.0000	0.000	0.000
62.C	63.C	0.9494	0.8219	0.1990	0.2011	0.2011	0.0014	0.002	8.626
63.A	64.A	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.000	0.001
63.B	64.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.0000	0.000	0.000
63.C	64.C	1.8988	1.6438	0.3981	0.4022	0.4022	0.0028	0.004	16.417
64.A	65.A	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.000	0.001
64.B	65.B	-0.0001	-0.0001	0.0000	0.0000	0.0000	0.0000	0.000	0.000
64.C	65.C	2.3058	1.9961	0.4834	0.4884	0.4884	0.0034	0.005	20.229
65.A	66.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
65.B	66.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
65.C	66.C	1.7633	1.5265	0.3697	0.3735	0.3735	0.0026	0.004	16.434
67.A	68.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
67.A	72.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000	0.000
67.B	72.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000	0.000
67.C	72.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000	0.000
67.A	97.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000	0.000
67.B	97.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000	0.000
67.C	97.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000	0.000
68.A	69.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
69.A	70.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
70.A	71.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
72.C	73.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
72.A	76.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000	0.000
72.B	76.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000	0.000
72.C	76.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000	0.000
73.C	74.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
74.C	75.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
76.A	77.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000	0.000
76.B	77.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000	0.000
76.C	77.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000	0.000
76.A	86.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000	0.000
76.B	86.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.001	0.000
76.C	86.C	0.0003	0.0003	0.0004	0.0004	0.0004	0.0004	0.000	0.001
77.A	78.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000	0.000
77.B	78.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
77.C	78.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000	0.000
78.A	79.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000	0.000
78.B	79.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000	0.000
78.C	79.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
78.A	80.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000	0.000
78.B	80.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000	0.000
78.C	80.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	0.000	0.000
80.A	81.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000	0.000
80.B	81.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000	0.000
80.C	81.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000	0.000
81.A	82.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000	0.000
81.B	82.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000	0.000
81.C	82.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000	0.000
81.C	84.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
82.A	83.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000	0.000
82.B	83.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000	0.000
82.C	83.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000	0.000
84.C	85.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
86.A	87.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000	0.000
86.B	87.B	-0.0001	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000	0.000
86.C	87.C	-0.0003	-0.0003	-0.0002	-0.0002	-0.0002	-0.0002	0.000	0.000
87.A	88.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
87.A	89.A	0.0002	0.0003	0.0002	0.0002	0.0002	0.0002	0.000	0.000
87.B	89.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000	0.000
87.C	89.C	-0.0002	-0.0002	-0.0001	-0.0001	-0.0001	-0.0001	0.000	0.000
89.B	90.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
89.A	91.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000	0.000
89.B	91.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000	0.000
89.C	91.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000	0.000
91.C	92.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
91.A	93.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000	0.000
91.B	93.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000	0.000
91.C	93.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000	0.000
93.A	94.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
93.A	95.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000	0.000
93.B	95.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000	0.000
93.C	95.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000	0.000
95.B	96.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
97.A	98.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000	0.000
97.B	98.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000	0.000
97.C	98.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000	0.000
98.A	99.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000	0.000
98.B	99.B	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	0.000	0.001
98.C	99.C	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000	0.000
99.A	100.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
99.B	100.B	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000	0.000
99.C	100.C	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.000	0.000
100.A	450.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000	0.000
100.B	450.B	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.001	0.001
100.C	450.C	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000	0.001
197.A	101.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000	0.000
197.B	101.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000	0.000
197.C	101.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000	0.000
101.C	102.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
101.A	105.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000	0.000
101.B	105.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000	0.000
101.C	105.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000	0.000
102.C	103.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
103.C	104.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
105.B	106.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
105.A	108.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000	0.000
105.B	108.B	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000	0.000
105.C	108.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000	0.000
106.B	107.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
108.A	109.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
108.A	300.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000	0.000
108.B	300.B	-0.0008	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.001
108.C	300.C	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.001
109.A	110.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
110.A	111.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
110.A	112.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
112.A	113.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
113.A	114.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
135.A	35.A	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.001	0.000
135.B	35.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
135.C	35.C	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000	0.000
152.A	52.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0004	0.000	0.001
152.B	52.B	-0.0001	-0.0001	0.0001	0.0001	0.0001	0.0002	0.000	0.002
152.C	52.C	0.6587	0.5703	0.1382	0.1397	0.1397	0.0011	0.001	5.631
160r.A	67.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000	0.000
160r.B	67.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000	0.000
160r.C	67.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000	0.000

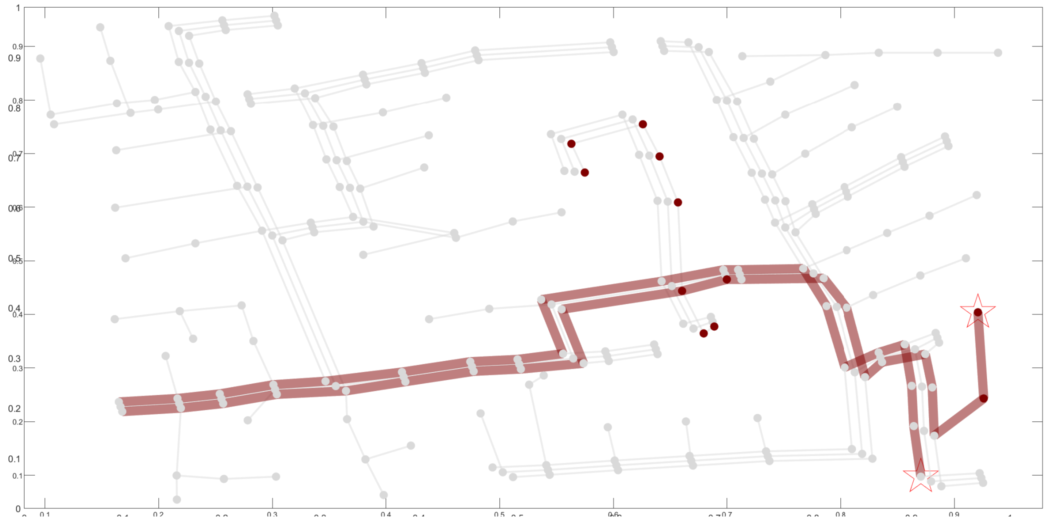

Figure K.4: Representation of M^P and M^Q values obtained for values higher than 0.5 when there is a two-phase perturbation at nodes 82, phase A and 85, phase C. Load consumption with a rated power of 400 kW and 200 kVAr. (Scenario S4)

Table K.7: M^P values obtained for Scenario S4

Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
149.A	1.A	0.0365	0.0336	0.0110	0.0110	0.0110	-0.0003	-0.0002	0.167
149.B	1.B	-0.0001	0.0000	0.0001	0.0001	0.0001	0.0002	0.0002	0.000
149.C	1.C	1.0354	0.8930	0.2157	0.2179	0.2179	0.0016	0.0022	4.739
1.B	2.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
1.C	3.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
1.A	7.A	0.0273	0.0252	0.0082	0.0083	0.0083	-0.0002	-0.0002	0.221
1.B	7.B	0.0000	0.0000	0.0001	0.0001	0.0001	0.0002	0.0002	0.002
1.C	7.C	0.7766	0.6698	0.1617	0.1634	0.1634	0.0012	0.0016	8.287
3.C	4.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
3.C	5.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
5.C	6.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
7.A	8.A	0.0182	0.0168	0.0055	0.0055	0.0055	-0.0001	-0.0001	0.155
7.B	8.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.001
7.C	8.C	0.5177	0.4465	0.1078	0.1089	0.1089	0.0008	0.0011	5.576
8.B	12.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
8.A	9.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
8.A	13.A	0.0273	0.0252	0.0082	0.0083	0.0083	-0.0002	-0.0002	0.220
8.B	13.B	0.0000	0.0000	0.0001	0.0001	0.0001	0.0002	0.0002	0.002
8.C	13.C	0.7766	0.6698	0.1617	0.1634	0.1634	0.0012	0.0016	8.086
9r.A	14.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
13.C	34.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000

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Nodes		Active power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
13.A	18.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.001
13.B	18.B	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
13.C	18.C	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.000
14.A	11.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
14.A	10.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
15.C	16.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
15.C	17.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
18.A	19.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
18.A	21.A	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
18.B	21.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
18.C	21.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
19.A	20.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
21.B	22.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
21.A	23.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
21.B	23.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
21.C	23.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
23.C	24.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
23.A	25.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
23.B	25.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
23.C	25.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
25r.A	26.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
25r.C	26.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
25.A	28.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
25.B	28.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
25.C	28.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
26.A	27.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
26.C	27.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
26.C	31.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
27.A	33.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
28.A	29.A	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
28.B	29.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
28.C	29.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
29.A	30.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
29.B	30.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
29.C	30.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
30.A	250.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
30.B	250.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
30.C	250.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
31.C	32.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
34.C	15.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
35.A	36.A	-0.0006	-0.0006	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	0.000

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Nodes		Active power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
35.B	36.B	0.0006	0.0006	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
35.A	40.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
35.B	40.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
35.C	40.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
36.A	37.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
36.B	38.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
38.B	39.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
40.C	41.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
40.A	42.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
40.B	42.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
40.C	42.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
42.B	43.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
42.A	44.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
42.B	44.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
42.C	44.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
44.A	45.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
44.A	47.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
44.B	47.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
44.C	47.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
45.A	46.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
47.A	48.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
47.B	48.B	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	0.000
47.C	48.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
47.A	49.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
47.B	49.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
47.C	49.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
49.A	50.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
49.B	50.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
49.C	50.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
50.A	51.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
50.B	51.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
50.C	51.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
51.A	151.A	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.000
51.B	151.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
51.C	151.C	0.0004	0.0004	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
52.A	53.A	0.0182	0.0168	0.0055	0.0055	0.0055	-0.0001	-0.0001	0.154
52.B	53.B	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.001
52.C	53.C	0.5178	0.4466	0.1078	0.1089	0.1089	0.0008	0.0011	5.599
53.A	54.A	0.0114	0.0105	0.0034	0.0034	0.0034	-0.0001	-0.0001	0.102
53.B	54.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.001
53.C	54.C	0.3236	0.2791	0.0674	0.0681	0.0681	0.0005	0.0007	3.618

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Nodes		Active power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
54.A	55.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	-0.0002	0.000
54.B	55.B	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.000
54.C	55.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
54.A	57.A	-0.0067	-0.0040	0.0017	0.0018	0.0018	0.0002	0.0002	0.065
54.B	57.B	-0.0005	-0.0005	-0.0004	-0.0004	-0.0004	-0.0003	-0.0003	0.002
54.C	57.C	0.9507	0.8201	0.1982	0.2003	0.2003	0.0016	0.0020	8.820
55.A	56.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	-0.0002	0.000
55.B	56.B	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.000
55.C	56.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
57.B	58.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
57.A	60.A	-0.0145	-0.0085	0.0038	0.0038	0.0038	0.0003	0.0004	0.125
57.B	60.B	-0.0011	-0.0011	-0.0009	-0.0009	-0.0009	-0.0007	-0.0007	0.004
57.C	60.C	2.0371	1.7573	0.4248	0.4292	0.4292	0.0033	0.0044	17.988
58.B	59.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
60.A	61.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.001
60.B	61.B	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
60.C	61.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
60.A	62.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
60.B	62.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
60.C	62.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
62.A	63.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
62.B	63.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
62.C	63.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
63.A	64.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
63.B	64.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
63.C	64.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
64.A	65.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
64.B	65.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
64.C	65.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
65.A	66.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
65.B	66.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
65.C	66.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
67.A	68.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
67.A	72.A	0.0025	0.0013	0.0019	0.0019	0.0019	0.0001	0.0001	0.007
67.B	72.B	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	-0.0002	0.000
67.C	72.C	0.7159	0.6087	0.1523	0.1539	0.1539	0.0012	0.0016	1.770
67.A	97.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
67.B	97.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
67.C	97.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
68.A	69.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
69.A	70.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000

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Nodes		Active power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
70.A	71.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
72.C	73.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
72.A	76.A	0.0018	0.0009	0.0014	0.0014	0.0014	0.0001	0.0001	0.006
72.B	76.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
72.C	76.C	0.5207	0.4427	0.1108	0.1119	0.1119	0.0009	0.0012	1.645
73.C	74.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
74.C	75.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
76.A	77.A	-0.0911	-0.0785	-0.0175	-0.0177	-0.0177	0.0002	0.0002	0.272
76.B	77.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
76.C	77.C	1.1335	0.9636	0.2411	0.2436	0.2436	0.0015	0.0021	3.206
76.A	86.A	0.0002	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
76.B	86.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
76.C	86.C	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
77.A	78.A	-0.0228	-0.0196	-0.0044	-0.0044	-0.0044	0.0001	0.0001	0.102
77.B	78.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
77.C	78.C	0.2834	0.2409	0.0603	0.0609	0.0609	0.0004	0.0005	1.284
78.A	79.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
78.B	79.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
78.C	79.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
78.A	80.A	-0.1081	-0.0932	-0.0208	-0.0210	-0.0210	0.0003	0.0002	0.327
78.B	80.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
78.C	80.C	1.3460	1.1443	0.2863	0.2893	0.2893	0.0018	0.0025	4.398
80.A	81.A	-0.0399	-0.0344	-0.0076	-0.0077	-0.0077	0.0001	0.0001	0.166
80.B	81.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
80.C	81.C	0.4959	0.4216	0.1055	0.1066	0.1066	0.0007	0.0009	2.271
81.A	82.A	0.3784	0.3204	0.0823	0.0832	0.0832	0.0008	0.0010	1.143
81.B	82.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
81.C	82.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
81.C	84.C	3.1686	2.6939	0.6659	0.6729	0.6729	0.0047	0.0064	9.970
82.A	83.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
82.B	83.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
82.C	83.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
84.C	85.C	2.2298	1.8957	0.4686	0.4735	0.4735	0.0033	0.0045	9.188
86.A	87.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
86.B	87.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
86.C	87.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
87.A	88.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
87.A	89.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
87.B	89.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
87.C	89.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
89.B	90.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000

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Nodes		Active power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
89.A	91.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
89.B	91.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
89.C	91.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
91.C	92.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
91.A	93.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
91.B	93.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
91.C	93.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
93.A	94.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
93.A	95.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
93.B	95.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
93.C	95.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
95.B	96.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
97.A	98.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
97.B	98.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
97.C	98.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
98.A	99.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
98.B	99.B	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	0.000
98.C	99.C	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
99.A	100.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
99.B	100.B	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
99.C	100.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
100.A	450.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
100.B	450.B	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.000
100.C	450.C	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
197.A	101.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
197.B	101.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
197.C	101.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
101.C	102.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
101.A	105.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
101.B	105.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
101.C	105.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
102.C	103.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
103.C	104.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
105.B	106.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
105.A	108.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
105.B	108.B	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
105.C	108.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
106.B	107.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
108.A	109.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
108.A	300.A	0.0003	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.001
108.B	300.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000

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Nodes		Active power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
108.C	300.C	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
109.A	110.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
110.A	111.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
110.A	112.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
112.A	113.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
113.A	114.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
135.A	35.A	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.000
135.B	35.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
135.C	35.C	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
152.A	52.A	0.0364	0.0336	0.0109	0.0110	0.0110	-0.0003	-0.0002	0.284
152.B	52.B	0.0000	0.0000	0.0001	0.0001	0.0001	0.0002	0.0002	0.002
152.C	52.C	1.0355	0.8931	0.2157	0.2179	0.2179	0.0016	0.0022	10.404
160r.A	67.A	-0.0796	-0.0687	-0.0153	-0.0155	-0.0155	0.0002	0.0002	0.224
160r.B	67.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0001	-0.0001	0.000
160r.C	67.C	0.9917	0.8431	0.2109	0.2131	0.2131	0.0013	0.0018	1.644

Table K.8: M^Q values obtained for Scenario S4

Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
149.A	1.A	1.3427	1.1662	0.2915	0.2945	0.2945	-0.0004	0.000	6.116
149.B	1.B	-0.0024	-0.0024	-0.0026	-0.0026	-0.0026	-0.0027	-0.003	0.000
149.C	1.C	1.1103	0.9539	0.2237	0.2261	0.2261	-0.0008	0.000	5.094
1.B	2.B	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.001	0.000
1.C	3.C	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
1.A	7.A	1.0070	0.8746	0.2187	0.2209	0.2209	-0.0003	0.000	8.070
1.B	7.B	-0.0018	-0.0018	-0.0019	-0.0019	-0.0019	-0.0021	-0.002	0.003
1.C	7.C	0.8328	0.7155	0.1678	0.1696	0.1696	-0.0006	0.000	8.908
3.C	4.C	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.001	0.000
3.C	5.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0014	-0.001	0.000
5.C	6.C	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
7.A	8.A	0.6714	0.5831	0.1458	0.1473	0.1473	-0.0002	0.000	5.681
7.B	8.B	-0.0012	-0.0012	-0.0013	-0.0013	-0.0013	-0.0014	-0.001	0.002
7.C	8.C	0.5552	0.4770	0.1119	0.1131	0.1131	-0.0004	0.000	5.993
8.B	12.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
8.A	9.A	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
8.A	13.A	1.0071	0.8747	0.2187	0.2209	0.2209	-0.0003	0.000	8.049
8.B	13.B	-0.0018	-0.0018	-0.0019	-0.0019	-0.0019	-0.0021	-0.002	0.003
8.C	13.C	0.8328	0.7155	0.1678	0.1696	0.1696	-0.0006	0.000	8.691

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
9r.A	14.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
13.C	34.C	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.001	0.000
13.A	18.A	-0.0056	-0.0056	-0.0057	-0.0057	-0.0057	-0.0057	-0.006	0.001
13.B	18.B	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	-0.005	0.000
13.C	18.C	-0.0052	-0.0052	-0.0052	-0.0052	-0.0052	-0.0053	-0.005	0.001
14.A	11.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
14.A	10.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
15.C	16.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0016	-0.002	0.000
15.C	17.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0015	-0.001	0.000
18.A	19.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
18.A	21.A	-0.0020	-0.0020	-0.0021	-0.0021	-0.0021	-0.0021	-0.002	0.000
18.B	21.B	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000
18.C	21.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
19.A	20.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0014	-0.001	0.000
21.B	22.B	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.002	0.000
21.A	23.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
21.B	23.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.001	0.000
21.C	23.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
23.C	24.C	-0.0022	-0.0022	-0.0023	-0.0023	-0.0023	-0.0023	-0.002	0.001
23.A	25.A	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
23.B	25.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
23.C	25.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0018	-0.002	0.000
25r.A	26.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000
25r.C	26.C	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000
25.A	28.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
25.B	28.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
25.C	28.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
26.A	27.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
26.C	27.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
26.C	31.C	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
27.A	33.A	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.002	0.000
28.A	29.A	-0.0020	-0.0020	-0.0021	-0.0021	-0.0021	-0.0021	-0.002	0.000
28.B	29.B	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000
28.C	29.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
29.A	30.A	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.002	0.001
29.B	30.B	-0.0021	-0.0021	-0.0020	-0.0020	-0.0020	-0.0020	-0.002	0.000
29.C	30.C	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.002	0.000
30.A	250.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
30.B	250.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
30.C	250.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
31.C	32.C	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
34.C	15.C	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	0.000	0.000
35.A	36.A	-0.0033	-0.0033	-0.0034	-0.0034	-0.0034	-0.0034	-0.003	0.001
35.B	36.B	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.003	0.000
35.A	40.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
35.B	40.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
35.C	40.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0015	-0.001	0.000
36.A	37.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
36.B	38.B	-0.0011	-0.0011	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
38.B	39.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
40.C	41.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0014	-0.001	0.000
40.A	42.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
40.B	42.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
40.C	42.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0015	-0.001	0.000
42.B	43.B	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.002	0.000
42.A	44.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
42.B	44.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
42.C	44.C	-0.0011	-0.0011	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
44.A	45.A	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.001	0.000
44.A	47.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
44.B	47.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
44.C	47.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0015	-0.001	0.000
45.A	46.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
47.A	48.A	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.001	0.000
47.B	48.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
47.C	48.C	-0.0009	-0.0009	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
47.A	49.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
47.B	49.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.001	0.000
47.C	49.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
49.A	50.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
49.B	50.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.001	0.000
49.C	50.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
50.A	51.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
50.B	51.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.001	0.000
50.C	51.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
51.A	151.A	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.002	0.000
51.B	151.B	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.003	0.000
51.C	151.C	-0.0031	-0.0031	-0.0032	-0.0032	-0.0032	-0.0032	-0.003	0.001
52.A	53.A	0.6714	0.5832	0.1458	0.1473	0.1473	-0.0002	0.000	5.620
52.B	53.B	-0.0012	-0.0012	-0.0013	-0.0013	-0.0013	-0.0014	-0.001	0.001
52.C	53.C	0.5553	0.4771	0.1119	0.1131	0.1131	-0.0004	0.000	6.019
53.A	54.A	0.4196	0.3645	0.0911	0.0921	0.0921	-0.0001	0.000	3.717

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
53.B	54.B	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0009	-0.001	0.001
53.C	54.C	0.3471	0.2982	0.0700	0.0707	0.0707	-0.0003	0.000	3.890
54.A	55.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0018	-0.002	0.000
54.B	55.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
54.C	55.C	-0.0015	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.001
54.A	57.A	1.1400	0.9903	0.2479	0.2505	0.2505	-0.0002	0.000	8.703
54.B	57.B	-0.0021	-0.0021	-0.0022	-0.0022	-0.0022	-0.0022	-0.002	0.001
54.C	57.C	0.9199	0.7902	0.1849	0.1868	0.1868	-0.0011	-0.001	8.560
55.A	56.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0018	-0.002	0.001
55.B	56.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
55.C	56.C	-0.0015	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.001
57.B	58.B	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0010	-0.001	0.000
57.A	60.A	2.4428	2.1220	0.5313	0.5367	0.5367	-0.0005	0.001	16.822
57.B	60.B	-0.0045	-0.0046	-0.0047	-0.0047	-0.0047	-0.0048	-0.005	0.002
57.C	60.C	1.9714	1.6934	0.3962	0.4004	0.4004	-0.0025	-0.001	17.458
58.B	59.B	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0010	-0.001	0.000
60.A	61.A	-0.0037	-0.0037	-0.0037	-0.0037	-0.0037	-0.0038	-0.004	0.002
60.B	61.B	-0.0036	-0.0036	-0.0035	-0.0035	-0.0035	-0.0035	-0.004	0.000
60.C	61.C	-0.0030	-0.0030	-0.0031	-0.0031	-0.0031	-0.0032	-0.003	0.002
60.A	62.A	-0.0150	-0.0151	-0.0153	-0.0153	-0.0153	-0.0155	-0.015	0.006
60.B	62.B	-0.0158	-0.0158	-0.0157	-0.0157	-0.0157	-0.0155	-0.016	0.000
60.C	62.C	-0.0145	-0.0146	-0.0150	-0.0150	-0.0150	-0.0155	-0.015	0.012
62.A	63.A	-0.0105	-0.0105	-0.0107	-0.0107	-0.0107	-0.0108	-0.011	0.000
62.B	63.B	-0.0111	-0.0111	-0.0110	-0.0110	-0.0110	-0.0109	-0.011	0.003
62.C	63.C	-0.0102	-0.0102	-0.0105	-0.0105	-0.0105	-0.0108	-0.011	0.009
63.A	64.A	-0.0210	-0.0211	-0.0214	-0.0214	-0.0214	-0.0217	-0.022	0.008
63.B	64.B	-0.0222	-0.0221	-0.0219	-0.0219	-0.0219	-0.0217	-0.022	0.000
63.C	64.C	-0.0203	-0.0204	-0.0211	-0.0211	-0.0211	-0.0216	-0.022	0.017
64.A	65.A	-0.0255	-0.0256	-0.0260	-0.0260	-0.0260	-0.0263	-0.026	0.000
64.B	65.B	-0.0269	-0.0269	-0.0266	-0.0266	-0.0266	-0.0264	-0.026	0.000
64.C	65.C	-0.0247	-0.0248	-0.0256	-0.0256	-0.0256	-0.0263	-0.026	0.021
65.A	66.A	-0.0195	-0.0196	-0.0199	-0.0199	-0.0199	-0.0201	-0.020	0.007
65.B	66.B	-0.0206	-0.0206	-0.0203	-0.0203	-0.0203	-0.0202	-0.020	0.005
65.C	66.C	-0.0189	-0.0190	-0.0196	-0.0196	-0.0196	-0.0201	-0.020	0.016
67.A	68.A	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.001	0.000
67.A	72.A	0.8863	0.7506	0.1926	0.1945	0.1945	-0.0002	0.000	2.623
67.B	72.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
67.C	72.C	0.6821	0.5806	0.1414	0.1429	0.1429	-0.0009	-0.001	1.692
67.A	97.A	-0.0014	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.001	0.000
67.B	97.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
67.C	97.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
68.A	69.A	-0.0011	-0.0012	-0.0011	-0.0011	-0.0011	-0.0011	-0.001	0.000
69.A	70.A	-0.0013	-0.0014	-0.0013	-0.0013	-0.0013	-0.0014	-0.001	0.000
70.A	71.A	-0.0011	-0.0012	-0.0011	-0.0011	-0.0011	-0.0011	-0.001	0.000
72.C	73.C	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.001	0.000
72.A	76.A	0.6446	0.5459	0.1400	0.1415	0.1415	-0.0001	0.000	2.173
72.B	76.B	-0.0013	-0.0013	-0.0012	-0.0012	-0.0012	-0.0013	-0.001	0.000
72.C	76.C	0.4961	0.4223	0.1028	0.1039	0.1039	-0.0006	0.000	1.572
73.C	74.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0015	-0.001	0.000
74.C	75.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0017	-0.002	0.001
76.A	77.A	1.2481	1.0571	0.2715	0.2742	0.2742	-0.0005	0.000	3.725
76.B	77.B	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.002	0.000
76.C	77.C	0.9391	0.7996	0.1946	0.1966	0.1966	-0.0014	-0.001	2.663
76.A	86.A	-0.0040	-0.0041	-0.0041	-0.0041	-0.0041	-0.0041	-0.004	0.001
76.B	86.B	-0.0045	-0.0044	-0.0044	-0.0044	-0.0044	-0.0044	-0.004	0.000
76.C	86.C	-0.0047	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	-0.005	0.001
77.A	78.A	0.3120	0.2643	0.0679	0.0686	0.0686	-0.0001	0.000	1.394
77.B	78.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.001	0.000
77.C	78.C	0.2348	0.1999	0.0486	0.0492	0.0492	-0.0003	0.000	1.067
78.A	79.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
78.B	79.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
78.C	79.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.002	0.001
78.A	80.A	1.4821	1.2553	0.3224	0.3257	0.3257	-0.0006	0.000	4.474
78.B	80.B	-0.0028	-0.0027	-0.0027	-0.0027	-0.0027	-0.0027	-0.003	0.000
78.C	80.C	1.1152	0.9496	0.2311	0.2335	0.2335	-0.0016	-0.001	3.654
80.A	81.A	0.5461	0.4625	0.1188	0.1200	0.1200	-0.0002	0.000	2.264
80.B	81.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
80.C	81.C	0.4109	0.3499	0.0851	0.0860	0.0860	-0.0006	0.000	1.887
81.A	82.A	0.8893	0.7527	0.1919	0.1938	0.1938	-0.0002	0.000	2.692
81.B	82.B	-0.0015	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
81.C	82.C	-0.0016	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
81.C	84.C	3.2097	2.7283	0.6724	0.6794	0.6794	0.0020	0.004	10.108
82.A	83.A	-0.0015	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
82.B	83.B	-0.0015	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
82.C	83.C	-0.0016	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.001
84.C	85.C	2.2587	1.9200	0.4732	0.4781	0.4781	0.0014	0.003	9.315
86.A	87.A	-0.0028	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.003	0.001
86.B	87.B	-0.0026	-0.0026	-0.0026	-0.0026	-0.0026	-0.0026	-0.003	0.000
86.C	87.C	-0.0030	-0.0031	-0.0031	-0.0031	-0.0031	-0.0031	-0.003	0.001
87.A	88.A	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.001	0.000
87.A	89.A	-0.0017	-0.0018	-0.0017	-0.0017	-0.0017	-0.0018	-0.002	0.001
87.B	89.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
87.C	89.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
89.B	90.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
89.A	91.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
89.B	91.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
89.C	91.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.002	0.000
91.C	92.C	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
91.A	93.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
91.B	93.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
91.C	93.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.002	0.000
93.A	94.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.001	0.000
93.A	95.A	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.001
93.B	95.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
93.C	95.C	-0.0020	-0.0021	-0.0020	-0.0020	-0.0020	-0.0021	-0.002	0.001
95.B	96.B	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.001	0.000
97.A	98.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
97.B	98.B	-0.0018	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
97.C	98.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
98.A	99.A	-0.0031	-0.0032	-0.0032	-0.0032	-0.0032	-0.0032	-0.003	0.000
98.B	99.B	-0.0035	-0.0035	-0.0034	-0.0034	-0.0034	-0.0034	-0.003	0.000
98.C	99.C	-0.0037	-0.0038	-0.0038	-0.0038	-0.0038	-0.0038	-0.004	0.000
99.A	100.A	-0.0017	-0.0018	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.001
99.B	100.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.001
99.C	100.C	-0.0020	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.002	0.000
100.A	450.A	-0.0046	-0.0047	-0.0046	-0.0046	-0.0046	-0.0047	-0.005	0.001
100.B	450.B	-0.0051	-0.0051	-0.0050	-0.0050	-0.0050	-0.0050	-0.005	0.001
100.C	450.C	-0.0054	-0.0055	-0.0055	-0.0055	-0.0055	-0.0055	-0.005	0.001
197.A	101.A	-0.0014	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.001	0.000
197.B	101.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
197.C	101.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
101.C	102.C	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
101.A	105.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
101.B	105.B	-0.0018	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
101.C	105.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
102.C	103.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0014	-0.001	0.000
103.C	104.C	-0.0028	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.003	0.001
105.B	106.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
105.A	108.A	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.001
105.B	108.B	-0.0021	-0.0021	-0.0020	-0.0020	-0.0020	-0.0020	-0.002	0.001
105.C	108.C	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.002	0.000
106.B	107.B	-0.0024	-0.0024	-0.0023	-0.0023	-0.0023	-0.0023	-0.002	0.001
108.A	109.A	-0.0018	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.001

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
108.A	300.A	-0.0057	-0.0059	-0.0058	-0.0058	-0.0058	-0.0058	-0.006	0.002
108.B	300.B	-0.0064	-0.0063	-0.0062	-0.0062	-0.0062	-0.0063	-0.006	0.002
108.C	300.C	-0.0068	-0.0069	-0.0069	-0.0069	-0.0069	-0.0069	-0.007	0.001
109.A	110.A	-0.0012	-0.0013	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
110.A	111.A	-0.0023	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.002	0.001
110.A	112.A	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.001	0.000
112.A	113.A	-0.0021	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.002	0.001
113.A	114.A	-0.0013	-0.0014	-0.0013	-0.0013	-0.0013	-0.0014	-0.001	0.000
135.A	35.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000
135.B	35.B	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.002	0.000
135.C	35.C	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.002	0.001
152.A	52.A	1.3429	1.1663	0.2916	0.2946	0.2946	-0.0004	0.000	10.379
152.B	52.B	-0.0025	-0.0025	-0.0026	-0.0026	-0.0026	-0.0027	-0.003	0.003
152.C	52.C	1.1106	0.9542	0.2238	0.2262	0.2262	-0.0008	0.000	11.184
160r.A	67.A	1.0920	0.9248	0.2375	0.2399	0.2399	-0.0005	0.000	3.071
160r.B	67.B	-0.0020	-0.0019	-0.0020	-0.0020	-0.0020	-0.0020	-0.002	0.000
160r.C	67.C	0.8215	0.6994	0.1702	0.1720	0.1720	-0.0012	-0.001	1.366

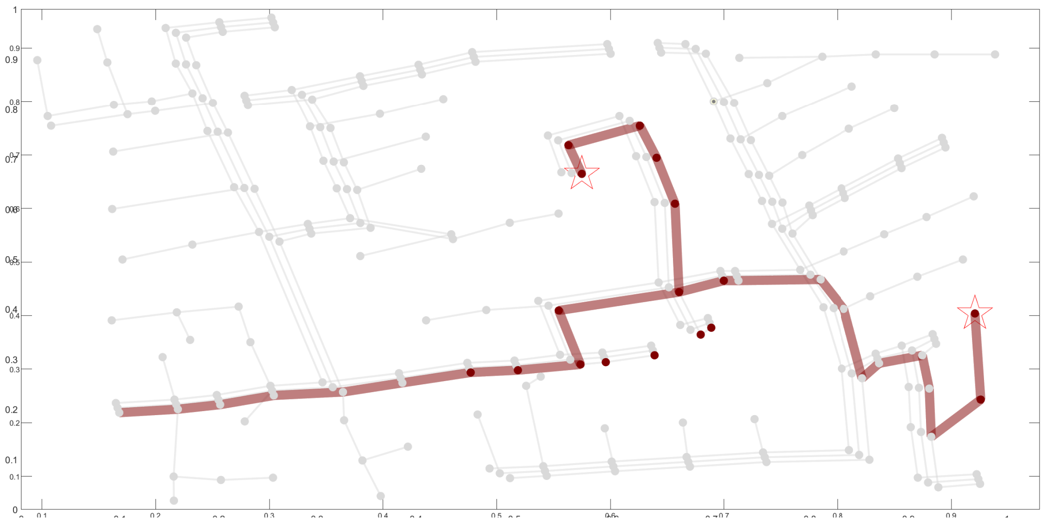

Figure K.5: Representation of M^P and M^Q values obtained for values higher than 0.5 when there is a single-phase perturbations at nodes 66, phase C and 85, phase C (synchronised). Load consumption with a rated power of 400 kW and 200 kVAr. (Scenario S6)

Table K.9: M^P values obtained for Scenario S6

Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
149.A	1.A	0.0365	0.0336	0.0110	0.0110	0.0110	-0.0003	-0.0002	0.167
149.B	1.B	-0.0001	0.0000	0.0001	0.0001	0.0001	0.0002	0.0002	0.000
149.C	1.C	1.0354	0.8930	0.2157	0.2179	0.2179	0.0016	0.0022	4.739
1.B	2.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
1.C	3.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
1.A	7.A	0.0273	0.0252	0.0082	0.0083	0.0083	-0.0002	-0.0002	0.221
1.B	7.B	0.0000	0.0000	0.0001	0.0001	0.0001	0.0002	0.0002	0.002
1.C	7.C	0.7766	0.6698	0.1617	0.1634	0.1634	0.0012	0.0016	8.287
3.C	4.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
3.C	5.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
5.C	6.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
7.A	8.A	0.0182	0.0168	0.0055	0.0055	0.0055	-0.0001	-0.0001	0.155
7.B	8.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.001
7.C	8.C	0.5177	0.4465	0.1078	0.1089	0.1089	0.0008	0.0011	5.576
8.B	12.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
8.A	9.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
8.A	13.A	0.0273	0.0252	0.0082	0.0083	0.0083	-0.0002	-0.0002	0.220
8.B	13.B	0.0000	0.0000	0.0001	0.0001	0.0001	0.0002	0.0002	0.002
8.C	13.C	0.7766	0.6698	0.1617	0.1634	0.1634	0.0012	0.0016	8.086
9r.A	14.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
13.C	34.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
13.A	18.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.001
13.B	18.B	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
13.C	18.C	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.000
14.A	11.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
14.A	10.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
15.C	16.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
15.C	17.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
18.A	19.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
18.A	21.A	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
18.B	21.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
18.C	21.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
19.A	20.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
21.B	22.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
21.A	23.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
21.B	23.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
21.C	23.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
23.C	24.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
23.A	25.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
23.B	25.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000

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Nodes		Active power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
23.C	25.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
25r.A	26.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
25r.C	26.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
25.A	28.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
25.B	28.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
25.C	28.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
26.A	27.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
26.C	27.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
26.C	31.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
27.A	33.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
28.A	29.A	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
28.B	29.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
28.C	29.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
29.A	30.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
29.B	30.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
29.C	30.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
30.A	250.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
30.B	250.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
30.C	250.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
31.C	32.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
34.C	15.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
35.A	36.A	-0.0006	-0.0006	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	0.000
35.B	36.B	0.0006	0.0006	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
35.A	40.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
35.B	40.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
35.C	40.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
36.A	37.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
36.B	38.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
38.B	39.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
40.C	41.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
40.A	42.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
40.B	42.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
40.C	42.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
42.B	43.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
42.A	44.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
42.B	44.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
42.C	44.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
44.A	45.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
44.A	47.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
44.B	47.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
44.C	47.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000

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Nodes		Active power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
45.A	46.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
47.A	48.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
47.B	48.B	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	0.000
47.C	48.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
47.A	49.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
47.B	49.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
47.C	49.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
49.A	50.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
49.B	50.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
49.C	50.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
50.A	51.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
50.B	51.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
50.C	51.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
51.A	151.A	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.000
51.B	151.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
51.C	151.C	0.0004	0.0004	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
52.A	53.A	0.0182	0.0168	0.0055	0.0055	0.0055	-0.0001	-0.0001	0.154
52.B	53.B	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.001
52.C	53.C	0.5178	0.4466	0.1078	0.1089	0.1089	0.0008	0.0011	5.599
53.A	54.A	0.0114	0.0105	0.0034	0.0034	0.0034	-0.0001	-0.0001	0.102
53.B	54.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.001
53.C	54.C	0.3236	0.2791	0.0674	0.0681	0.0681	0.0005	0.0007	3.618
54.A	55.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	-0.0002	0.000
54.B	55.B	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.000
54.C	55.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
54.A	57.A	-0.0067	-0.0040	0.0017	0.0018	0.0018	0.0002	0.0002	0.065
54.B	57.B	-0.0005	-0.0005	-0.0004	-0.0004	-0.0004	-0.0003	-0.0003	0.002
54.C	57.C	0.9507	0.8201	0.1982	0.2003	0.2003	0.0016	0.0020	8.820
55.A	56.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	-0.0002	0.000
55.B	56.B	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.000
55.C	56.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
57.B	58.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
57.A	60.A	-0.0145	-0.0085	0.0038	0.0038	0.0038	0.0003	0.0004	0.125
57.B	60.B	-0.0011	-0.0011	-0.0009	-0.0009	-0.0009	-0.0007	-0.0007	0.004
57.C	60.C	2.0371	1.7573	0.4248	0.4292	0.4292	0.0033	0.0044	17.988
58.B	59.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
60.A	61.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.001
60.B	61.B	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
60.C	61.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
60.A	62.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
60.B	62.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000

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Nodes		Active power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
60.C	62.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
62.A	63.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
62.B	63.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
62.C	63.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
63.A	64.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
63.B	64.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
63.C	64.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
64.A	65.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
64.B	65.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
64.C	65.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
65.A	66.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
65.B	66.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
65.C	66.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
67.A	68.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
67.A	72.A	0.0025	0.0013	0.0019	0.0019	0.0019	0.0001	0.0001	0.007
67.B	72.B	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	-0.0002	0.000
67.C	72.C	0.7159	0.6087	0.1523	0.1539	0.1539	0.0012	0.0016	1.770
67.A	97.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
67.B	97.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
67.C	97.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
68.A	69.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
69.A	70.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
70.A	71.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
72.C	73.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
72.A	76.A	0.0018	0.0009	0.0014	0.0014	0.0014	0.0001	0.0001	0.006
72.B	76.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
72.C	76.C	0.5207	0.4427	0.1108	0.1119	0.1119	0.0009	0.0012	1.645
73.C	74.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
74.C	75.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
76.A	77.A	-0.0911	-0.0785	-0.0175	-0.0177	-0.0177	0.0002	0.0002	0.272
76.B	77.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
76.C	77.C	1.1335	0.9636	0.2411	0.2436	0.2436	0.0015	0.0021	3.206
76.A	86.A	0.0002	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
76.B	86.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
76.C	86.C	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
77.A	78.A	-0.0228	-0.0196	-0.0044	-0.0044	-0.0044	0.0001	0.0001	0.102
77.B	78.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
77.C	78.C	0.2834	0.2409	0.0603	0.0609	0.0609	0.0004	0.0005	1.284
78.A	79.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
78.B	79.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
78.C	79.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000

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Nodes		Active power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
78.A	80.A	-0.1081	-0.0932	-0.0208	-0.0210	-0.0210	0.0003	0.0002	0.327
78.B	80.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
78.C	80.C	1.3460	1.1443	0.2863	0.2893	0.2893	0.0018	0.0025	4.398
80.A	81.A	-0.0399	-0.0344	-0.0076	-0.0077	-0.0077	0.0001	0.0001	0.166
80.B	81.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
80.C	81.C	0.4959	0.4216	0.1055	0.1066	0.1066	0.0007	0.0009	2.271
81.A	82.A	0.3784	0.3204	0.0823	0.0832	0.0832	0.0008	0.0010	1.143
81.B	82.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
81.C	82.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
81.C	84.C	3.1686	2.6939	0.6659	0.6729	0.6729	0.0047	0.0064	9.970
82.A	83.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
82.B	83.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
82.C	83.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
84.C	85.C	2.2298	1.8957	0.4686	0.4735	0.4735	0.0033	0.0045	9.188
86.A	87.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
86.B	87.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
86.C	87.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
87.A	88.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
87.A	89.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
87.B	89.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
87.C	89.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
89.B	90.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
89.A	91.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
89.B	91.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
89.C	91.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
91.C	92.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
91.A	93.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
91.B	93.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
91.C	93.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
93.A	94.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
93.A	95.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
93.B	95.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
93.C	95.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
95.B	96.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
97.A	98.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
97.B	98.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
97.C	98.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
98.A	99.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
98.B	99.B	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	0.000
98.C	99.C	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
99.A	100.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000

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Nodes		Active power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
99.B	100.B	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
99.C	100.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
100.A	450.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
100.B	450.B	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.000
100.C	450.C	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
197.A	101.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
197.B	101.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
197.C	101.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
101.C	102.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
101.A	105.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
101.B	105.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
101.C	105.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
102.C	103.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
103.C	104.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
105.B	106.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
105.A	108.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
105.B	108.B	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
105.C	108.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
106.B	107.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
108.A	109.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
108.A	300.A	0.0003	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.001
108.B	300.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
108.C	300.C	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
109.A	110.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
110.A	111.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
110.A	112.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
112.A	113.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
113.A	114.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
135.A	35.A	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.000
135.B	35.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
135.C	35.C	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
152.A	52.A	0.0364	0.0336	0.0109	0.0110	0.0110	-0.0003	-0.0002	0.284
152.B	52.B	0.0000	0.0000	0.0001	0.0001	0.0001	0.0002	0.0002	0.002
152.C	52.C	1.0355	0.8931	0.2157	0.2179	0.2179	0.0016	0.0022	10.404
160r.A	67.A	-0.0796	-0.0687	-0.0153	-0.0155	-0.0155	0.0002	0.0002	0.224
160r.B	67.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0001	-0.0001	0.000
160r.C	67.C	0.9917	0.8431	0.2109	0.2131	0.2131	0.0013	0.0018	1.644

Table K.10: M^Q values obtained for Scenario S6

Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
149.A	1.A	1.3427	1.1662	0.2915	0.2945	0.2945	-0.0004	0.000	6.116
149.B	1.B	-0.0024	-0.0024	-0.0026	-0.0026	-0.0026	-0.0027	-0.003	0.000
149.C	1.C	1.1103	0.9539	0.2237	0.2261	0.2261	-0.0008	0.000	5.094
1.B	2.B	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.001	0.000
1.C	3.C	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
1.A	7.A	1.0070	0.8746	0.2187	0.2209	0.2209	-0.0003	0.000	8.070
1.B	7.B	-0.0018	-0.0018	-0.0019	-0.0019	-0.0019	-0.0021	-0.002	0.003
1.C	7.C	0.8328	0.7155	0.1678	0.1696	0.1696	-0.0006	0.000	8.908
3.C	4.C	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.001	0.000
3.C	5.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0014	-0.001	0.000
5.C	6.C	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
7.A	8.A	0.6714	0.5831	0.1458	0.1473	0.1473	-0.0002	0.000	5.681
7.B	8.B	-0.0012	-0.0012	-0.0013	-0.0013	-0.0013	-0.0014	-0.001	0.002
7.C	8.C	0.5552	0.4770	0.1119	0.1131	0.1131	-0.0004	0.000	5.993
8.B	12.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
8.A	9.A	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
8.A	13.A	1.0071	0.8747	0.2187	0.2209	0.2209	-0.0003	0.000	8.049
8.B	13.B	-0.0018	-0.0018	-0.0019	-0.0019	-0.0019	-0.0021	-0.002	0.003
8.C	13.C	0.8328	0.7155	0.1678	0.1696	0.1696	-0.0006	0.000	8.691
9r.A	14.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
13.C	34.C	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.001	0.000
13.A	18.A	-0.0056	-0.0056	-0.0057	-0.0057	-0.0057	-0.0057	-0.006	0.001
13.B	18.B	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	-0.005	0.000
13.C	18.C	-0.0052	-0.0052	-0.0052	-0.0052	-0.0052	-0.0053	-0.005	0.001
14.A	11.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
14.A	10.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
15.C	16.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0016	-0.002	0.000
15.C	17.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0015	-0.001	0.000
18.A	19.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
18.A	21.A	-0.0020	-0.0020	-0.0021	-0.0021	-0.0021	-0.0021	-0.002	0.000
18.B	21.B	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000
18.C	21.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
19.A	20.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0014	-0.001	0.000
21.B	22.B	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.002	0.000
21.A	23.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
21.B	23.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.001	0.000
21.C	23.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
23.C	24.C	-0.0022	-0.0022	-0.0023	-0.0023	-0.0023	-0.0023	-0.002	0.001
23.A	25.A	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
23.B	25.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
23.C	25.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0018	-0.002	0.000
25r.A	26.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000
25r.C	26.C	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000
25.A	28.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
25.B	28.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
25.C	28.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
26.A	27.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
26.C	27.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
26.C	31.C	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
27.A	33.A	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.002	0.000
28.A	29.A	-0.0020	-0.0020	-0.0021	-0.0021	-0.0021	-0.0021	-0.002	0.000
28.B	29.B	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000
28.C	29.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
29.A	30.A	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.002	0.001
29.B	30.B	-0.0021	-0.0021	-0.0020	-0.0020	-0.0020	-0.0020	-0.002	0.000
29.C	30.C	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.002	0.000
30.A	250.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
30.B	250.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
30.C	250.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
31.C	32.C	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
34.C	15.C	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	0.000	0.000
35.A	36.A	-0.0033	-0.0033	-0.0034	-0.0034	-0.0034	-0.0034	-0.003	0.001
35.B	36.B	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.003	0.000
35.A	40.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
35.B	40.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
35.C	40.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0015	-0.001	0.000
36.A	37.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
36.B	38.B	-0.0011	-0.0011	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
38.B	39.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
40.C	41.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0014	-0.001	0.000
40.A	42.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
40.B	42.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
40.C	42.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0015	-0.001	0.000
42.B	43.B	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.002	0.000
42.A	44.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
42.B	44.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
42.C	44.C	-0.0011	-0.0011	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
44.A	45.A	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.001	0.000
44.A	47.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
44.B	47.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
44.C	47.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0015	-0.001	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
45.A	46.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
47.A	48.A	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.001	0.000
47.B	48.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
47.C	48.C	-0.0009	-0.0009	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
47.A	49.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
47.B	49.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.001	0.000
47.C	49.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
49.A	50.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
49.B	50.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.001	0.000
49.C	50.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
50.A	51.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
50.B	51.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.001	0.000
50.C	51.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
51.A	151.A	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.002	0.000
51.B	151.B	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.003	0.000
51.C	151.C	-0.0031	-0.0031	-0.0032	-0.0032	-0.0032	-0.0032	-0.003	0.001
52.A	53.A	0.6714	0.5832	0.1458	0.1473	0.1473	-0.0002	0.000	5.620
52.B	53.B	-0.0012	-0.0012	-0.0013	-0.0013	-0.0013	-0.0014	-0.001	0.001
52.C	53.C	0.5553	0.4771	0.1119	0.1131	0.1131	-0.0004	0.000	6.019
53.A	54.A	0.4196	0.3645	0.0911	0.0921	0.0921	-0.0001	0.000	3.717
53.B	54.B	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0009	-0.001	0.001
53.C	54.C	0.3471	0.2982	0.0700	0.0707	0.0707	-0.0003	0.000	3.890
54.A	55.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0018	-0.002	0.000
54.B	55.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
54.C	55.C	-0.0015	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.001
54.A	57.A	1.1400	0.9903	0.2479	0.2505	0.2505	-0.0002	0.000	8.703
54.B	57.B	-0.0021	-0.0021	-0.0022	-0.0022	-0.0022	-0.0022	-0.002	0.001
54.C	57.C	0.9199	0.7902	0.1849	0.1868	0.1868	-0.0011	-0.001	8.560
55.A	56.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0018	-0.002	0.001
55.B	56.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
55.C	56.C	-0.0015	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.001
57.B	58.B	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0010	-0.001	0.000
57.A	60.A	2.4428	2.1220	0.5313	0.5367	0.5367	-0.0005	0.001	16.822
57.B	60.B	-0.0045	-0.0046	-0.0047	-0.0047	-0.0047	-0.0048	-0.005	0.002
57.C	60.C	1.9714	1.6934	0.3962	0.4004	0.4004	-0.0025	-0.001	17.458
58.B	59.B	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0010	-0.001	0.000
60.A	61.A	-0.0037	-0.0037	-0.0037	-0.0037	-0.0037	-0.0038	-0.004	0.002
60.B	61.B	-0.0036	-0.0036	-0.0035	-0.0035	-0.0035	-0.0035	-0.004	0.000
60.C	61.C	-0.0030	-0.0030	-0.0031	-0.0031	-0.0031	-0.0032	-0.003	0.002
60.A	62.A	-0.0150	-0.0151	-0.0153	-0.0153	-0.0153	-0.0155	-0.015	0.006
60.B	62.B	-0.0158	-0.0158	-0.0157	-0.0157	-0.0157	-0.0155	-0.016	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
60.C	62.C	-0.0145	-0.0146	-0.0150	-0.0150	-0.0150	-0.0155	-0.015	0.012
62.A	63.A	-0.0105	-0.0105	-0.0107	-0.0107	-0.0107	-0.0108	-0.011	0.000
62.B	63.B	-0.0111	-0.0111	-0.0110	-0.0110	-0.0110	-0.0109	-0.011	0.003
62.C	63.C	-0.0102	-0.0102	-0.0105	-0.0105	-0.0105	-0.0108	-0.011	0.009
63.A	64.A	-0.0210	-0.0211	-0.0214	-0.0214	-0.0214	-0.0217	-0.022	0.008
63.B	64.B	-0.0222	-0.0221	-0.0219	-0.0219	-0.0219	-0.0217	-0.022	0.000
63.C	64.C	-0.0203	-0.0204	-0.0211	-0.0211	-0.0211	-0.0216	-0.022	0.017
64.A	65.A	-0.0255	-0.0256	-0.0260	-0.0260	-0.0260	-0.0263	-0.026	0.000
64.B	65.B	-0.0269	-0.0269	-0.0266	-0.0266	-0.0266	-0.0264	-0.026	0.000
64.C	65.C	-0.0247	-0.0248	-0.0256	-0.0256	-0.0256	-0.0263	-0.026	0.021
65.A	66.A	-0.0195	-0.0196	-0.0199	-0.0199	-0.0199	-0.0201	-0.020	0.007
65.B	66.B	-0.0206	-0.0206	-0.0203	-0.0203	-0.0203	-0.0202	-0.020	0.005
65.C	66.C	-0.0189	-0.0190	-0.0196	-0.0196	-0.0196	-0.0201	-0.020	0.016
67.A	68.A	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.001	0.000
67.A	72.A	0.8863	0.7506	0.1926	0.1945	0.1945	-0.0002	0.000	2.623
67.B	72.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
67.C	72.C	0.6821	0.5806	0.1414	0.1429	0.1429	-0.0009	-0.001	1.692
67.A	97.A	-0.0014	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.001	0.000
67.B	97.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
67.C	97.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
68.A	69.A	-0.0011	-0.0012	-0.0011	-0.0011	-0.0011	-0.0011	-0.001	0.000
69.A	70.A	-0.0013	-0.0014	-0.0013	-0.0013	-0.0013	-0.0014	-0.001	0.000
70.A	71.A	-0.0011	-0.0012	-0.0011	-0.0011	-0.0011	-0.0011	-0.001	0.000
72.C	73.C	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.001	0.000
72.A	76.A	0.6446	0.5459	0.1400	0.1415	0.1415	-0.0001	0.000	2.173
72.B	76.B	-0.0013	-0.0013	-0.0012	-0.0012	-0.0012	-0.0013	-0.001	0.000
72.C	76.C	0.4961	0.4223	0.1028	0.1039	0.1039	-0.0006	0.000	1.572
73.C	74.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0015	-0.001	0.000
74.C	75.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0017	-0.002	0.001
76.A	77.A	1.2481	1.0571	0.2715	0.2742	0.2742	-0.0005	0.000	3.725
76.B	77.B	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.002	0.000
76.C	77.C	0.9391	0.7996	0.1946	0.1966	0.1966	-0.0014	-0.001	2.663
76.A	86.A	-0.0040	-0.0041	-0.0041	-0.0041	-0.0041	-0.0041	-0.004	0.001
76.B	86.B	-0.0045	-0.0044	-0.0044	-0.0044	-0.0044	-0.0044	-0.004	0.000
76.C	86.C	-0.0047	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	-0.005	0.001
77.A	78.A	0.3120	0.2643	0.0679	0.0686	0.0686	-0.0001	0.000	1.394
77.B	78.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.001	0.000
77.C	78.C	0.2348	0.1999	0.0486	0.0492	0.0492	-0.0003	0.000	1.067
78.A	79.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
78.B	79.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
78.C	79.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.002	0.001

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
78.A	80.A	1.4821	1.2553	0.3224	0.3257	0.3257	-0.0006	0.000	4.474
78.B	80.B	-0.0028	-0.0027	-0.0027	-0.0027	-0.0027	-0.0027	-0.003	0.000
78.C	80.C	1.1152	0.9496	0.2311	0.2335	0.2335	-0.0016	-0.001	3.654
80.A	81.A	0.5461	0.4625	0.1188	0.1200	0.1200	-0.0002	0.000	2.264
80.B	81.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
80.C	81.C	0.4109	0.3499	0.0851	0.0860	0.0860	-0.0006	0.000	1.887
81.A	82.A	0.8893	0.7527	0.1919	0.1938	0.1938	-0.0002	0.000	2.692
81.B	82.B	-0.0015	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
81.C	82.C	-0.0016	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
81.C	84.C	3.2097	2.7283	0.6724	0.6794	0.6794	0.0020	0.004	10.108
82.A	83.A	-0.0015	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
82.B	83.B	-0.0015	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
82.C	83.C	-0.0016	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.001
84.C	85.C	2.2587	1.9200	0.4732	0.4781	0.4781	0.0014	0.003	9.315
86.A	87.A	-0.0028	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.003	0.001
86.B	87.B	-0.0026	-0.0026	-0.0026	-0.0026	-0.0026	-0.0026	-0.003	0.000
86.C	87.C	-0.0030	-0.0031	-0.0031	-0.0031	-0.0031	-0.0031	-0.003	0.001
87.A	88.A	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.001	0.000
87.A	89.A	-0.0017	-0.0018	-0.0017	-0.0017	-0.0017	-0.0018	-0.002	0.001
87.B	89.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
87.C	89.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
89.B	90.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
89.A	91.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
89.B	91.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
89.C	91.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.002	0.000
91.C	92.C	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
91.A	93.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
91.B	93.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
91.C	93.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.002	0.000
93.A	94.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.001	0.000
93.A	95.A	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.001
93.B	95.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
93.C	95.C	-0.0020	-0.0021	-0.0020	-0.0020	-0.0020	-0.0021	-0.002	0.001
95.B	96.B	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.001	0.000
97.A	98.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
97.B	98.B	-0.0018	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
97.C	98.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
98.A	99.A	-0.0031	-0.0032	-0.0032	-0.0032	-0.0032	-0.0032	-0.003	0.000
98.B	99.B	-0.0035	-0.0035	-0.0034	-0.0034	-0.0034	-0.0034	-0.003	0.000
98.C	99.C	-0.0037	-0.0038	-0.0038	-0.0038	-0.0038	-0.0038	-0.004	0.000
99.A	100.A	-0.0017	-0.0018	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.001

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
99.B	100.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.001
99.C	100.C	-0.0020	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.002	0.000
100.A	450.A	-0.0046	-0.0047	-0.0046	-0.0046	-0.0046	-0.0047	-0.005	0.001
100.B	450.B	-0.0051	-0.0051	-0.0050	-0.0050	-0.0050	-0.0050	-0.005	0.001
100.C	450.C	-0.0054	-0.0055	-0.0055	-0.0055	-0.0055	-0.0055	-0.005	0.001
197.A	101.A	-0.0014	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.001	0.000
197.B	101.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
197.C	101.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
101.C	102.C	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
101.A	105.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
101.B	105.B	-0.0018	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
101.C	105.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
102.C	103.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0014	-0.001	0.000
103.C	104.C	-0.0028	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.003	0.001
105.B	106.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
105.A	108.A	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.001
105.B	108.B	-0.0021	-0.0021	-0.0020	-0.0020	-0.0020	-0.0020	-0.002	0.001
105.C	108.C	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.002	0.000
106.B	107.B	-0.0024	-0.0024	-0.0023	-0.0023	-0.0023	-0.0023	-0.002	0.001
108.A	109.A	-0.0018	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.001
108.A	300.A	-0.0057	-0.0059	-0.0058	-0.0058	-0.0058	-0.0058	-0.006	0.002
108.B	300.B	-0.0064	-0.0063	-0.0062	-0.0062	-0.0062	-0.0063	-0.006	0.002
108.C	300.C	-0.0068	-0.0069	-0.0069	-0.0069	-0.0069	-0.0069	-0.007	0.001
109.A	110.A	-0.0012	-0.0013	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
110.A	111.A	-0.0023	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.002	0.001
110.A	112.A	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.001	0.000
112.A	113.A	-0.0021	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.002	0.001
113.A	114.A	-0.0013	-0.0014	-0.0013	-0.0013	-0.0013	-0.0014	-0.001	0.000
135.A	35.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000
135.B	35.B	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.002	0.000
135.C	35.C	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.002	0.001
152.A	52.A	1.3429	1.1663	0.2916	0.2946	0.2946	-0.0004	0.000	10.379
152.B	52.B	-0.0025	-0.0025	-0.0026	-0.0026	-0.0026	-0.0027	-0.003	0.003
152.C	52.C	1.1106	0.9542	0.2238	0.2262	0.2262	-0.0008	0.000	11.184
160r.A	67.A	1.0920	0.9248	0.2375	0.2399	0.2399	-0.0005	0.000	3.071
160r.B	67.B	-0.0020	-0.0019	-0.0020	-0.0020	-0.0020	-0.0020	-0.002	0.000
160r.C	67.C	0.8215	0.6994	0.1702	0.1720	0.1720	-0.0012	-0.001	1.366

K.0.2 Considering OLTCs connected with capacitors compensation

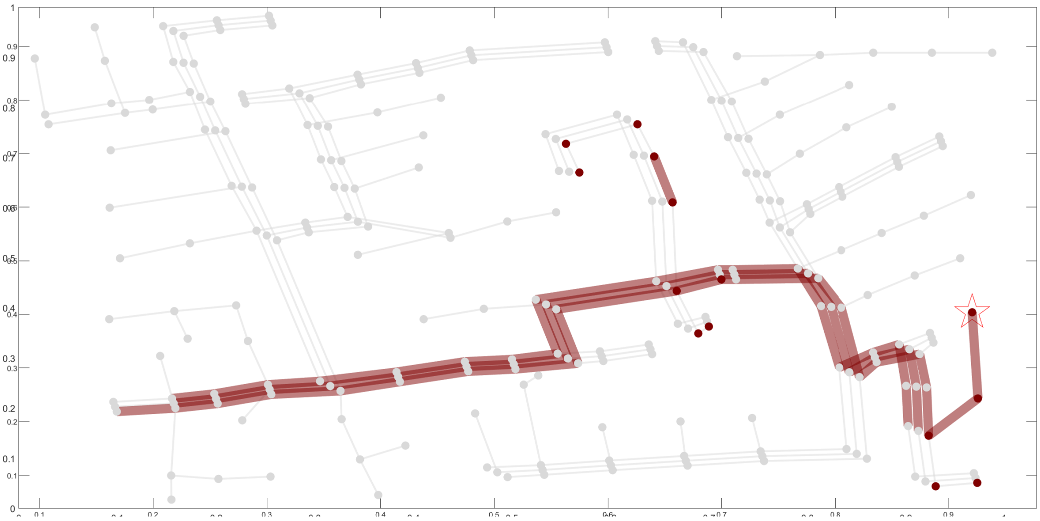

Figure K.6: Representation of M^P and M^Q values obtained for values higher than 0.5 when there is a single-phase perturbation at node 85, phase C. Load consumption with a rated power of 400 kW and 200 kVAr. (Scenario S1)

Table K.11: M^P values obtained for Scenario S1

Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
149.A	1.A	0.4871	0.4509	0.3778	0.3782	0.3782	0.3177	0.3188	0.124
149.B	1.B	-0.3080	-0.2580	-0.0257	-0.0269	-0.0269	0.1782	0.1750	0.000
149.C	1.C	0.9350	0.8376	0.3850	0.3865	0.3865	0.2329	0.2333	3.171
1.B	2.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
1.C	3.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
1.A	7.A	0.3653	0.3382	0.2833	0.2837	0.2837	0.2382	0.2391	1.334
1.B	7.B	-0.2310	-0.1935	-0.0193	-0.0202	-0.0202	0.1336	0.1313	2.600
1.C	7.C	0.7012	0.6281	0.2888	0.2899	0.2899	0.1747	0.1750	4.781
3.C	4.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
3.C	5.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
5.C	6.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
7.A	8.A	0.2435	0.2255	0.1889	0.1891	0.1891	0.1588	0.1594	0.918
7.B	8.B	-0.1540	-0.1290	-0.0129	-0.0135	-0.0135	0.0891	0.0875	1.828
7.C	8.C	0.4675	0.4188	0.1925	0.1932	0.1932	0.1165	0.1167	3.324
8.B	12.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
8.A	9.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
8.A	13.A	0.3653	0.3382	0.2833	0.2836	0.2836	0.2382	0.2391	1.321
8.B	13.B	-0.2310	-0.1935	-0.0193	-0.0202	-0.0202	0.1336	0.1313	2.593
8.C	13.C	0.7012	0.6281	0.2888	0.2899	0.2899	0.1747	0.1750	4.770
9r.A	14.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
13.C	34.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
13.A	18.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
13.B	18.B	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
13.C	18.C	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.000
14.A	11.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
14.A	10.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
15.C	16.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
15.C	17.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
18.A	19.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
18.A	21.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
18.B	21.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
18.C	21.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
19.A	20.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
21.B	22.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
21.A	23.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
21.B	23.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
21.C	23.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
23.C	24.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
23.A	25.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
23.B	25.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
23.C	25.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
25r.A	26.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
25r.C	26.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
25.A	28.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
25.B	28.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
25.C	28.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
26.A	27.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
26.C	27.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
26.C	31.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
27.A	33.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
28.A	29.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
28.B	29.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
28.C	29.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
29.A	30.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
29.B	30.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
29.C	30.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
30.A	250.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
30.B	250.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
30.C	250.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
31.C	32.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
34.C	15.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
35.A	36.A	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
35.B	36.B	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
35.A	40.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
35.B	40.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
35.C	40.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
36.A	37.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
36.B	38.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
38.B	39.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
40.C	41.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
40.A	42.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
40.B	42.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
40.C	42.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
42.B	43.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
42.A	44.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
42.B	44.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
42.C	44.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
44.A	45.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
44.A	47.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
44.B	47.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
44.C	47.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
45.A	46.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
47.A	48.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
47.B	48.B	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	0.000
47.C	48.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
47.A	49.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
47.B	49.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
47.C	49.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
49.A	50.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
49.B	50.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
49.C	50.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
50.A	51.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
50.B	51.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
50.C	51.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
51.A	151.A	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.000
51.B	151.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
51.C	151.C	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
52.A	53.A	0.2434	0.2254	0.1888	0.1890	0.1890	0.1587	0.1593	0.883
52.B	53.B	-0.1539	-0.1290	-0.0129	-0.0135	-0.0135	0.0891	0.0875	1.822
52.C	53.C	0.4674	0.4187	0.1925	0.1932	0.1932	0.1164	0.1166	3.297
53.A	54.A	0.1522	0.1409	0.1180	0.1181	0.1181	0.0992	0.0996	0.624
53.B	54.B	-0.0962	-0.0806	-0.0080	-0.0084	-0.0084	0.0557	0.0547	1.224
53.C	54.C	0.2921	0.2617	0.1203	0.1208	0.1208	0.0728	0.0729	2.179

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
54.A	55.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	-0.0002	0.000
54.B	55.B	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.000
54.C	55.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
54.A	57.A	0.3360	0.3047	0.2397	0.2401	0.2401	0.1864	0.1873	1.345
54.B	57.B	-0.2196	-0.1708	0.0623	0.0611	0.0611	0.2664	0.2633	2.750
54.C	57.C	0.8710	0.7787	0.3470	0.3484	0.3484	0.1849	0.1857	6.052
55.A	56.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	-0.0002	0.000
55.B	56.B	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.000
55.C	56.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
57.B	58.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
57.A	60.A	0.7199	0.6530	0.5136	0.5144	0.5144	0.3993	0.4014	2.826
57.B	60.B	-0.4706	-0.3660	0.1335	0.1309	0.1309	0.5709	0.5642	5.898
57.C	60.C	1.8663	1.6687	0.7435	0.7466	0.7466	0.3963	0.3979	11.859
58.B	59.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
60.A	61.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
60.B	61.B	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
60.C	61.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
60.A	62.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
60.B	62.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
60.C	62.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
62.A	63.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
62.B	63.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
62.C	63.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
63.A	64.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
63.B	64.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
63.C	64.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
64.A	65.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
64.B	65.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
64.C	65.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
65.A	66.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
65.B	66.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
65.C	66.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
67.A	68.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
67.A	72.A	0.2819	0.2619	0.2036	0.2039	0.2039	0.1551	0.1559	0.374
67.B	72.B	-0.1745	-0.1353	0.0486	0.0476	0.0476	0.2148	0.2123	2.434
67.C	72.C	0.6778	0.5959	0.2718	0.2729	0.2729	0.1456	0.1462	1.430
67.A	97.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
67.B	97.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
67.C	97.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
68.A	69.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
69.A	70.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
70.A	71.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
72.C	73.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
72.A	76.A	0.2050	0.1905	0.1481	0.1483	0.1483	0.1128	0.1134	0.318
72.B	76.B	-0.1269	-0.0984	0.0354	0.0346	0.0346	0.1562	0.1544	1.911
72.C	76.C	0.4930	0.4334	0.1977	0.1985	0.1985	0.1058	0.1063	1.243
73.C	74.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
74.C	75.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
76.A	77.A	0.2493	0.2279	0.1618	0.1622	0.1622	0.1080	0.1089	0.401
76.B	77.B	-0.2262	-0.1878	-0.0028	-0.0038	-0.0038	0.1647	0.1621	2.423
76.C	77.C	0.8994	0.7875	0.3557	0.3572	0.3572	0.2063	0.2068	1.920
76.A	86.A	0.0168	0.0160	0.0158	0.0158	0.0158	0.0155	0.0155	0.010
76.B	86.B	0.0206	0.0212	0.0219	0.0219	0.0219	0.0226	0.0226	0.014
76.C	86.C	0.0150	0.0155	0.0150	0.0150	0.0150	0.0147	0.0147	0.006
77.A	78.A	0.0623	0.0570	0.0405	0.0405	0.0405	0.0270	0.0272	0.157
77.B	78.B	-0.0565	-0.0469	-0.0007	-0.0010	-0.0010	0.0412	0.0405	0.749
77.C	78.C	0.2248	0.1969	0.0889	0.0893	0.0893	0.0516	0.0517	0.756
78.A	79.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
78.B	79.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
78.C	79.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
78.A	80.A	0.2961	0.2706	0.1922	0.1926	0.1926	0.1283	0.1293	0.518
78.B	80.B	-0.2686	-0.2230	-0.0034	-0.0045	-0.0045	0.1955	0.1925	2.845
78.C	80.C	1.0680	0.9352	0.4224	0.4242	0.4242	0.2450	0.2455	2.481
80.A	81.A	0.1091	0.0997	0.0708	0.0710	0.0710	0.0473	0.0476	0.267
80.B	81.B	-0.0990	-0.0822	-0.0012	-0.0017	-0.0017	0.0720	0.0709	1.227
80.C	81.C	0.3935	0.3445	0.1556	0.1563	0.1563	0.0903	0.0905	1.288
81.A	82.A	0.0764	0.0710	0.0680	0.0680	0.0680	0.0649	0.0650	0.085
81.B	82.B	0.0976	0.1010	0.1066	0.1065	0.1065	0.1120	0.1119	0.101
81.C	82.C	0.1273	0.1308	0.1286	0.1286	0.1286	0.1277	0.1277	0.030
81.C	84.C	3.1509	2.6376	0.6551	0.6619	0.6619	0.0047	0.0063	8.259
82.A	83.A	0.0764	0.0710	0.0680	0.0680	0.0680	0.0649	0.0650	0.086
82.B	83.B	0.0976	0.1010	0.1066	0.1065	0.1065	0.1120	0.1119	0.101
82.C	83.C	0.1273	0.1308	0.1286	0.1286	0.1286	0.1277	0.1277	0.030
84.C	85.C	2.2173	1.8561	0.4610	0.4658	0.4658	0.0033	0.0044	7.846
86.A	87.A	0.0084	0.0079	0.0077	0.0077	0.0077	0.0076	0.0076	0.006
86.B	87.B	0.0112	0.0115	0.0120	0.0119	0.0119	0.0124	0.0123	0.009
86.C	87.C	0.0140	0.0144	0.0142	0.0142	0.0142	0.0140	0.0140	0.004
87.A	88.A	0.0194	0.0191	0.0190	0.0190	0.0190	0.0190	0.0190	0.005
87.A	89.A	0.0002	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
87.B	89.B	0.0161	0.0163	0.0165	0.0165	0.0165	0.0167	0.0167	0.005
87.C	89.C	0.0004	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.002
89.B	90.B	0.0268	0.0268	0.0269	0.0269	0.0269	0.0270	0.0270	0.002

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
89.A	91.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
89.B	91.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
89.C	91.C	0.0083	0.0086	0.0086	0.0086	0.0086	0.0086	0.0086	0.004
91.C	92.C	0.0320	0.0331	0.0331	0.0331	0.0331	0.0333	0.0333	0.016
91.A	93.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
91.B	93.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
91.C	93.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
93.A	94.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
93.A	95.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
93.B	95.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
93.C	95.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
95.B	96.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
97.A	98.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
97.B	98.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
97.C	98.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
98.A	99.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
98.B	99.B	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	0.001
98.C	99.C	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
99.A	100.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
99.B	100.B	-0.0002	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
99.C	100.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.000
100.A	450.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
100.B	450.B	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.001
100.C	450.C	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.001
197.A	101.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
197.B	101.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
197.C	101.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
101.C	102.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
101.A	105.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
101.B	105.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
101.C	105.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
102.C	103.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
103.C	104.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
105.B	106.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
105.A	108.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
105.B	108.B	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
105.C	108.C	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
106.B	107.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
108.A	109.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
108.A	300.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
108.B	300.B	-0.0008	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.001

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
108.C	300.C	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.001
109.A	110.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
110.A	111.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
110.A	112.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
112.A	113.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
113.A	114.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
135.A	35.A	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.000
135.B	35.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
135.C	35.C	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
152.A	52.A	0.4869	0.4507	0.3776	0.3781	0.3781	0.3175	0.3186	1.701
152.B	52.B	-0.3079	-0.2580	-0.0257	-0.0270	-0.0270	0.1781	0.1749	3.308
152.C	52.C	0.9349	0.8374	0.3849	0.3864	0.3864	0.2328	0.2332	6.148
160r.A	67.A	0.3039	0.2782	0.2055	0.2059	0.2059	0.1460	0.1470	0.361
160r.B	67.B	-0.2029	-0.1595	0.0442	0.0432	0.0432	0.2289	0.2261	2.644
160r.C	67.C	0.8925	0.7956	0.4146	0.4159	0.4159	0.2810	0.2814	1.341

Table K.12: M^Q values obtained for Scenario S1

Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
149.A	1.A	0.9534	0.8934	0.6934	0.6945	0.6945	0.5160	0.5189	0.319
149.B	1.B	0.3743	0.3687	0.4045	0.4043	0.4043	0.4473	0.4467	0.000
149.C	1.C	1.0542	0.9235	0.4066	0.4073	0.4073	0.5207	0.5146	2.925
1.B	2.B	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.000
1.C	3.C	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
1.A	7.A	0.7150	0.6701	0.5200	0.5209	0.5209	0.3869	0.3891	3.443
1.B	7.B	0.2807	0.2765	0.3034	0.3032	0.3032	0.3355	0.3350	0.420
1.C	7.C	0.7906	0.6926	0.3050	0.3055	0.3055	0.3905	0.3859	4.410
3.C	4.C	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	0.000
3.C	5.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
5.C	6.C	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
7.A	8.A	0.4767	0.4467	0.3467	0.3472	0.3472	0.2580	0.2594	2.370
7.B	8.B	0.1871	0.1843	0.2022	0.2022	0.2022	0.2236	0.2233	0.296
7.C	8.C	0.5271	0.4618	0.2033	0.2037	0.2037	0.2603	0.2573	3.066
8.B	12.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
8.A	9.A	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
8.A	13.A	0.7150	0.6700	0.5200	0.5208	0.5208	0.3869	0.3891	3.411
8.B	13.B	0.2807	0.2765	0.3033	0.3032	0.3032	0.3354	0.3350	0.419
8.C	13.C	0.7906	0.6926	0.3050	0.3055	0.3055	0.3905	0.3859	4.400

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
9r.A	14.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
13.C	34.C	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
13.A	18.A	-0.0056	-0.0056	-0.0056	-0.0056	-0.0056	-0.0056	-0.0056	0.000
13.B	18.B	-0.0047	-0.0047	-0.0047	-0.0047	-0.0047	-0.0047	-0.0047	0.000
13.C	18.C	-0.0051	-0.0051	-0.0052	-0.0052	-0.0052	-0.0052	-0.0052	0.000
14.A	11.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
14.A	10.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
15.C	16.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
15.C	17.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
18.A	19.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
18.A	21.A	-0.0021	-0.0021	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	0.000
18.B	21.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
18.C	21.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.001
19.A	20.A	-0.0014	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
21.B	22.B	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	0.000
21.A	23.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
21.B	23.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
21.C	23.C	-0.0015	-0.0015	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
23.C	24.C	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0023	-0.0023	0.001
23.A	25.A	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
23.B	25.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
23.C	25.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
25r.A	26.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000
25r.C	26.C	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000
25.A	28.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
25.B	28.B	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0012	-0.0012	0.000
25.C	28.C	-0.0012	-0.0012	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
26.A	27.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
26.C	27.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
26.C	31.C	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
27.A	33.A	-0.0021	-0.0021	-0.0020	-0.0020	-0.0020	-0.0021	-0.0021	0.000
28.A	29.A	-0.0021	-0.0021	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	0.000
28.B	29.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
28.C	29.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.001
29.A	30.A	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	0.000
29.B	30.B	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	0.000
29.C	30.C	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	0.001
30.A	250.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
30.B	250.B	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0012	-0.0012	0.000
30.C	250.C	-0.0012	-0.0012	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
31.C	32.C	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
34.C	15.C	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	0.000
35.A	36.A	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0033	-0.0033	0.000
35.B	36.B	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	0.000
35.A	40.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
35.B	40.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
35.C	40.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
36.A	37.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
36.B	38.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
38.B	39.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
40.C	41.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
40.A	42.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
40.B	42.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
40.C	42.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
42.B	43.B	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.000
42.A	44.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
42.B	44.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
42.C	44.C	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0012	-0.0012	0.000
44.A	45.A	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	0.000
44.A	47.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
44.B	47.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
44.C	47.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
45.A	46.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
47.A	48.A	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.000
47.B	48.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
47.C	48.C	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
47.A	49.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
47.B	49.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
47.C	49.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
49.A	50.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
49.B	50.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
49.C	50.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
50.A	51.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
50.B	51.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
50.C	51.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
51.A	151.A	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	0.000
51.B	151.B	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	0.000
51.C	151.C	-0.0031	-0.0031	-0.0031	-0.0031	-0.0031	-0.0032	-0.0032	0.001
52.A	53.A	0.4765	0.4465	0.3465	0.3471	0.3471	0.2578	0.2593	2.279
52.B	53.B	0.1870	0.1842	0.2021	0.2021	0.2021	0.2235	0.2232	0.295
52.C	53.C	0.5271	0.4617	0.2032	0.2036	0.2036	0.2602	0.2572	3.041
53.A	54.A	0.2978	0.2791	0.2166	0.2169	0.2169	0.1611	0.1621	1.611

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
53.B	54.B	0.1169	0.1151	0.1263	0.1263	0.1263	0.1397	0.1395	0.198
53.C	54.C	0.3294	0.2886	0.1270	0.1272	0.1272	0.1626	0.1607	2.010
54.A	55.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000
54.B	55.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
54.C	55.C	-0.0015	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
54.A	57.A	0.8912	0.8353	0.6443	0.6453	0.6453	0.4748	0.4776	3.744
54.B	57.B	0.3185	0.3150	0.3663	0.3661	0.3661	0.4228	0.4220	0.610
54.C	57.C	0.8586	0.7438	0.2983	0.2989	0.2989	0.3977	0.3924	4.943
55.A	56.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000
55.B	56.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
55.C	56.C	-0.0015	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
57.B	58.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
57.A	60.A	1.9096	1.7898	1.3805	1.3828	1.3828	1.0175	1.0234	7.865
57.B	60.B	0.6824	0.6750	0.7849	0.7844	0.7844	0.9060	0.9043	1.308
57.C	60.C	1.8399	1.5939	0.6392	0.6405	0.6405	0.8521	0.8408	9.686
58.B	59.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
60.A	61.A	-0.0039	-0.0039	-0.0038	-0.0038	-0.0038	-0.0038	-0.0038	0.001
60.B	61.B	-0.0035	-0.0035	-0.0035	-0.0035	-0.0035	-0.0035	-0.0035	0.000
60.C	61.C	-0.0031	-0.0031	-0.0032	-0.0032	-0.0032	-0.0032	-0.0032	0.002
60.A	62.A	-0.0160	-0.0160	-0.0158	-0.0158	-0.0158	-0.0156	-0.0156	0.005
60.B	62.B	-0.0155	-0.0155	-0.0155	-0.0155	-0.0155	-0.0155	-0.0155	0.000
60.C	62.C	-0.0146	-0.0147	-0.0152	-0.0152	-0.0152	-0.0156	-0.0156	0.012
62.A	63.A	-0.0112	-0.0112	-0.0110	-0.0110	-0.0110	-0.0109	-0.0109	0.005
62.B	63.B	-0.0108	-0.0108	-0.0108	-0.0108	-0.0108	-0.0109	-0.0109	0.000
62.C	63.C	-0.0103	-0.0103	-0.0106	-0.0106	-0.0106	-0.0109	-0.0109	0.000
63.A	64.A	-0.0224	-0.0224	-0.0221	-0.0221	-0.0221	-0.0218	-0.0219	0.007
63.B	64.B	-0.0216	-0.0216	-0.0217	-0.0217	-0.0217	-0.0218	-0.0218	0.000
63.C	64.C	-0.0205	-0.0206	-0.0213	-0.0213	-0.0213	-0.0218	-0.0218	0.017
64.A	65.A	-0.0272	-0.0272	-0.0268	-0.0268	-0.0268	-0.0265	-0.0265	0.009
64.B	65.B	-0.0263	-0.0263	-0.0263	-0.0263	-0.0263	-0.0264	-0.0264	0.002
64.C	65.C	-0.0249	-0.0251	-0.0258	-0.0258	-0.0258	-0.0265	-0.0265	0.020
65.A	66.A	-0.0208	-0.0208	-0.0205	-0.0205	-0.0205	-0.0203	-0.0203	0.007
65.B	66.B	-0.0201	-0.0201	-0.0201	-0.0201	-0.0201	-0.0202	-0.0202	0.001
65.C	66.C	-0.0190	-0.0192	-0.0197	-0.0197	-0.0197	-0.0202	-0.0202	0.016
67.A	68.A	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	0.000
67.A	72.A	0.7262	0.6863	0.5298	0.5307	0.5307	0.3875	0.3897	1.000
67.B	72.B	0.2692	0.2701	0.3053	0.3051	0.3051	0.3476	0.3470	0.490
67.C	72.C	0.6515	0.5467	0.2244	0.2249	0.2249	0.3127	0.3085	1.147
67.A	97.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
67.B	97.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
67.C	97.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.001

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
68.A	69.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	0.000
69.A	70.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
70.A	71.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	0.000
72.C	73.C	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	0.001
72.A	76.A	0.5281	0.4991	0.3853	0.3860	0.3860	0.2818	0.2834	0.850
72.B	76.B	0.1958	0.1964	0.2220	0.2219	0.2219	0.2528	0.2523	0.385
72.C	76.C	0.4738	0.3976	0.1632	0.1635	0.1635	0.2274	0.2244	0.997
73.C	74.C	-0.0014	-0.0015	-0.0014	-0.0014	-0.0014	-0.0015	-0.0015	0.001
74.C	75.C	-0.0016	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.001
76.A	77.A	0.8084	0.7574	0.5445	0.5456	0.5456	0.3511	0.3541	1.298
76.B	77.B	0.2811	0.2805	0.3046	0.3044	0.3044	0.3372	0.3367	0.351
76.C	77.C	1.0906	0.9069	0.2955	0.2970	0.2970	0.2909	0.2869	2.227
76.A	86.A	0.0362	0.0353	0.0346	0.0346	0.0346	0.0340	0.0340	0.016
76.B	86.B	0.0311	0.0307	0.0310	0.0310	0.0310	0.0313	0.0313	0.005
76.C	86.C	0.0266	0.0283	0.0289	0.0288	0.0288	0.0296	0.0296	0.023
77.A	78.A	0.2021	0.1893	0.1361	0.1364	0.1364	0.0878	0.0885	0.507
77.B	78.B	0.0703	0.0701	0.0761	0.0761	0.0761	0.0843	0.0842	0.109
77.C	78.C	0.2726	0.2267	0.0739	0.0742	0.0742	0.0727	0.0717	0.877
78.A	79.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
78.B	79.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
78.C	79.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0016	-0.0016	0.000
78.A	80.A	0.9600	0.8993	0.6465	0.6479	0.6479	0.4169	0.4205	1.675
78.B	80.B	0.3338	0.3331	0.3616	0.3615	0.3615	0.4004	0.3997	0.413
78.C	80.C	1.2951	1.0770	0.3509	0.3526	0.3526	0.3454	0.3407	2.878
80.A	81.A	0.3537	0.3313	0.2382	0.2387	0.2387	0.1536	0.1549	0.864
80.B	81.B	0.1230	0.1227	0.1332	0.1332	0.1332	0.1475	0.1473	0.178
80.C	81.C	0.4771	0.3968	0.1293	0.1299	0.1299	0.1272	0.1255	1.493
81.A	82.A	0.2286	0.2222	0.2151	0.2152	0.2152	0.2089	0.2090	0.147
81.B	82.B	0.2127	0.2106	0.2117	0.2117	0.2117	0.2128	0.2128	0.016
81.C	82.C	0.1731	0.1840	0.1900	0.1899	0.1899	0.1973	0.1971	0.202
81.C	84.C	3.1916	2.6712	0.6614	0.6683	0.6683	0.0019	0.0035	8.374
82.A	83.A	0.2286	0.2222	0.2151	0.2152	0.2152	0.2089	0.2090	0.147
82.B	83.B	0.2127	0.2106	0.2117	0.2117	0.2117	0.2128	0.2128	0.016
82.C	83.C	0.1731	0.1840	0.1900	0.1899	0.1899	0.1973	0.1971	0.202
84.C	85.C	2.2460	1.8798	0.4654	0.4703	0.4703	0.0013	0.0025	7.955
86.A	87.A	0.0220	0.0214	0.0210	0.0210	0.0210	0.0205	0.0206	0.011
86.B	87.B	0.0212	0.0210	0.0212	0.0212	0.0212	0.0213	0.0213	0.002
86.C	87.C	0.0174	0.0185	0.0188	0.0187	0.0187	0.0192	0.0192	0.015
87.A	88.A	0.0189	0.0186	0.0186	0.0186	0.0186	0.0185	0.0185	0.005
87.A	89.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
87.B	89.B	0.0141	0.0139	0.0142	0.0142	0.0142	0.0143	0.0143	0.003

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
87.C	89.C	0.0191	0.0199	0.0201	0.0201	0.0201	0.0205	0.0205	0.011
89.B	90.B	0.0262	0.0262	0.0263	0.0263	0.0263	0.0264	0.0264	0.002
89.A	91.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
89.B	91.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
89.C	91.C	0.0174	0.0180	0.0180	0.0180	0.0180	0.0181	0.0181	0.009
91.C	92.C	0.0312	0.0323	0.0323	0.0323	0.0323	0.0325	0.0325	0.016
91.A	93.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
91.B	93.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
91.C	93.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0016	-0.0016	0.001
93.A	94.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	0.000
93.A	95.A	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
93.B	95.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
93.C	95.C	-0.0020	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.001
95.B	96.B	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	0.000
97.A	98.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
97.B	98.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
97.C	98.C	-0.0018	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.001
98.A	99.A	-0.0032	-0.0031	-0.0031	-0.0031	-0.0031	-0.0031	-0.0031	0.001
98.B	99.B	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	0.000
98.C	99.C	-0.0037	-0.0038	-0.0038	-0.0038	-0.0038	-0.0038	-0.0038	0.001
99.A	100.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
99.B	100.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
99.C	100.C	-0.0020	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.001
100.A	450.A	-0.0046	-0.0045	-0.0045	-0.0045	-0.0045	-0.0045	-0.0045	0.001
100.B	450.B	-0.0050	-0.0050	-0.0050	-0.0050	-0.0050	-0.0050	-0.0050	0.000
100.C	450.C	-0.0054	-0.0055	-0.0055	-0.0055	-0.0055	-0.0055	-0.0055	0.002
197.A	101.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
197.B	101.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
197.C	101.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.001
101.C	102.C	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
101.A	105.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
101.B	105.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
101.C	105.C	-0.0018	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.001
102.C	103.C	-0.0013	-0.0014	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.001
103.C	104.C	-0.0028	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	0.001
105.B	106.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
105.A	108.A	-0.0019	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000
105.B	108.B	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	0.000
105.C	108.C	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	0.001
106.B	107.B	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	0.000
108.A	109.A	-0.0019	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
108.A	300.A	-0.0057	-0.0057	-0.0057	-0.0057	-0.0057	-0.0057	-0.0057	0.001
108.B	300.B	-0.0062	-0.0062	-0.0062	-0.0062	-0.0062	-0.0062	-0.0062	0.000
108.C	300.C	-0.0067	-0.0069	-0.0068	-0.0068	-0.0068	-0.0068	-0.0068	0.002
109.A	110.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
110.A	111.A	-0.0024	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	0.000
110.A	112.A	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	0.000
112.A	113.A	-0.0022	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.000
113.A	114.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
135.A	35.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000
135.B	35.B	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	0.000
135.C	35.C	-0.0023	-0.0023	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	0.001
152.A	52.A	0.9530	0.8931	0.6931	0.6942	0.6942	0.5157	0.5186	4.391
152.B	52.B	0.3741	0.3685	0.4043	0.4041	0.4041	0.4471	0.4465	0.535
152.C	52.C	1.0542	0.9235	0.4065	0.4072	0.4072	0.5205	0.5144	5.672
160r.A	67.A	0.9807	0.9225	0.6884	0.6897	0.6897	0.4757	0.4790	1.156
160r.B	67.B	0.4003	0.3989	0.4261	0.4259	0.4259	0.4623	0.4617	0.388
160r.C	67.C	0.9442	0.8014	0.3404	0.3413	0.3413	0.4051	0.4005	1.324

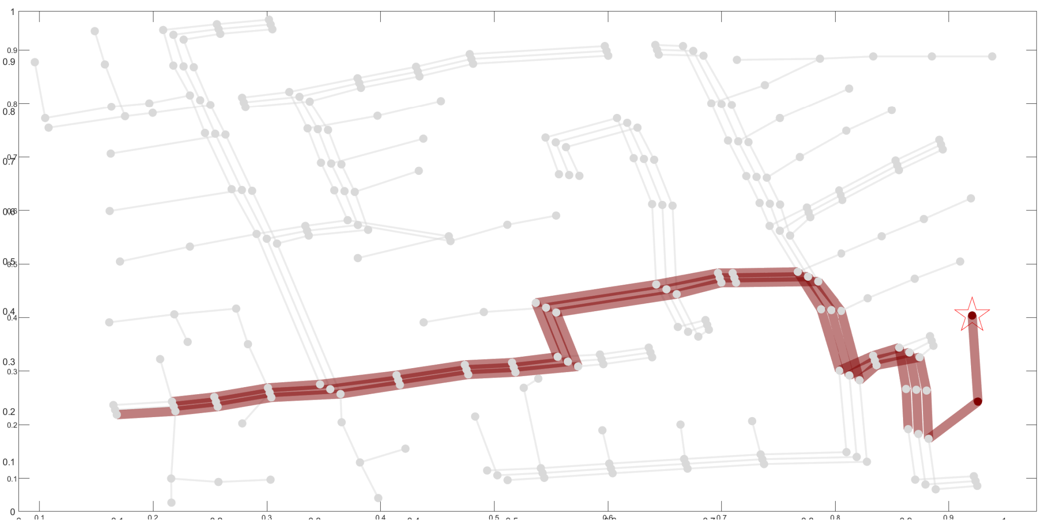

Figure K.7: Representation of M^P and M^Q values obtained for values higher than 0.5 when there is a single-phase perturbation at node 85, phase C. Photovoltaic generation with a rated power of 400 kVA at unity power factor. (Scenario S2)

Table K.13: M^P values obtained for Scenario S2

Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
149.A	1.A	0.1546	0.2020	0.1780	0.2509	0.2848	0.1546	0.1546	0.060
149.B	1.B	0.7820	0.7197	0.7800	0.5110	0.3642	0.7820	0.7820	0.675
149.C	1.C	1.1704	0.9412	1.1358	0.4735	0.2805	1.1704	1.1704	2.635
1.B	2.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
1.C	3.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
1.A	7.A	0.1159	0.1515	0.1335	0.1881	0.2136	0.1159	0.1159	1.050
1.B	7.B	0.5865	0.5397	0.5850	0.3833	0.2731	0.5865	0.5865	2.055
1.C	7.C	0.8778	0.7059	0.8519	0.3551	0.2103	0.8778	0.8778	5.914
3.C	4.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
3.C	5.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
5.C	6.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
7.A	8.A	0.0773	0.1010	0.0890	0.1254	0.1424	0.0773	0.0773	0.729
7.B	8.B	0.3910	0.3598	0.3900	0.2555	0.1821	0.3910	0.3910	1.456
7.C	8.C	0.5852	0.4706	0.5679	0.2367	0.1402	0.5852	0.5852	4.098
8.B	12.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
8.A	9.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
8.A	13.A	0.1159	0.1515	0.1335	0.1881	0.2136	0.1159	0.1159	1.040
8.B	13.B	0.5865	0.5397	0.5849	0.3833	0.2731	0.5865	0.5865	2.057
8.C	13.C	0.8778	0.7059	0.8519	0.3551	0.2103	0.8778	0.8778	5.926
9r.A	14.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
13.C	34.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
13.A	18.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
13.B	18.B	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
13.C	18.C	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.000
14.A	11.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
14.A	10.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
15.C	16.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
15.C	17.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
18.A	19.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
18.A	21.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
18.B	21.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
18.C	21.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
19.A	20.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
21.B	22.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
21.A	23.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
21.B	23.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
21.C	23.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
23.C	24.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
23.A	25.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
23.B	25.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
23.C	25.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
25r.A	26.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
25r.C	26.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
25.A	28.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
25.B	28.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
25.C	28.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
26.A	27.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
26.C	27.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
26.C	31.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
27.A	33.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
28.A	29.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
28.B	29.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
28.C	29.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
29.A	30.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
29.B	30.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
29.C	30.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
30.A	250.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
30.B	250.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
30.C	250.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
31.C	32.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
34.C	15.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
35.A	36.A	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	0.000
35.B	36.B	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
35.A	40.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
35.B	40.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
35.C	40.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
36.A	37.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
36.B	38.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
38.B	39.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
40.C	41.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
40.A	42.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
40.B	42.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
40.C	42.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
42.B	43.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
42.A	44.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
42.B	44.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
42.C	44.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
44.A	45.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
44.A	47.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
44.B	47.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
44.C	47.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
45.A	46.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
47.A	48.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
47.B	48.B	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	0.000
47.C	48.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
47.A	49.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
47.B	49.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
47.C	49.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
49.A	50.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
49.B	50.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
49.C	50.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
50.A	51.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
50.B	51.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
50.C	51.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
51.A	151.A	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.000
51.B	151.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
51.C	151.C	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
52.A	53.A	0.0772	0.1009	0.0889	0.1254	0.1423	0.0772	0.0772	0.711
52.B	53.B	0.3909	0.3597	0.3899	0.2554	0.1820	0.3909	0.3909	1.467
52.C	53.C	0.5851	0.4706	0.5679	0.2367	0.1402	0.5851	0.5851	4.133
53.A	54.A	0.0483	0.0631	0.0556	0.0783	0.0890	0.0483	0.0483	0.465
53.B	54.B	0.2443	0.2248	0.2437	0.1596	0.1138	0.2443	0.2443	0.986
53.C	54.C	0.3657	0.2941	0.3549	0.1479	0.0876	0.3657	0.3657	2.730
54.A	55.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
54.B	55.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
54.C	55.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
54.A	57.A	0.0432	0.0868	0.0656	0.1273	0.1571	0.0432	0.0432	0.972
54.B	57.B	0.8675	0.8042	0.8640	0.5993	0.4530	0.8675	0.8675	2.005
54.C	57.C	0.9340	0.7385	0.9030	0.3521	0.2012	0.9340	0.9340	6.111
55.A	56.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
55.B	56.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
55.C	56.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
57.B	58.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
57.A	60.A	0.0926	0.1861	0.1406	0.2728	0.3366	0.0926	0.0926	2.004
57.B	60.B	1.8588	1.7231	1.8513	1.2842	0.9706	1.8588	1.8588	4.044
57.C	60.C	2.0014	1.5825	1.9351	0.7546	0.4312	2.0014	2.0014	12.156
58.B	59.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
60.A	61.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
60.B	61.B	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
60.C	61.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
60.A	62.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
60.B	62.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
60.C	62.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
62.A	63.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
62.B	63.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
62.C	63.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
63.A	64.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
63.B	64.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
63.C	64.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
64.A	65.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
64.B	65.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
64.C	65.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
65.A	66.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
65.B	66.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
65.C	66.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
67.A	68.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
67.A	72.A	0.0176	0.0536	0.0385	0.0908	0.1194	0.0176	0.0176	0.398
67.B	72.B	0.7341	0.6808	0.7266	0.5022	0.3768	0.7341	0.7341	2.111
67.C	72.C	0.8338	0.6623	0.7928	0.3053	0.1705	0.8338	0.8338	1.913
67.A	97.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
67.B	97.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
67.C	97.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
68.A	69.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
69.A	70.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
70.A	71.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
72.C	73.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
72.A	76.A	0.0128	0.0390	0.0280	0.0660	0.0868	0.0128	0.0128	0.327
72.B	76.B	0.5339	0.4951	0.5284	0.3652	0.2740	0.5339	0.5339	1.646
72.C	76.C	0.6064	0.4817	0.5766	0.2220	0.1240	0.6064	0.6064	1.681
73.C	74.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
74.C	75.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
76.A	77.A	-0.0416	0.0035	-0.0128	0.0394	0.0692	-0.0416	-0.0416	0.421
76.B	77.B	0.6911	0.6386	0.6845	0.4568	0.3295	0.6911	0.6911	2.695
76.C	77.C	1.3031	1.0528	1.2468	0.4992	0.2787	1.3031	1.3031	3.182
76.A	86.A	0.0149	0.0153	0.0148	0.0158	0.0159	0.0149	0.0149	0.009
76.B	86.B	0.0246	0.0244	0.0248	0.0234	0.0229	0.0246	0.0246	0.016
76.C	86.C	0.0135	0.0133	0.0136	0.0138	0.0139	0.0135	0.0135	0.005
77.A	78.A	-0.0104	0.0009	-0.0032	0.0099	0.0173	-0.0104	-0.0104	0.149
77.B	78.B	0.1728	0.1597	0.1711	0.1142	0.0824	0.1728	0.1728	0.793
77.C	78.C	0.3258	0.2632	0.3117	0.1248	0.0697	0.3258	0.3258	1.213
78.A	79.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
78.B	79.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
78.C	79.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
78.A	80.A	-0.0494	0.0041	-0.0152	0.0468	0.0821	-0.0494	-0.0494	0.528
78.B	80.B	0.8207	0.7584	0.8128	0.5424	0.3912	0.8207	0.8207	3.067
78.C	80.C	1.5475	1.2502	1.4805	0.5928	0.3309	1.5475	1.5475	4.152
80.A	81.A	-0.0182	0.0015	-0.0056	0.0173	0.0303	-0.0182	-0.0182	0.253
80.B	81.B	0.3024	0.2794	0.2995	0.1998	0.1441	0.3024	0.3024	1.271
80.C	81.C	0.5701	0.4606	0.5454	0.2184	0.1219	0.5701	0.5701	2.092
81.A	82.A	0.0573	0.0599	0.0569	0.0640	0.0662	0.0573	0.0573	0.075
81.B	82.B	0.1285	0.1269	0.1297	0.1196	0.1153	0.1285	0.1285	0.113
81.C	82.C	0.1224	0.1201	0.1227	0.1229	0.1230	0.1224	0.1224	0.025
81.C	84.C	5.2200	4.3280	5.1801	1.5845	0.4690	5.2200	5.2200	14.724
82.A	83.A	0.0573	0.0599	0.0569	0.0640	0.0662	0.0573	0.0573	0.075
82.B	83.B	0.1285	0.1269	0.1297	0.1196	0.1153	0.1285	0.1285	0.113
82.C	83.C	0.1224	0.1201	0.1227	0.1229	0.1230	0.1224	0.1224	0.025
84.C	85.C	3.6733	3.0456	3.6452	1.1150	0.3300	3.6733	3.6733	13.487
86.A	87.A	0.0073	0.0075	0.0072	0.0078	0.0079	0.0073	0.0073	0.006
86.B	87.B	0.0135	0.0134	0.0137	0.0128	0.0125	0.0135	0.0135	0.010
86.C	87.C	0.0133	0.0131	0.0134	0.0134	0.0135	0.0133	0.0133	0.003
87.A	88.A	0.0188	0.0189	0.0188	0.0192	0.0192	0.0188	0.0188	0.005
87.A	89.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
87.B	89.B	0.0174	0.0174	0.0175	0.0171	0.0169	0.0174	0.0174	0.006
87.C	89.C	0.0003	0.0003	0.0004	0.0003	0.0003	0.0003	0.0003	0.001
89.B	90.B	0.0274	0.0275	0.0275	0.0273	0.0272	0.0274	0.0274	0.004
89.A	91.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
89.B	91.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
89.C	91.C	0.0087	0.0086	0.0088	0.0085	0.0085	0.0087	0.0087	0.004
91.C	92.C	0.0334	0.0330	0.0337	0.0329	0.0326	0.0334	0.0334	0.015
91.A	93.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
91.B	93.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
91.C	93.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
93.A	94.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
93.A	95.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
93.B	95.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
93.C	95.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0002	-0.0001	-0.0001	0.000
95.B	96.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
97.A	98.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
97.B	98.B	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	-0.0003	-0.0003	0.000
97.C	98.C	0.0002	0.0002	0.0002	0.0002	0.0001	0.0002	0.0002	0.000
98.A	99.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
98.B	99.B	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	0.000
98.C	99.C	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
99.A	100.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
99.B	100.B	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
99.C	100.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
100.A	450.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
100.B	450.B	-0.0008	-0.0007	-0.0008	-0.0007	-0.0007	-0.0008	-0.0008	0.001
100.C	450.C	0.0005	0.0005	0.0005	0.0004	0.0004	0.0005	0.0005	0.001
197.A	101.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
197.B	101.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
197.C	101.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
101.C	102.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
101.A	105.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
101.B	105.B	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	-0.0003	-0.0003	0.000
101.C	105.C	0.0002	0.0002	0.0002	0.0002	0.0001	0.0002	0.0002	0.000
102.C	103.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
103.C	104.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
105.B	106.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
105.A	108.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
105.B	108.B	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
105.C	108.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
106.B	107.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
108.A	109.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
108.A	300.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
108.B	300.B	-0.0009	-0.0009	-0.0010	-0.0009	-0.0009	-0.0009	-0.0009	0.001
108.C	300.C	0.0006	0.0006	0.0006	0.0006	0.0005	0.0006	0.0006	0.001
109.A	110.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
110.A	111.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
110.A	112.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
112.A	113.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
113.A	114.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
135.A	35.A	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
135.B	35.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
135.C	35.C	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
152.A	52.A	0.1544	0.2018	0.1779	0.2507	0.2847	0.1544	0.1544	1.381
152.B	52.B	0.7818	0.7195	0.7797	0.5109	0.3641	0.7818	0.7818	2.647
152.C	52.C	1.1703	0.9411	1.1357	0.4734	0.2804	1.1703	1.1703	7.666
160r.A	67.A	-0.0188	0.0313	0.0124	0.0718	0.1047	-0.0188	-0.0188	0.396
160r.B	67.B	0.8091	0.7512	0.8023	0.5501	0.4097	0.8091	0.8091	3.014
160r.C	67.C	1.2359	1.0029	1.1765	0.5260	0.3366	1.2360	1.2360	2.015

Table K.14: M^Q values obtained for Scenario S2

Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
149.A	1.A	-0.0284	0.0131	-0.0401	0.2211	0.3552	-0.0284	-0.028	0.183
149.B	1.B	0.6333	0.6493	0.6623	0.5619	0.5119	0.6333	0.633	0.243
149.C	1.C	4.0677	3.4526	4.0259	1.8745	1.0824	4.0677	4.068	8.839
1.B	2.B	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.001	0.000
1.C	3.C	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
1.A	7.A	-0.0213	0.0098	-0.0301	0.1658	0.2664	-0.0213	-0.021	3.187
1.B	7.B	0.4750	0.4870	0.4967	0.4214	0.3839	0.4750	0.475	0.740
1.C	7.C	3.0507	2.5894	3.0194	1.4058	0.8117	3.0507	3.051	19.837
3.C	4.C	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.001	0.000
3.C	5.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
5.C	6.C	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
7.A	8.A	-0.0142	0.0065	-0.0200	0.1105	0.1776	-0.0142	-0.014	2.211
7.B	8.B	0.3167	0.3246	0.3311	0.2809	0.2559	0.3167	0.317	0.524
7.C	8.C	2.0338	1.7263	2.0129	0.9372	0.5411	2.0338	2.034	13.746
8.B	12.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
8.A	9.A	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
8.A	13.A	-0.0214	0.0098	-0.0301	0.1658	0.2664	-0.0214	-0.021	3.155
8.B	13.B	0.4749	0.4869	0.4967	0.4214	0.3839	0.4749	0.475	0.741
8.C	13.C	3.0507	2.5894	3.0193	1.4058	0.8117	3.0507	3.051	19.878
9r.A	14.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
13.C	34.C	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.001	0.000
13.A	18.A	-0.0056	-0.0056	-0.0056	-0.0056	-0.0056	-0.0056	-0.006	0.000
13.B	18.B	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	-0.005	0.000
13.C	18.C	-0.0054	-0.0053	-0.0053	-0.0053	-0.0053	-0.0054	-0.005	0.000
14.A	11.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
14.A	10.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
15.C	16.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
15.C	17.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.001	0.000
18.A	19.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
18.A	21.A	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.002	0.000
18.B	21.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
18.C	21.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
19.A	20.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
21.B	22.B	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.002	0.000
21.A	23.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
21.B	23.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
21.C	23.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
23.C	24.C	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.002	0.001
23.A	25.A	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
23.B	25.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
23.C	25.C	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000
25r.A	26.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000
25r.C	26.C	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000
25.A	28.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
25.B	28.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
25.C	28.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
26.A	27.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
26.C	27.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
26.C	31.C	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
27.A	33.A	-0.0021	-0.0021	-0.0021	-0.0021	-0.0020	-0.0021	-0.002	0.000
28.A	29.A	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.002	0.000
28.B	29.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
28.C	29.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
29.A	30.A	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.002	0.000
29.B	30.B	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.002	0.000
29.C	30.C	-0.0023	-0.0023	-0.0023	-0.0022	-0.0022	-0.0023	-0.002	0.000
30.A	250.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
30.B	250.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
30.C	250.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
31.C	32.C	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
34.C	15.C	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	0.000	0.000
35.A	36.A	-0.0033	-0.0033	-0.0033	-0.0033	-0.0033	-0.0033	-0.003	0.000
35.B	36.B	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.003	0.000
35.A	40.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
35.B	40.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
35.C	40.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.001	0.000
36.A	37.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
36.B	38.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
38.B	39.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
40.C	41.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0013	-0.0014	-0.001	0.000
40.A	42.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
40.B	42.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
40.C	42.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.001	0.000
42.B	43.B	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.002	0.000
42.A	44.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
42.B	44.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
42.C	44.C	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
44.A	45.A	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.001	0.000
44.A	47.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
44.B	47.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
44.C	47.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.001	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
45.A	46.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
47.A	48.A	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.001	0.000
47.B	48.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
47.C	48.C	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
47.A	49.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
47.B	49.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
47.C	49.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
49.A	50.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
49.B	50.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
49.C	50.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
50.A	51.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
50.B	51.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
50.C	51.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
51.A	151.A	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.002	0.000
51.B	151.B	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.003	0.000
51.C	151.C	-0.0032	-0.0032	-0.0032	-0.0032	-0.0032	-0.0032	-0.003	0.000
52.A	53.A	-0.0143	0.0064	-0.0201	0.1104	0.1775	-0.0143	-0.014	2.157
52.B	53.B	0.3165	0.3245	0.3310	0.2808	0.2558	0.3165	0.317	0.528
52.C	53.C	2.0335	1.7260	2.0126	0.9370	0.5410	2.0335	2.034	13.862
53.A	54.A	-0.0089	0.0040	-0.0126	0.0690	0.1109	-0.0089	-0.009	1.412
53.B	54.B	0.1978	0.2028	0.2069	0.1755	0.1599	0.1978	0.198	0.355
53.C	54.C	1.2709	1.0787	1.2579	0.5856	0.3381	1.2709	1.271	9.157
54.A	55.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
54.B	55.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
54.C	55.C	-0.0017	-0.0017	-0.0017	-0.0016	-0.0016	-0.0017	-0.002	0.001
54.A	57.A	-0.0444	-0.0046	-0.0550	0.1922	0.3204	-0.0444	-0.044	3.204
54.B	57.B	0.6499	0.6619	0.6787	0.5614	0.5011	0.6499	0.650	0.859
54.C	57.C	3.4632	2.9371	3.4313	1.5706	0.8854	3.4632	3.463	21.498
55.A	56.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
55.B	56.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
55.C	56.C	-0.0017	-0.0017	-0.0017	-0.0016	-0.0016	-0.0017	-0.002	0.000
57.B	58.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
57.A	60.A	-0.0952	-0.0098	-0.1179	0.4118	0.6865	-0.0952	-0.095	6.606
57.B	60.B	1.3925	1.4182	1.4542	1.2028	1.0736	1.3925	1.392	1.733
57.C	60.C	7.4209	6.2936	7.3527	3.3654	1.8972	7.4209	7.421	42.763
58.B	59.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
60.A	61.A	-0.0037	-0.0038	-0.0037	-0.0038	-0.0038	-0.0037	-0.004	0.000
60.B	61.B	-0.0036	-0.0036	-0.0036	-0.0036	-0.0035	-0.0036	-0.004	0.000
60.C	61.C	-0.0034	-0.0034	-0.0034	-0.0033	-0.0033	-0.0034	-0.003	0.002
60.A	62.A	-0.0151	-0.0151	-0.0151	-0.0153	-0.0154	-0.0151	-0.015	0.000
60.B	62.B	-0.0157	-0.0157	-0.0157	-0.0157	-0.0156	-0.0157	-0.016	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
60.C	62.C	-0.0167	-0.0166	-0.0167	-0.0162	-0.0159	-0.0167	-0.017	0.011
62.A	63.A	-0.0106	-0.0106	-0.0105	-0.0107	-0.0108	-0.0106	-0.011	0.000
62.B	63.B	-0.0110	-0.0110	-0.0110	-0.0110	-0.0109	-0.0110	-0.011	0.001
62.C	63.C	-0.0117	-0.0116	-0.0117	-0.0113	-0.0111	-0.0117	-0.012	0.007
63.A	64.A	-0.0211	-0.0212	-0.0211	-0.0214	-0.0216	-0.0211	-0.021	0.000
63.B	64.B	-0.0220	-0.0220	-0.0220	-0.0219	-0.0219	-0.0220	-0.022	0.002
63.C	64.C	-0.0234	-0.0232	-0.0234	-0.0227	-0.0223	-0.0234	-0.023	0.015
64.A	65.A	-0.0256	-0.0257	-0.0256	-0.0260	-0.0263	-0.0256	-0.026	0.008
64.B	65.B	-0.0267	-0.0268	-0.0268	-0.0266	-0.0265	-0.0267	-0.027	0.000
64.C	65.C	-0.0284	-0.0282	-0.0284	-0.0275	-0.0270	-0.0284	-0.028	0.018
65.A	66.A	-0.0196	-0.0197	-0.0196	-0.0199	-0.0201	-0.0196	-0.020	0.006
65.B	66.B	-0.0204	-0.0205	-0.0205	-0.0204	-0.0203	-0.0204	-0.020	0.002
65.C	66.C	-0.0217	-0.0215	-0.0217	-0.0210	-0.0207	-0.0217	-0.022	0.014
67.A	68.A	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.001	0.000
67.A	72.A	-0.0617	-0.0289	-0.0673	0.1367	0.2479	-0.0617	-0.062	1.232
67.B	72.B	0.5293	0.5394	0.5537	0.4562	0.4069	0.5293	0.529	0.867
67.C	72.C	3.0338	2.5743	2.9647	1.3445	0.7484	3.0338	3.034	6.591
67.A	97.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
67.B	97.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
67.C	97.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
68.A	69.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.001	0.000
69.A	70.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
70.A	71.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.001	0.000
72.C	73.C	-0.0011	-0.0011	-0.0012	-0.0011	-0.0011	-0.0011	-0.001	0.000
72.A	76.A	-0.0448	-0.0210	-0.0490	0.0994	0.1803	-0.0448	-0.045	1.012
72.B	76.B	0.3850	0.3923	0.4027	0.3318	0.2959	0.3850	0.385	0.676
72.C	76.C	2.2063	1.8722	2.1561	0.9778	0.5442	2.2063	2.206	5.792
73.C	74.C	-0.0015	-0.0014	-0.0015	-0.0014	-0.0014	-0.0015	-0.001	0.001
74.C	75.C	-0.0017	-0.0016	-0.0017	-0.0016	-0.0016	-0.0017	-0.002	0.000
76.A	77.A	-0.2564	-0.2108	-0.2620	0.0088	0.1595	-0.2564	-0.256	1.603
76.B	77.B	0.4891	0.5018	0.5141	0.4286	0.3864	0.4891	0.489	0.951
76.C	77.C	3.8067	3.1978	3.7184	1.5596	0.7975	3.8067	3.807	9.346
76.A	86.A	0.0321	0.0323	0.0320	0.0337	0.0340	0.0321	0.032	0.017
76.B	86.B	0.0327	0.0329	0.0327	0.0323	0.0320	0.0327	0.033	0.007
76.C	86.C	0.0313	0.0306	0.0317	0.0297	0.0290	0.0313	0.031	0.022
77.A	78.A	-0.0641	-0.0527	-0.0655	0.0022	0.0399	-0.0641	-0.064	0.567
77.B	78.B	0.1223	0.1255	0.1285	0.1072	0.0966	0.1223	0.122	0.280
77.C	78.C	0.9517	0.7995	0.9296	0.3899	0.1994	0.9517	0.952	3.563
78.A	79.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
78.B	79.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
78.C	79.C	-0.0016	-0.0016	-0.0016	-0.0015	-0.0015	-0.0016	-0.002	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
78.A	80.A	-0.3045	-0.2503	-0.3111	0.0104	0.1894	-0.3045	-0.304	2.010
78.B	80.B	0.5808	0.5958	0.6104	0.5090	0.4588	0.5808	0.581	1.083
78.C	80.C	4.5204	3.7973	4.4154	1.8519	0.9469	4.5204	4.520	12.197
80.A	81.A	-0.1122	-0.0922	-0.1146	0.0038	0.0698	-0.1122	-0.112	0.963
80.B	81.B	0.2140	0.2195	0.2249	0.1875	0.1690	0.2140	0.214	0.449
80.C	81.C	1.6654	1.3990	1.6267	0.6823	0.3489	1.6654	1.665	6.145
81.A	82.A	0.1893	0.1911	0.1881	0.2024	0.2067	0.1893	0.189	0.152
81.B	82.B	0.2195	0.2211	0.2203	0.2178	0.2164	0.2195	0.219	0.037
81.C	82.C	0.2160	0.2103	0.2185	0.2021	0.1956	0.2160	0.216	0.195
81.C	84.C	5.2889	4.3846	5.2484	1.6035	0.4726	5.2889	5.289	14.926
82.A	83.A	0.1893	0.1911	0.1881	0.2024	0.2066	0.1893	0.189	0.151
82.B	83.B	0.2194	0.2211	0.2203	0.2178	0.2164	0.2194	0.219	0.037
82.C	83.C	0.2160	0.2103	0.2185	0.2021	0.1956	0.2160	0.216	0.196
84.C	85.C	3.7218	3.0854	3.6932	1.1283	0.3326	3.7218	3.722	13.672
86.A	87.A	0.0193	0.0194	0.0191	0.0203	0.0206	0.0193	0.019	0.012
86.B	87.B	0.0220	0.0221	0.0220	0.0218	0.0217	0.0220	0.022	0.004
86.C	87.C	0.0200	0.0195	0.0203	0.0191	0.0187	0.0200	0.020	0.014
87.A	88.A	0.0184	0.0184	0.0184	0.0188	0.0187	0.0184	0.018	0.005
87.A	89.A	-0.0017	-0.0017	-0.0017	-0.0018	-0.0018	-0.0017	-0.002	0.000
87.B	89.B	0.0151	0.0151	0.0151	0.0148	0.0147	0.0151	0.015	0.004
87.C	89.C	0.0212	0.0209	0.0214	0.0206	0.0202	0.0212	0.021	0.011
89.B	90.B	0.0268	0.0268	0.0268	0.0266	0.0265	0.0268	0.027	0.004
89.A	91.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
89.B	91.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
89.C	91.C	0.0182	0.0180	0.0184	0.0179	0.0177	0.0182	0.018	0.009
91.C	92.C	0.0326	0.0322	0.0329	0.0321	0.0318	0.0326	0.033	0.015
91.A	93.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
91.B	93.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
91.C	93.C	-0.0016	-0.0015	-0.0016	-0.0015	-0.0015	-0.0016	-0.002	0.001
93.A	94.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.001	0.000
93.A	95.A	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
93.B	95.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
93.C	95.C	-0.0021	-0.0021	-0.0021	-0.0020	-0.0020	-0.0021	-0.002	0.001
95.B	96.B	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.001	0.000
97.A	98.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
97.B	98.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
97.C	98.C	-0.0019	-0.0018	-0.0019	-0.0018	-0.0018	-0.0019	-0.002	0.000
98.A	99.A	-0.0031	-0.0031	-0.0031	-0.0032	-0.0032	-0.0031	-0.003	0.000
98.B	99.B	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.003	0.000
98.C	99.C	-0.0037	-0.0037	-0.0037	-0.0037	-0.0037	-0.0037	-0.004	0.001
99.A	100.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
99.B	100.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
99.C	100.C	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.002	0.000
100.A	450.A	-0.0046	-0.0046	-0.0046	-0.0046	-0.0046	-0.0046	-0.005	0.001
100.B	450.B	-0.0050	-0.0050	-0.0050	-0.0050	-0.0050	-0.0050	-0.005	0.000
100.C	450.C	-0.0054	-0.0053	-0.0054	-0.0054	-0.0053	-0.0054	-0.005	0.001
197.A	101.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
197.B	101.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
197.C	101.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
101.C	102.C	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
101.A	105.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
101.B	105.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
101.C	105.C	-0.0019	-0.0018	-0.0019	-0.0018	-0.0018	-0.0019	-0.002	0.000
102.C	103.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
103.C	104.C	-0.0029	-0.0028	-0.0029	-0.0028	-0.0028	-0.0029	-0.003	0.001
105.B	106.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
105.A	108.A	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
105.B	108.B	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.002	0.000
105.C	108.C	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.002	0.001
106.B	107.B	-0.0024	-0.0024	-0.0024	-0.0023	-0.0023	-0.0024	-0.002	0.000
108.A	109.A	-0.0018	-0.0018	-0.0018	-0.0019	-0.0018	-0.0018	-0.002	0.000
108.A	300.A	-0.0057	-0.0057	-0.0057	-0.0058	-0.0058	-0.0057	-0.006	0.001
108.B	300.B	-0.0062	-0.0062	-0.0062	-0.0062	-0.0062	-0.0062	-0.006	0.000
108.C	300.C	-0.0067	-0.0067	-0.0068	-0.0067	-0.0067	-0.0067	-0.007	0.002
109.A	110.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
110.A	111.A	-0.0023	-0.0023	-0.0023	-0.0024	-0.0024	-0.0023	-0.002	0.000
110.A	112.A	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.001	0.000
112.A	113.A	-0.0021	-0.0021	-0.0021	-0.0022	-0.0022	-0.0021	-0.002	0.000
113.A	114.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
135.A	35.A	-0.0017	-0.0017	-0.0017	-0.0018	-0.0018	-0.0017	-0.002	0.000
135.B	35.B	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.002	0.000
135.C	35.C	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.002	0.000
152.A	52.A	-0.0286	0.0129	-0.0402	0.2209	0.3550	-0.0286	-0.029	4.191
152.B	52.B	0.6331	0.6490	0.6620	0.5617	0.5116	0.6331	0.633	0.953
152.C	52.C	4.0670	3.4521	4.0253	1.8741	1.0820	4.0670	4.067	25.715
160r.A	67.A	-0.1943	-0.1437	-0.2009	0.1005	0.2664	-0.1943	-0.194	1.497
160r.B	67.B	0.6299	0.6445	0.6574	0.5639	0.5174	0.6299	0.630	1.057
160r.C	67.C	3.7108	3.1359	3.6195	1.6278	0.9087	3.7108	3.711	6.278

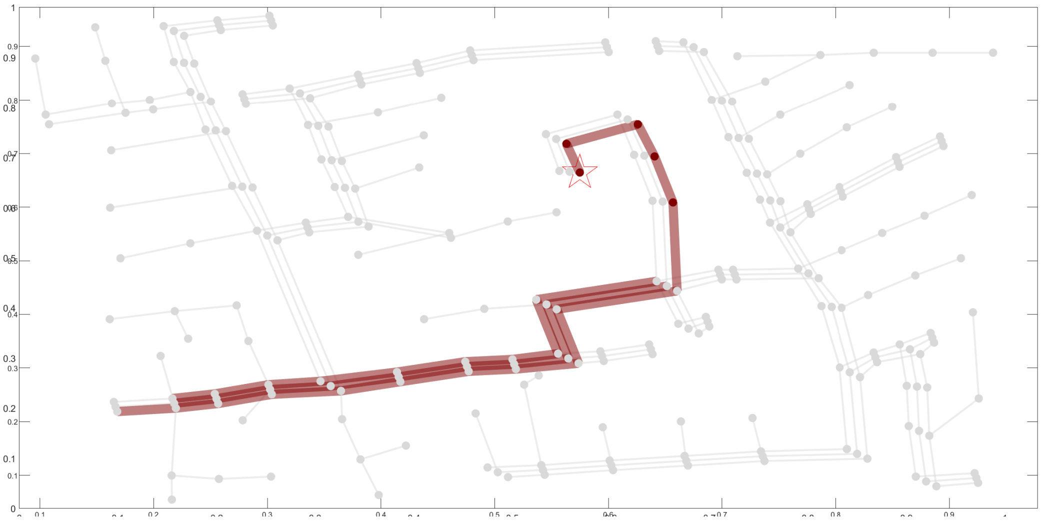

Figure K.8: Representation of M^P and M^Q values obtained for values higher than 0.5 when there is a single-phase perturbation at node 66, phase C. Load consumption with a rated power of 400 kW and 200 kVAr. (Scenario S3)

Table K.15: M^P values obtained for Scenario S3

Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
149.A	1.A	0.4578	0.4407	0.3678	0.3682	0.3682	0.3170	0.3180	0.000
149.B	1.B	-0.2852	-0.2470	-0.0177	-0.0189	-0.0189	0.1787	0.1756	0.000
149.C	1.C	0.9294	0.8397	0.3887	0.3902	0.3902	0.2333	0.2337	3.120
1.B	2.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
1.C	3.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
1.A	7.A	0.3433	0.3306	0.2758	0.2761	0.2761	0.2378	0.2385	1.111
1.B	7.B	-0.2139	-0.1852	-0.0133	-0.0142	-0.0142	0.1340	0.1317	2.622
1.C	7.C	0.6971	0.6298	0.2915	0.2926	0.2926	0.1749	0.1753	4.646
3.C	4.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
3.C	5.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
5.C	6.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
7.A	8.A	0.2289	0.2204	0.1839	0.1841	0.1841	0.1585	0.1590	0.761
7.B	8.B	-0.1426	-0.1235	-0.0089	-0.0095	-0.0095	0.0894	0.0878	1.819
7.C	8.C	0.4647	0.4198	0.1943	0.1951	0.1951	0.1166	0.1169	3.249
8.B	12.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
8.A	9.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
8.A	13.A	0.3433	0.3305	0.2758	0.2761	0.2761	0.2377	0.2385	1.087
8.B	13.B	-0.2139	-0.1852	-0.0133	-0.0142	-0.0142	0.1340	0.1317	2.573
8.C	13.C	0.6970	0.6298	0.2915	0.2926	0.2926	0.1749	0.1753	4.648
9r.A	14.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
13.C	34.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
13.A	18.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
13.B	18.B	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
13.C	18.C	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.000
14.A	11.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
14.A	10.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
15.C	16.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
15.C	17.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
18.A	19.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
18.A	21.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
18.B	21.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
18.C	21.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
19.A	20.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
21.B	22.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
21.A	23.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
21.B	23.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
21.C	23.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
23.C	24.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
23.A	25.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
23.B	25.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
23.C	25.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
25r.A	26.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
25r.C	26.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
25.A	28.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
25.B	28.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
25.C	28.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
26.A	27.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
26.C	27.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
26.C	31.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
27.A	33.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
28.A	29.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
28.B	29.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
28.C	29.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
29.A	30.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
29.B	30.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
29.C	30.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
30.A	250.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
30.B	250.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
30.C	250.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
31.C	32.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
34.C	15.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
35.A	36.A	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
35.B	36.B	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
35.A	40.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
35.B	40.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
35.C	40.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
36.A	37.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
36.B	38.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
38.B	39.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
40.C	41.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
40.A	42.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
40.B	42.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
40.C	42.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
42.B	43.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
42.A	44.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
42.B	44.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
42.C	44.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
44.A	45.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
44.A	47.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
44.B	47.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
44.C	47.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
45.A	46.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
47.A	48.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
47.B	48.B	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	0.000
47.C	48.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
47.A	49.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
47.B	49.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
47.C	49.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
49.A	50.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
49.B	50.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
49.C	50.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
50.A	51.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
50.B	51.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
50.C	51.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
51.A	151.A	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.000
51.B	151.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
51.C	151.C	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
52.A	53.A	0.2288	0.2203	0.1838	0.1840	0.1840	0.1584	0.1589	0.817
52.B	53.B	-0.1426	-0.1235	-0.0089	-0.0095	-0.0095	0.0893	0.0878	1.819
52.C	53.C	0.4646	0.4198	0.1943	0.1950	0.1950	0.1166	0.1168	3.244
53.A	54.A	0.1430	0.1377	0.1149	0.1150	0.1150	0.0990	0.0993	0.487
53.B	54.B	-0.0891	-0.0772	-0.0055	-0.0059	-0.0059	0.0558	0.0549	1.200
53.C	54.C	0.2904	0.2624	0.1214	0.1219	0.1219	0.0729	0.0730	2.127

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
54.A	55.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	-0.0002	0.000
54.B	55.B	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.000
54.C	55.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
54.A	57.A	0.3104	0.2951	0.2311	0.2315	0.2315	0.1858	0.1867	1.126
54.B	57.B	-0.1974	-0.1589	0.0698	0.0686	0.0686	0.2669	0.2638	3.102
54.C	57.C	0.8636	0.7793	0.3495	0.3509	0.3509	0.1852	0.1860	5.940
55.A	56.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	-0.0002	0.000
55.B	56.B	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.000
55.C	56.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
57.B	58.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
57.A	60.A	0.6651	0.6322	0.4953	0.4960	0.4960	0.3982	0.4001	2.357
57.B	60.B	-0.4230	-0.3405	0.1496	0.1471	0.1471	0.5719	0.5654	6.672
57.C	60.C	1.8507	1.6699	0.7488	0.7520	0.7520	0.3968	0.3986	11.598
58.B	59.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
60.A	61.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
60.B	61.B	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
60.C	61.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
60.A	62.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0000	0.001
60.B	62.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.0000	0.0000	0.000
60.C	62.C	1.3488	1.1644	0.2821	0.2850	0.2850	0.0020	0.0027	9.055
62.A	63.A	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.001
62.B	63.B	-0.0001	-0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
62.C	63.C	0.9442	0.8151	0.1975	0.1995	0.1995	0.0014	0.0019	6.897
63.A	64.A	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.001
63.B	64.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.0000	0.0000	0.000
63.C	64.C	1.8885	1.6302	0.3950	0.3991	0.3991	0.0028	0.0037	12.958
64.A	65.A	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.001
64.B	65.B	-0.0001	-0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
64.C	65.C	2.2932	1.9796	0.4797	0.4846	0.4846	0.0034	0.0045	16.032
65.A	66.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
65.B	66.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
65.C	66.C	1.7537	1.5139	0.3668	0.3706	0.3706	0.0026	0.0035	13.208
67.A	68.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
67.A	72.A	0.1588	0.1558	0.1514	0.1514	0.1514	0.1509	0.1510	0.052
67.B	72.B	0.2150	0.2176	0.2250	0.2250	0.2250	0.2296	0.2294	0.101
67.C	72.C	0.1468	0.1499	0.1457	0.1457	0.1457	0.1423	0.1423	0.050
67.A	97.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
67.B	97.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
67.C	97.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
68.A	69.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
69.A	70.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
70.A	71.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
72.C	73.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
72.A	76.A	0.1155	0.1133	0.1101	0.1101	0.1101	0.1098	0.1098	0.040
72.B	76.B	0.1563	0.1583	0.1636	0.1636	0.1636	0.1670	0.1669	0.077
72.C	76.C	0.1068	0.1090	0.1060	0.1060	0.1060	0.1035	0.1035	0.038
73.C	74.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
74.C	75.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
76.A	77.A	0.1105	0.1074	0.1037	0.1037	0.1037	0.1034	0.1035	0.045
76.B	77.B	0.1673	0.1694	0.1758	0.1757	0.1757	0.1797	0.1795	0.085
76.C	77.C	0.2076	0.2111	0.2074	0.2074	0.2074	0.2044	0.2044	0.045
76.A	86.A	0.0163	0.0160	0.0155	0.0155	0.0155	0.0155	0.0155	0.006
76.B	86.B	0.0212	0.0214	0.0222	0.0222	0.0222	0.0226	0.0226	0.011
76.C	86.C	0.0151	0.0155	0.0151	0.0151	0.0151	0.0147	0.0147	0.005
77.A	78.A	0.0276	0.0269	0.0259	0.0259	0.0259	0.0259	0.0259	0.014
77.B	78.B	0.0418	0.0423	0.0439	0.0439	0.0439	0.0449	0.0449	0.025
77.C	78.C	0.0519	0.0528	0.0519	0.0518	0.0518	0.0511	0.0511	0.014
78.A	79.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
78.B	79.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
78.C	79.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
78.A	80.A	0.1312	0.1275	0.1231	0.1232	0.1232	0.1228	0.1229	0.052
78.B	80.B	0.1986	0.2011	0.2087	0.2087	0.2087	0.2133	0.2132	0.098
78.C	80.C	0.2465	0.2507	0.2463	0.2463	0.2463	0.2428	0.2427	0.052
80.A	81.A	0.0483	0.0470	0.0454	0.0454	0.0454	0.0453	0.0453	0.022
80.B	81.B	0.0732	0.0741	0.0769	0.0769	0.0769	0.0786	0.0785	0.042
80.C	81.C	0.0908	0.0923	0.0907	0.0907	0.0907	0.0894	0.0894	0.022
81.A	82.A	0.0690	0.0671	0.0648	0.0648	0.0648	0.0646	0.0647	0.031
81.B	82.B	0.1045	0.1058	0.1098	0.1098	0.1098	0.1123	0.1122	0.057
81.C	82.C	0.1297	0.1319	0.1296	0.1296	0.1296	0.1278	0.1277	0.030
81.C	84.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
82.A	83.A	0.0690	0.0671	0.0648	0.0648	0.0648	0.0646	0.0647	0.031
82.B	83.B	0.1045	0.1058	0.1098	0.1098	0.1098	0.1123	0.1122	0.057
82.C	83.C	0.1297	0.1319	0.1296	0.1296	0.1296	0.1278	0.1277	0.030
84.C	85.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
86.A	87.A	0.0080	0.0078	0.0076	0.0076	0.0076	0.0076	0.0076	0.004
86.B	87.B	0.0115	0.0117	0.0121	0.0121	0.0121	0.0124	0.0124	0.007
86.C	87.C	0.0142	0.0145	0.0142	0.0142	0.0142	0.0140	0.0140	0.004
87.A	88.A	0.0192	0.0192	0.0189	0.0189	0.0189	0.0190	0.0190	0.004
87.A	89.A	0.0002	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
87.B	89.B	0.0163	0.0164	0.0166	0.0166	0.0166	0.0167	0.0167	0.004
87.C	89.C	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.001
89.B	90.B	0.0268	0.0268	0.0269	0.0269	0.0269	0.0270	0.0270	0.002

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
89.A	91.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
89.B	91.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
89.C	91.C	0.0085	0.0086	0.0087	0.0087	0.0087	0.0087	0.0087	0.002
91.C	92.C	0.0327	0.0332	0.0333	0.0333	0.0333	0.0333	0.0333	0.009
91.A	93.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
91.B	93.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
91.C	93.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
93.A	94.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
93.A	95.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
93.B	95.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
93.C	95.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
95.B	96.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
97.A	98.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
97.B	98.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
97.C	98.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
98.A	99.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
98.B	99.B	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	0.000
98.C	99.C	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.001
99.A	100.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
99.B	100.B	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
99.C	100.C	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
100.A	450.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
100.B	450.B	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.001
100.C	450.C	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.001
197.A	101.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
197.B	101.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
197.C	101.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
101.C	102.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
101.A	105.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
101.B	105.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
101.C	105.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
102.C	103.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
103.C	104.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
105.B	106.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
105.A	108.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
105.B	108.B	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
105.C	108.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
106.B	107.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
108.A	109.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
108.A	300.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
108.B	300.B	-0.0008	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.001

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
108.C	300.C	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.001
109.A	110.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
110.A	111.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
110.A	112.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
112.A	113.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
113.A	114.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
135.A	35.A	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.000
135.B	35.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
135.C	35.C	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
152.A	52.A	0.4576	0.4406	0.3676	0.3680	0.3680	0.3169	0.3179	1.466
152.B	52.B	-0.2852	-0.2469	-0.0177	-0.0189	-0.0189	0.1786	0.1756	3.316
152.C	52.C	0.9293	0.8396	0.3885	0.3900	0.3900	0.2332	0.2336	5.993
160r.A	67.A	0.1505	0.1463	0.1413	0.1413	0.1413	0.1410	0.1411	0.060
160r.B	67.B	0.2285	0.2313	0.2400	0.2400	0.2400	0.2454	0.2452	0.113
160r.C	67.C	0.2835	0.2883	0.2833	0.2832	0.2832	0.2792	0.2792	0.060

Table K.16: M^Q values obtained for Scenario S3

Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
149.A	1.A	0.9283	0.8957	0.6840	0.6851	0.6851	0.5153	0.518	0.000
149.B	1.B	0.3524	0.3532	0.3989	0.3987	0.3987	0.4471	0.446	0.000
149.C	1.C	1.0662	0.9384	0.4235	0.4242	0.4242	0.5221	0.516	2.881
1.B	2.B	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.001	0.000
1.C	3.C	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
1.A	7.A	0.6962	0.6717	0.5130	0.5138	0.5138	0.3864	0.389	3.259
1.B	7.B	0.2643	0.2649	0.2991	0.2990	0.2990	0.3353	0.335	0.535
1.C	7.C	0.7996	0.7038	0.3176	0.3182	0.3182	0.3915	0.387	4.290
3.C	4.C	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.001	0.000
3.C	5.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
5.C	6.C	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
7.A	8.A	0.4641	0.4478	0.3420	0.3425	0.3425	0.2576	0.259	2.233
7.B	8.B	0.1762	0.1766	0.1994	0.1993	0.1993	0.2235	0.223	0.371
7.C	8.C	0.5331	0.4692	0.2117	0.2121	0.2121	0.2610	0.258	3.000
8.B	12.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
8.A	9.A	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
8.A	13.A	0.6962	0.6717	0.5129	0.5137	0.5137	0.3864	0.389	3.190
8.B	13.B	0.2643	0.2648	0.2991	0.2990	0.2990	0.3353	0.335	0.525
8.C	13.C	0.7996	0.7038	0.3176	0.3181	0.3181	0.3915	0.387	4.291

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
9r.A	14.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
13.C	34.C	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.001	0.000
13.A	18.A	-0.0056	-0.0056	-0.0056	-0.0056	-0.0056	-0.0056	-0.006	0.000
13.B	18.B	-0.0047	-0.0047	-0.0047	-0.0047	-0.0047	-0.0047	-0.005	0.000
13.C	18.C	-0.0051	-0.0051	-0.0052	-0.0052	-0.0052	-0.0052	-0.005	0.001
14.A	11.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
14.A	10.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
15.C	16.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.002	0.001
15.C	17.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.001
18.A	19.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
18.A	21.A	-0.0021	-0.0021	-0.0020	-0.0020	-0.0020	-0.0020	-0.002	0.000
18.B	21.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
18.C	21.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
19.A	20.A	-0.0014	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
21.B	22.B	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.002	0.000
21.A	23.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
21.B	23.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
21.C	23.C	-0.0015	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
23.C	24.C	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0023	-0.002	0.001
23.A	25.A	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
23.B	25.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
23.C	25.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
25r.A	26.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000
25r.C	26.C	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000
25.A	28.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
25.B	28.B	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0012	-0.001	0.000
25.C	28.C	-0.0012	-0.0012	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
26.A	27.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
26.C	27.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
26.C	31.C	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
27.A	33.A	-0.0021	-0.0021	-0.0020	-0.0020	-0.0020	-0.0021	-0.002	0.000
28.A	29.A	-0.0021	-0.0021	-0.0020	-0.0020	-0.0020	-0.0020	-0.002	0.000
28.B	29.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
28.C	29.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
29.A	30.A	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.002	0.000
29.B	30.B	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.002	0.000
29.C	30.C	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.002	0.001
30.A	250.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
30.B	250.B	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0012	-0.001	0.000
30.C	250.C	-0.0012	-0.0012	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
31.C	32.C	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
34.C	15.C	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	0.000	0.000
35.A	36.A	-0.0034	-0.0034	-0.0033	-0.0033	-0.0033	-0.0033	-0.003	0.000
35.B	36.B	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.003	0.000
35.A	40.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
35.B	40.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
35.C	40.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
36.A	37.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
36.B	38.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
38.B	39.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
40.C	41.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
40.A	42.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
40.B	42.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
40.C	42.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
42.B	43.B	-0.0020	-0.0020	-0.0021	-0.0021	-0.0021	-0.0021	-0.002	0.000
42.A	44.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
42.B	44.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
42.C	44.C	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0012	-0.001	0.000
44.A	45.A	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.001	0.000
44.A	47.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
44.B	47.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
44.C	47.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
45.A	46.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
47.A	48.A	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.001	0.000
47.B	48.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
47.C	48.C	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
47.A	49.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
47.B	49.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
47.C	49.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
49.A	50.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
49.B	50.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
49.C	50.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.001
50.A	51.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
50.B	51.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
50.C	51.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.001
51.A	151.A	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.002	0.000
51.B	151.B	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.003	0.000
51.C	151.C	-0.0031	-0.0031	-0.0031	-0.0031	-0.0031	-0.0032	-0.003	0.001
52.A	53.A	0.4639	0.4476	0.3418	0.3424	0.3424	0.2575	0.259	2.396
52.B	53.B	0.1761	0.1765	0.1993	0.1992	0.1992	0.2234	0.223	0.371
52.C	53.C	0.5331	0.4692	0.2117	0.2120	0.2120	0.2609	0.258	2.996
53.A	54.A	0.2900	0.2798	0.2136	0.2140	0.2140	0.1609	0.162	1.428

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
53.B	54.B	0.1101	0.1103	0.1246	0.1245	0.1245	0.1396	0.139	0.245
53.C	54.C	0.3332	0.2933	0.1323	0.1325	0.1325	0.1630	0.161	1.964
54.A	55.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000
54.B	55.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
54.C	55.C	-0.0015	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
54.A	57.A	0.8691	0.8379	0.6362	0.6372	0.6372	0.4743	0.477	3.570
54.B	57.B	0.2985	0.3016	0.3614	0.3611	0.3611	0.4227	0.422	0.830
54.C	57.C	0.8658	0.7550	0.3121	0.3128	0.3128	0.3988	0.394	4.848
55.A	56.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000
55.B	56.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
55.C	56.C	-0.0015	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
57.B	58.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
57.A	60.A	1.8623	1.7955	1.3633	1.3654	1.3654	1.0162	1.022	7.473
57.B	60.B	0.6395	0.6461	0.7743	0.7737	0.7737	0.9057	0.904	1.785
57.C	60.C	1.8554	1.6178	0.6688	0.6702	0.6702	0.8545	0.844	9.466
58.B	59.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
60.A	61.A	-0.0039	-0.0039	-0.0038	-0.0038	-0.0038	-0.0038	-0.004	0.000
60.B	61.B	-0.0035	-0.0035	-0.0035	-0.0035	-0.0035	-0.0035	-0.004	0.000
60.C	61.C	-0.0031	-0.0031	-0.0032	-0.0032	-0.0032	-0.0032	-0.003	0.002
60.A	62.A	-0.0160	-0.0159	-0.0158	-0.0158	-0.0158	-0.0156	-0.016	0.003
60.B	62.B	-0.0154	-0.0154	-0.0155	-0.0155	-0.0155	-0.0155	-0.016	0.001
60.C	62.C	0.6522	0.5610	0.1243	0.1257	0.1257	-0.0146	-0.014	4.483
62.A	63.A	-0.0112	-0.0112	-0.0110	-0.0110	-0.0110	-0.0109	-0.011	0.002
62.B	63.B	-0.0108	-0.0108	-0.0108	-0.0108	-0.0108	-0.0109	-0.011	0.000
62.C	63.C	0.4567	0.3928	0.0870	0.0881	0.0881	-0.0102	-0.010	3.415
63.A	64.A	-0.0224	-0.0224	-0.0221	-0.0221	-0.0221	-0.0218	-0.022	0.004
63.B	64.B	-0.0216	-0.0216	-0.0217	-0.0217	-0.0217	-0.0218	-0.022	0.000
63.C	64.C	0.9136	0.7858	0.1742	0.1762	0.1762	-0.0204	-0.020	6.418
64.A	65.A	-0.0273	-0.0273	-0.0269	-0.0269	-0.0269	-0.0265	-0.027	0.006
64.B	65.B	-0.0264	-0.0264	-0.0264	-0.0264	-0.0264	-0.0264	-0.026	0.000
64.C	65.C	1.1098	0.9546	0.2117	0.2142	0.2142	-0.0248	-0.024	7.944
65.A	66.A	-0.0209	-0.0209	-0.0206	-0.0206	-0.0206	-0.0203	-0.020	0.005
65.B	66.B	-0.0202	-0.0202	-0.0202	-0.0202	-0.0202	-0.0202	-0.020	0.000
65.C	66.C	0.8490	0.7303	0.1621	0.1640	0.1640	-0.0189	-0.018	6.547
67.A	68.A	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.001	0.000
67.A	72.A	0.3903	0.3884	0.3776	0.3776	0.3776	0.3746	0.375	0.104
67.B	72.B	0.3475	0.3456	0.3485	0.3485	0.3485	0.3518	0.352	0.043
67.C	72.C	0.3200	0.3291	0.3360	0.3359	0.3359	0.3388	0.339	0.124
67.A	97.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
67.B	97.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
67.C	97.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
68.A	69.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.001	0.000
69.A	70.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
70.A	71.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.001	0.000
72.C	73.C	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.001	0.000
72.A	76.A	0.2838	0.2825	0.2746	0.2746	0.2746	0.2725	0.273	0.079
72.B	76.B	0.2527	0.2514	0.2535	0.2535	0.2535	0.2558	0.256	0.032
72.C	76.C	0.2327	0.2393	0.2444	0.2443	0.2443	0.2464	0.246	0.094
73.C	74.C	-0.0014	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.001	0.000
74.C	75.C	-0.0016	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.001
76.A	77.A	0.3491	0.3471	0.3366	0.3367	0.3367	0.3336	0.334	0.100
76.B	77.B	0.3377	0.3361	0.3381	0.3381	0.3381	0.3405	0.341	0.030
76.C	77.C	0.3010	0.3093	0.3150	0.3149	0.3149	0.3167	0.316	0.105
76.A	86.A	0.0355	0.0353	0.0342	0.0343	0.0343	0.0340	0.034	0.011
76.B	86.B	0.0309	0.0307	0.0310	0.0310	0.0310	0.0313	0.031	0.005
76.C	86.C	0.0279	0.0287	0.0294	0.0294	0.0294	0.0297	0.030	0.013
77.A	78.A	0.0873	0.0868	0.0842	0.0842	0.0842	0.0834	0.083	0.030
77.B	78.B	0.0844	0.0840	0.0845	0.0845	0.0845	0.0851	0.085	0.009
77.C	78.C	0.0753	0.0773	0.0787	0.0787	0.0787	0.0792	0.079	0.032
78.A	79.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
78.B	79.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
78.C	79.C	-0.0015	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
78.A	80.A	0.4145	0.4122	0.3997	0.3998	0.3998	0.3961	0.396	0.116
78.B	80.B	0.4010	0.3990	0.4015	0.4015	0.4015	0.4043	0.404	0.035
78.C	80.C	0.3574	0.3673	0.3740	0.3739	0.3739	0.3760	0.376	0.122
80.A	81.A	0.1527	0.1518	0.1473	0.1473	0.1473	0.1459	0.146	0.049
80.B	81.B	0.1477	0.1470	0.1479	0.1479	0.1479	0.1490	0.149	0.015
80.C	81.C	0.1317	0.1353	0.1378	0.1377	0.1377	0.1385	0.138	0.052
81.A	82.A	0.2182	0.2169	0.2104	0.2104	0.2104	0.2085	0.209	0.067
81.B	82.B	0.2110	0.2100	0.2113	0.2113	0.2113	0.2128	0.213	0.020
81.C	82.C	0.1881	0.1933	0.1968	0.1968	0.1968	0.1979	0.198	0.071
81.C	84.C	-0.0028	-0.0028	-0.0028	-0.0028	-0.0028	-0.0028	-0.003	0.000
82.A	83.A	0.2181	0.2169	0.2104	0.2104	0.2104	0.2085	0.209	0.067
82.B	83.B	0.2110	0.2100	0.2113	0.2113	0.2113	0.2128	0.213	0.020
82.C	83.C	0.1881	0.1933	0.1968	0.1967	0.1967	0.1979	0.198	0.071
84.C	85.C	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.002	0.000
86.A	87.A	0.0216	0.0214	0.0207	0.0207	0.0207	0.0205	0.021	0.008
86.B	87.B	0.0211	0.0210	0.0211	0.0211	0.0211	0.0213	0.021	0.003
86.C	87.C	0.0182	0.0187	0.0191	0.0191	0.0191	0.0192	0.019	0.008
87.A	88.A	0.0188	0.0187	0.0185	0.0185	0.0185	0.0185	0.019	0.003
87.A	89.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
87.B	89.B	0.0140	0.0140	0.0142	0.0142	0.0142	0.0143	0.014	0.003

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
87.C	89.C	0.0197	0.0201	0.0203	0.0203	0.0203	0.0205	0.020	0.007
89.B	90.B	0.0262	0.0262	0.0263	0.0263	0.0263	0.0264	0.026	0.002
89.A	91.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
89.B	91.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
89.C	91.C	0.0178	0.0181	0.0182	0.0182	0.0182	0.0182	0.018	0.005
91.C	92.C	0.0319	0.0324	0.0326	0.0325	0.0325	0.0325	0.033	0.008
91.A	93.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
91.B	93.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
91.C	93.C	-0.0015	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
93.A	94.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.001	0.000
93.A	95.A	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
93.B	95.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
93.C	95.C	-0.0020	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.002	0.000
95.B	96.B	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.001	0.000
97.A	98.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
97.B	98.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
97.C	98.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
98.A	99.A	-0.0031	-0.0031	-0.0031	-0.0031	-0.0031	-0.0031	-0.003	0.000
98.B	99.B	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.003	0.000
98.C	99.C	-0.0037	-0.0038	-0.0038	-0.0038	-0.0038	-0.0038	-0.004	0.001
99.A	100.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
99.B	100.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
99.C	100.C	-0.0020	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.002	0.000
100.A	450.A	-0.0046	-0.0046	-0.0045	-0.0045	-0.0045	-0.0045	-0.005	0.001
100.B	450.B	-0.0050	-0.0050	-0.0050	-0.0050	-0.0050	-0.0050	-0.005	0.000
100.C	450.C	-0.0054	-0.0055	-0.0055	-0.0055	-0.0055	-0.0055	-0.005	0.001
197.A	101.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
197.B	101.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
197.C	101.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
101.C	102.C	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
101.A	105.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
101.B	105.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
101.C	105.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
102.C	103.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
103.C	104.C	-0.0028	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.003	0.001
105.B	106.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
105.A	108.A	-0.0019	-0.0019	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000
105.B	108.B	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.002	0.000
105.C	108.C	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.002	0.000
106.B	107.B	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.002	0.000
108.A	109.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
108.A	300.A	-0.0057	-0.0057	-0.0057	-0.0057	-0.0057	-0.0057	-0.006	0.001
108.B	300.B	-0.0062	-0.0062	-0.0062	-0.0062	-0.0062	-0.0062	-0.006	0.000
108.C	300.C	-0.0068	-0.0069	-0.0069	-0.0069	-0.0069	-0.0068	-0.007	0.001
109.A	110.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
110.A	111.A	-0.0024	-0.0024	-0.0023	-0.0023	-0.0023	-0.0023	-0.002	0.000
110.A	112.A	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.001	0.000
112.A	113.A	-0.0022	-0.0022	-0.0021	-0.0021	-0.0021	-0.0021	-0.002	0.000
113.A	114.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
135.A	35.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000
135.B	35.B	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.002	0.000
135.C	35.C	-0.0023	-0.0023	-0.0024	-0.0024	-0.0024	-0.0024	-0.002	0.001
152.A	52.A	0.9279	0.8953	0.6837	0.6847	0.6847	0.5150	0.518	4.302
152.B	52.B	0.3522	0.3530	0.3987	0.3985	0.3985	0.4469	0.446	0.677
152.C	52.C	1.0662	0.9384	0.4233	0.4241	0.4241	0.5218	0.516	5.534
160r.A	67.A	0.4775	0.4748	0.4606	0.4606	0.4606	0.4564	0.457	0.133
160r.B	67.B	0.4621	0.4598	0.4626	0.4626	0.4626	0.4659	0.466	0.041
160r.C	67.C	0.4125	0.4239	0.4315	0.4314	0.4314	0.4339	0.434	0.141

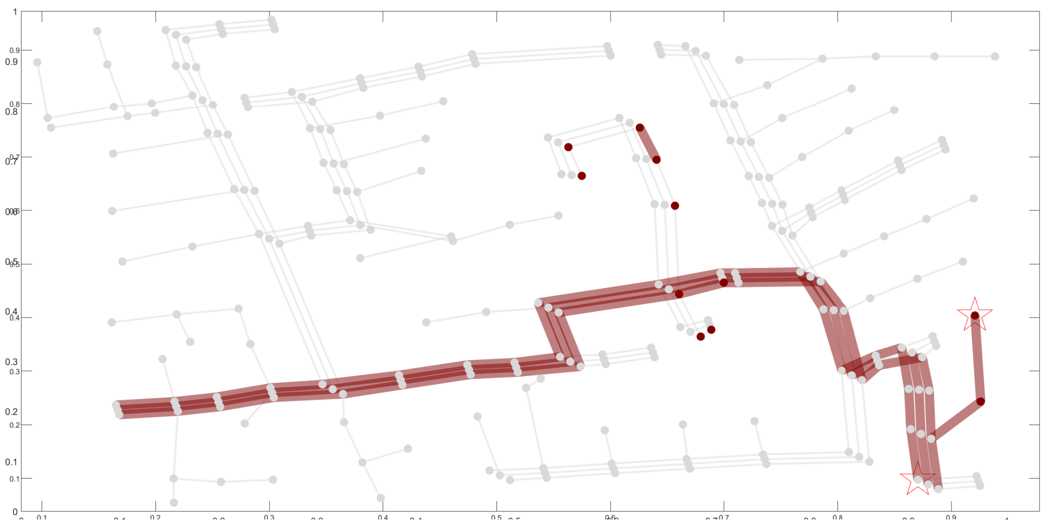

Figure K.9: Representation of M^P and M^Q values obtained for values higher than 0.5 when there is a two-phase perturbation at nodes 82, phase A and 85, phase C. Load consumption with a rated power of 400 kW and 200 kVAr. (Scenario S4)

Table K.17: M^P values obtained for Scenario S4

Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
149.A	1.A	0.5010	0.4880	0.4048	0.4052	0.4052	0.3313	0.3325	0.352
149.B	1.B	-0.1363	-0.1152	0.0295	0.0287	0.0287	0.1763	0.1742	0.751
149.C	1.C	0.8523	0.7316	0.2603	0.2615	0.2615	0.2103	0.2080	0.891
1.B	2.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
1.C	3.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
1.A	7.A	0.3757	0.3660	0.3036	0.3039	0.3039	0.2485	0.2493	0.299
1.B	7.B	-0.1022	-0.0864	0.0221	0.0215	0.0215	0.1322	0.1307	0.664
1.C	7.C	0.6392	0.5487	0.1952	0.1961	0.1961	0.1577	0.1560	0.871
3.C	4.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
3.C	5.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
5.C	6.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
7.A	8.A	0.2505	0.2440	0.2024	0.2026	0.2026	0.1657	0.1662	0.238
7.B	8.B	-0.0682	-0.0576	0.0147	0.0144	0.0144	0.0882	0.0871	0.524
7.C	8.C	0.4261	0.3658	0.1301	0.1307	0.1307	0.1052	0.1040	0.796
8.B	12.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
8.A	9.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
8.A	13.A	0.3757	0.3660	0.3036	0.3039	0.3039	0.2485	0.2493	0.318
8.B	13.B	-0.1022	-0.0864	0.0221	0.0215	0.0215	0.1322	0.1307	0.720
8.C	13.C	0.6392	0.5487	0.1952	0.1961	0.1961	0.1577	0.1560	1.144
9r.A	14.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
13.C	34.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
13.A	18.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
13.B	18.B	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
13.C	18.C	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.000
14.A	11.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
14.A	10.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
15.C	16.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
15.C	17.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
18.A	19.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
18.A	21.A	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
18.B	21.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
18.C	21.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
19.A	20.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
21.B	22.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
21.A	23.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
21.B	23.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
21.C	23.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
23.C	24.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
23.A	25.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
23.B	25.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000

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Nodes		Active power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
23.C	25.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
25r.A	26.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
25r.C	26.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
25.A	28.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
25.B	28.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
25.C	28.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
26.A	27.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
26.C	27.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
26.C	31.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
27.A	33.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
28.A	29.A	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
28.B	29.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
28.C	29.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
29.A	30.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
29.B	30.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
29.C	30.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
30.A	250.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
30.B	250.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
30.C	250.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
31.C	32.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
34.C	15.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
35.A	36.A	-0.0005	-0.0006	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	0.000
35.B	36.B	0.0005	0.0006	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
35.A	40.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
35.B	40.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
35.C	40.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
36.A	37.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
36.B	38.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
38.B	39.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
40.C	41.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
40.A	42.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
40.B	42.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
40.C	42.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
42.B	43.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
42.A	44.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
42.B	44.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
42.C	44.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
44.A	45.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
44.A	47.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
44.B	47.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
44.C	47.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000

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Nodes		Active power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
45.A	46.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
47.A	48.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
47.B	48.B	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	0.000
47.C	48.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
47.A	49.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
47.B	49.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
47.C	49.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
49.A	50.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
49.B	50.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
49.C	50.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
50.A	51.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
50.B	51.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
50.C	51.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
51.A	151.A	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.000
51.B	151.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
51.C	151.C	0.0004	0.0004	0.0005	0.0005	0.0005	0.0004	0.0004	0.000
52.A	53.A	0.2504	0.2439	0.2023	0.2025	0.2025	0.1656	0.1661	0.277
52.B	53.B	-0.0681	-0.0576	0.0147	0.0143	0.0143	0.0881	0.0871	0.596
52.C	53.C	0.4261	0.3658	0.1301	0.1307	0.1307	0.1051	0.1040	1.141
53.A	54.A	0.1565	0.1524	0.1264	0.1266	0.1266	0.1035	0.1038	0.203
53.B	54.B	-0.0426	-0.0360	0.0092	0.0090	0.0090	0.0551	0.0544	0.426
53.C	54.C	0.2663	0.2286	0.0813	0.0817	0.0817	0.0657	0.0650	0.842
54.A	55.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	-0.0002	0.000
54.B	55.B	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.000
54.C	55.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
54.A	57.A	0.3291	0.3211	0.2622	0.2625	0.2625	0.1981	0.1992	0.397
54.B	57.B	-0.0681	-0.0433	0.1128	0.1120	0.1120	0.2653	0.2632	1.294
54.C	57.C	0.8028	0.6874	0.2310	0.2322	0.2322	0.1643	0.1625	2.150
55.A	56.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	-0.0002	0.000
55.B	56.B	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.000
55.C	56.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
57.B	58.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
57.A	60.A	0.7052	0.6880	0.5618	0.5625	0.5625	0.4245	0.4268	0.722
57.B	60.B	-0.1458	-0.0929	0.2417	0.2400	0.2400	0.5685	0.5639	2.341
57.C	60.C	1.7204	1.4731	0.4951	0.4977	0.4977	0.3521	0.3483	4.173
58.B	59.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
60.A	61.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.001
60.B	61.B	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
60.C	61.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
60.A	62.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
60.B	62.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000

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Nodes		Active power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
60.C	62.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
62.A	63.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
62.B	63.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
62.C	63.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
63.A	64.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
63.B	64.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
63.C	64.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
64.A	65.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
64.B	65.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
64.C	65.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
65.A	66.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
65.B	66.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
65.C	66.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
67.A	68.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
67.A	72.A	0.2720	0.2664	0.2149	0.2151	0.2151	0.1604	0.1613	0.305
67.B	72.B	-0.0448	-0.0241	0.0983	0.0976	0.0976	0.2166	0.2148	0.900
67.C	72.C	0.6111	0.5219	0.1768	0.1778	0.1778	0.1305	0.1290	0.872
67.A	97.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
67.B	97.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
67.C	97.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
68.A	69.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
69.A	70.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
70.A	71.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
72.C	73.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
72.A	76.A	0.1978	0.1938	0.1563	0.1565	0.1565	0.1166	0.1173	0.252
72.B	76.B	-0.0326	-0.0176	0.0715	0.0710	0.0710	0.1575	0.1562	0.739
72.C	76.C	0.4444	0.3795	0.1286	0.1293	0.1293	0.0949	0.0938	0.800
73.C	74.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
74.C	75.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
76.A	77.A	0.2007	0.2043	0.1805	0.1808	0.1808	0.1155	0.1168	0.238
76.B	77.B	-0.0804	-0.0613	0.0544	0.0538	0.0538	0.1674	0.1657	0.795
76.C	77.C	0.9418	0.8012	0.2583	0.2599	0.2599	0.1872	0.1850	1.415
76.A	86.A	0.0170	0.0170	0.0165	0.0165	0.0165	0.0159	0.0160	0.010
76.B	86.B	0.0220	0.0220	0.0219	0.0219	0.0219	0.0224	0.0224	0.004
76.C	86.C	0.0135	0.0141	0.0145	0.0145	0.0145	0.0144	0.0144	0.007
77.A	78.A	0.0502	0.0511	0.0451	0.0452	0.0452	0.0289	0.0292	0.092
77.B	78.B	-0.0201	-0.0153	0.0136	0.0134	0.0134	0.0418	0.0414	0.293
77.C	78.C	0.2354	0.2003	0.0646	0.0650	0.0650	0.0468	0.0463	0.678
78.A	79.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
78.B	79.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
78.C	79.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000

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Nodes		Active power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
78.A	80.A	0.2383	0.2426	0.2143	0.2146	0.2146	0.1371	0.1386	0.282
78.B	80.B	-0.0955	-0.0728	0.0646	0.0638	0.0638	0.1988	0.1968	0.979
78.C	80.C	1.1184	0.9514	0.3067	0.3086	0.3086	0.2223	0.2197	2.116
80.A	81.A	0.0878	0.0894	0.0790	0.0791	0.0791	0.0505	0.0511	0.148
80.B	81.B	-0.0352	-0.0268	0.0238	0.0235	0.0235	0.0732	0.0725	0.487
80.C	81.C	0.4120	0.3505	0.1130	0.1137	0.1137	0.0819	0.0809	1.235
81.A	82.A	0.4952	0.4381	0.1753	0.1763	0.1763	0.0702	0.0709	1.146
81.B	82.B	0.1908	0.1832	0.1428	0.1430	0.1430	0.1138	0.1142	0.307
81.C	82.C	-0.1458	-0.1245	0.0009	0.0003	0.0003	0.1151	0.1133	1.410
81.C	84.C	3.1348	2.6608	0.6587	0.6656	0.6656	0.0047	0.0064	7.496
82.A	83.A	0.0775	0.0767	0.0723	0.0724	0.0724	0.0676	0.0677	0.095
82.B	83.B	0.1094	0.1090	0.1086	0.1086	0.1086	0.1111	0.1111	0.019
82.C	83.C	0.1131	0.1177	0.1231	0.1231	0.1231	0.1256	0.1255	0.094
84.C	85.C	2.2060	1.8725	0.4635	0.4684	0.4684	0.0033	0.0045	7.652
86.A	87.A	0.0086	0.0086	0.0082	0.0082	0.0082	0.0079	0.0079	0.007
86.B	87.B	0.0120	0.0120	0.0120	0.0120	0.0120	0.0122	0.0122	0.002
86.C	87.C	0.0131	0.0136	0.0138	0.0138	0.0138	0.0138	0.0138	0.005
87.A	88.A	0.0190	0.0193	0.0194	0.0194	0.0194	0.0192	0.0192	0.005
87.A	89.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
87.B	89.B	0.0167	0.0167	0.0166	0.0166	0.0166	0.0167	0.0167	0.001
87.C	89.C	0.0003	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.001
89.B	90.B	0.0275	0.0274	0.0270	0.0270	0.0270	0.0271	0.0271	0.005
89.A	91.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
89.B	91.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
89.C	91.C	0.0084	0.0085	0.0086	0.0086	0.0086	0.0085	0.0085	0.002
91.C	92.C	0.0322	0.0329	0.0329	0.0329	0.0329	0.0328	0.0328	0.009
91.A	93.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
91.B	93.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
91.C	93.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
93.A	94.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
93.A	95.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
93.B	95.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
93.C	95.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
95.B	96.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
97.A	98.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
97.B	98.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
97.C	98.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
98.A	99.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
98.B	99.B	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	0.000
98.C	99.C	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
99.A	100.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000

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Nodes		Active power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
99.B	100.B	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
99.C	100.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
100.A	450.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
100.B	450.B	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.000
100.C	450.C	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
197.A	101.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
197.B	101.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
197.C	101.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
101.C	102.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
101.A	105.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
101.B	105.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
101.C	105.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
102.C	103.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
103.C	104.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
105.B	106.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
105.A	108.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
105.B	108.B	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
105.C	108.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
106.B	107.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
108.A	109.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
108.A	300.A	0.0003	0.0003	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
108.B	300.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
108.C	300.C	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
109.A	110.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
110.A	111.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
110.A	112.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
112.A	113.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
113.A	114.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
135.A	35.A	0.0005	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.000
135.B	35.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
135.C	35.C	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
152.A	52.A	0.5008	0.4878	0.4046	0.4051	0.4051	0.3312	0.3323	0.405
152.B	52.B	-0.1363	-0.1152	0.0294	0.0287	0.0287	0.1762	0.1742	0.926
152.C	52.C	0.8523	0.7316	0.2602	0.2614	0.2614	0.2102	0.2079	1.613
160r.A	67.A	0.2714	0.2717	0.2318	0.2321	0.2321	0.1553	0.1568	0.308
160r.B	67.B	-0.0400	-0.0193	0.1069	0.1062	0.1062	0.2314	0.2296	0.779
160r.C	67.C	0.8330	0.7180	0.2843	0.2854	0.2854	0.2591	0.2566	0.900

Table K.18: M^Q values obtained for Scenario S4

Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
149.A	1.A	1.4316	1.2734	0.6163	0.6182	0.6182	0.5002	0.498	1.938
149.B	1.B	0.8974	0.8463	0.6357	0.6368	0.6368	0.4730	0.476	1.020
149.C	1.C	0.5089	0.4405	0.2611	0.2606	0.2606	0.4950	0.488	0.343
1.B	2.B	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.001	0.000
1.C	3.C	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
1.A	7.A	1.0737	0.9551	0.4622	0.4636	0.4636	0.3752	0.373	1.648
1.B	7.B	0.6730	0.6347	0.4767	0.4776	0.4776	0.3547	0.357	0.901
1.C	7.C	0.3817	0.3304	0.1958	0.1954	0.1954	0.3712	0.366	0.336
3.C	4.C	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.001	0.000
3.C	5.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
5.C	6.C	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
7.A	8.A	0.7158	0.6367	0.3082	0.3091	0.3091	0.2501	0.249	1.312
7.B	8.B	0.4487	0.4231	0.3178	0.3184	0.3184	0.2365	0.238	0.712
7.C	8.C	0.2545	0.2202	0.1305	0.1303	0.1303	0.2475	0.244	0.307
8.B	12.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
8.A	9.A	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
8.A	13.A	1.0737	0.9550	0.4622	0.4636	0.4636	0.3751	0.373	1.749
8.B	13.B	0.6730	0.6347	0.4767	0.4776	0.4776	0.3547	0.357	0.978
8.C	13.C	0.3817	0.3304	0.1958	0.1954	0.1954	0.3712	0.366	0.441
9r.A	14.A	-0.0017	-0.0018	-0.0018	-0.0018	-0.0018	-0.0017	-0.002	0.001
13.C	34.C	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.001	0.000
13.A	18.A	-0.0055	-0.0056	-0.0057	-0.0057	-0.0057	-0.0056	-0.006	0.001
13.B	18.B	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	-0.0047	-0.005	0.001
13.C	18.C	-0.0051	-0.0052	-0.0052	-0.0052	-0.0052	-0.0052	-0.005	0.002
14.A	11.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
14.A	10.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
15.C	16.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.002	0.000
15.C	17.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
18.A	19.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
18.A	21.A	-0.0020	-0.0020	-0.0021	-0.0021	-0.0021	-0.0020	-0.002	0.001
18.B	21.B	-0.0017	-0.0018	-0.0018	-0.0018	-0.0018	-0.0017	-0.002	0.000
18.C	21.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.001
19.A	20.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
21.B	22.B	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.002	0.001
21.A	23.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
21.B	23.B	-0.0014	-0.0015	-0.0015	-0.0015	-0.0015	-0.0014	-0.001	0.000
21.C	23.C	-0.0015	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
23.C	24.C	-0.0022	-0.0022	-0.0023	-0.0023	-0.0023	-0.0023	-0.002	0.000
23.A	25.A	-0.0018	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
23.B	25.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
23.C	25.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
25r.A	26.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000
25r.C	26.C	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000
25.A	28.A	-0.0013	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
25.B	28.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
25.C	28.C	-0.0012	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
26.A	27.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
26.C	27.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
26.C	31.C	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
27.A	33.A	-0.0021	-0.0021	-0.0020	-0.0020	-0.0020	-0.0021	-0.002	0.000
28.A	29.A	-0.0020	-0.0020	-0.0021	-0.0021	-0.0021	-0.0020	-0.002	0.001
28.B	29.B	-0.0017	-0.0018	-0.0018	-0.0018	-0.0018	-0.0017	-0.002	0.000
28.C	29.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
29.A	30.A	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.002	0.001
29.B	30.B	-0.0020	-0.0021	-0.0020	-0.0020	-0.0020	-0.0020	-0.002	0.000
29.C	30.C	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.002	0.001
30.A	250.A	-0.0013	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.001
30.B	250.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
30.C	250.C	-0.0012	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
31.C	32.C	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
34.C	15.C	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	0.000	0.000
35.A	36.A	-0.0033	-0.0033	-0.0034	-0.0034	-0.0034	-0.0033	-0.003	0.001
35.B	36.B	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.003	0.001
35.A	40.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
35.B	40.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
35.C	40.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
36.A	37.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
36.B	38.B	-0.0010	-0.0011	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
38.B	39.B	-0.0013	-0.0014	-0.0014	-0.0014	-0.0014	-0.0013	-0.001	0.000
40.C	41.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
40.A	42.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
40.B	42.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
40.C	42.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
42.B	43.B	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.002	0.001
42.A	44.A	-0.0012	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
42.B	44.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
42.C	44.C	-0.0011	-0.0011	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
44.A	45.A	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.001	0.000
44.A	47.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
44.B	47.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
44.C	47.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
45.A	46.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
47.A	48.A	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.001	0.000
47.B	48.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
47.C	48.C	-0.0009	-0.0009	-0.0010	-0.0010	-0.0010	-0.0009	-0.001	0.000
47.A	49.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
47.B	49.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0014	-0.001	0.000
47.C	49.C	-0.0015	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
49.A	50.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
49.B	50.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0014	-0.001	0.000
49.C	50.C	-0.0015	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
50.A	51.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
50.B	51.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0014	-0.001	0.000
50.C	51.C	-0.0015	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
51.A	151.A	-0.0023	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.002	0.001
51.B	151.B	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.003	0.001
51.C	151.C	-0.0031	-0.0031	-0.0032	-0.0032	-0.0032	-0.0032	-0.003	0.000
52.A	53.A	0.7158	0.6366	0.3080	0.3090	0.3090	0.2500	0.249	1.524
52.B	53.B	0.4485	0.4230	0.3177	0.3183	0.3183	0.2364	0.238	0.809
52.C	53.C	0.2545	0.2202	0.1305	0.1302	0.1302	0.2474	0.244	0.440
53.A	54.A	0.4473	0.3979	0.1925	0.1931	0.1931	0.1562	0.156	1.120
53.B	54.B	0.2803	0.2644	0.1986	0.1989	0.1989	0.1477	0.149	0.579
53.C	54.C	0.1591	0.1376	0.0815	0.0814	0.0814	0.1546	0.152	0.325
54.A	55.A	-0.0017	-0.0017	-0.0018	-0.0018	-0.0018	-0.0017	-0.002	0.001
54.B	55.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
54.C	55.C	-0.0015	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
54.A	57.A	1.1569	1.0301	0.5155	0.5169	0.5169	0.4566	0.454	2.129
54.B	57.B	0.6690	0.6362	0.5211	0.5218	0.5218	0.4419	0.444	0.881
54.C	57.C	0.3342	0.2816	0.1584	0.1579	0.1579	0.3752	0.369	0.730
55.A	56.A	-0.0017	-0.0017	-0.0018	-0.0018	-0.0018	-0.0017	-0.002	0.001
55.B	56.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
55.C	56.C	-0.0015	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.001
57.B	58.B	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0010	-0.001	0.000
57.A	60.A	2.4790	2.2074	1.1046	1.1075	1.1075	0.9783	0.973	3.872
57.B	60.B	1.4335	1.3631	1.1167	1.1180	1.1180	0.9469	0.951	1.594
57.C	60.C	0.7162	0.6034	0.3394	0.3383	0.3383	0.8040	0.791	1.416
58.B	59.B	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0010	-0.001	0.000
60.A	61.A	-0.0037	-0.0037	-0.0038	-0.0038	-0.0038	-0.0038	-0.004	0.002
60.B	61.B	-0.0036	-0.0036	-0.0036	-0.0036	-0.0036	-0.0035	-0.004	0.001
60.C	61.C	-0.0031	-0.0031	-0.0032	-0.0032	-0.0032	-0.0032	-0.003	0.002
60.A	62.A	-0.0151	-0.0154	-0.0156	-0.0156	-0.0156	-0.0156	-0.016	0.006
60.B	62.B	-0.0159	-0.0161	-0.0159	-0.0159	-0.0159	-0.0156	-0.016	0.006

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
60.C	62.C	-0.0146	-0.0149	-0.0153	-0.0153	-0.0153	-0.0156	-0.016	0.013
62.A	63.A	-0.0106	-0.0107	-0.0109	-0.0109	-0.0109	-0.0109	-0.011	0.004
62.B	63.B	-0.0111	-0.0113	-0.0111	-0.0111	-0.0111	-0.0109	-0.011	0.007
62.C	63.C	-0.0102	-0.0104	-0.0107	-0.0107	-0.0107	-0.0109	-0.011	0.009
63.A	64.A	-0.0212	-0.0215	-0.0218	-0.0218	-0.0218	-0.0218	-0.022	0.000
63.B	64.B	-0.0223	-0.0225	-0.0223	-0.0223	-0.0223	-0.0218	-0.022	0.013
63.C	64.C	-0.0204	-0.0208	-0.0215	-0.0215	-0.0215	-0.0218	-0.022	0.000
64.A	65.A	-0.0257	-0.0261	-0.0265	-0.0265	-0.0265	-0.0265	-0.026	0.000
64.B	65.B	-0.0271	-0.0273	-0.0270	-0.0270	-0.0270	-0.0265	-0.026	0.011
64.C	65.C	-0.0248	-0.0253	-0.0261	-0.0261	-0.0261	-0.0264	-0.026	0.021
65.A	66.A	-0.0197	-0.0200	-0.0203	-0.0203	-0.0203	-0.0203	-0.020	0.007
65.B	66.B	-0.0207	-0.0209	-0.0207	-0.0207	-0.0207	-0.0202	-0.020	0.008
65.C	66.C	-0.0190	-0.0193	-0.0199	-0.0199	-0.0199	-0.0202	-0.020	0.016
67.A	68.A	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.001	0.000
67.A	72.A	0.9124	0.8126	0.4086	0.4097	0.4097	0.3664	0.364	1.500
67.B	72.B	0.5602	0.5408	0.4421	0.4426	0.4426	0.3619	0.363	0.683
67.C	72.C	0.2319	0.1914	0.1169	0.1164	0.1164	0.3016	0.297	0.335
67.A	97.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
67.B	97.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
67.C	97.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.001
68.A	69.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.001	0.000
69.A	70.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
70.A	71.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.001	0.000
72.C	73.C	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.001	0.000
72.A	76.A	0.6636	0.5910	0.2972	0.2980	0.2980	0.2665	0.265	1.237
72.B	76.B	0.4074	0.3933	0.3215	0.3219	0.3219	0.2632	0.264	0.561
72.C	76.C	0.1687	0.1392	0.0850	0.0847	0.0847	0.2193	0.216	0.307
73.C	74.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
74.C	75.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
76.A	77.A	1.2032	1.0522	0.4295	0.4314	0.4314	0.3241	0.322	2.356
76.B	77.B	0.6166	0.5924	0.4623	0.4630	0.4630	0.3530	0.355	0.846
76.C	77.C	0.4099	0.3332	0.1216	0.1216	0.1216	0.2778	0.273	0.539
76.A	86.A	0.0340	0.0347	0.0350	0.0350	0.0350	0.0344	0.034	0.009
76.B	86.B	0.0331	0.0326	0.0317	0.0317	0.0317	0.0316	0.032	0.011
76.C	86.C	0.0271	0.0278	0.0284	0.0284	0.0284	0.0289	0.029	0.013
77.A	78.A	0.3008	0.2630	0.1074	0.1078	0.1078	0.0810	0.080	0.911
77.B	78.B	0.1542	0.1481	0.1156	0.1157	0.1157	0.0883	0.089	0.312
77.C	78.C	0.1025	0.0833	0.0304	0.0304	0.0304	0.0694	0.068	0.258
78.A	79.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
78.B	79.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
78.C	79.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.002	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
78.A	80.A	1.4288	1.2495	0.5100	0.5122	0.5122	0.3848	0.382	2.800
78.B	80.B	0.7322	0.7035	0.5489	0.5497	0.5497	0.4192	0.421	1.041
78.C	80.C	0.4868	0.3957	0.1443	0.1444	0.1444	0.3298	0.324	0.806
80.A	81.A	0.5264	0.4603	0.1879	0.1887	0.1887	0.1418	0.141	1.464
80.B	81.B	0.2697	0.2592	0.2022	0.2025	0.2025	0.1544	0.155	0.518
80.C	81.C	0.1794	0.1458	0.0532	0.0532	0.0532	0.1215	0.119	0.471
81.A	82.A	0.5874	0.4956	0.1636	0.1644	0.1644	0.1920	0.189	1.142
81.B	82.B	0.4312	0.4130	0.3120	0.3126	0.3126	0.2227	0.224	0.830
81.C	82.C	0.1086	0.1174	0.1531	0.1529	0.1529	0.1896	0.189	0.437
81.C	84.C	3.1754	2.6948	0.6650	0.6720	0.6720	0.0020	0.004	7.600
82.A	83.A	0.2040	0.2086	0.2125	0.2124	0.2124	0.2113	0.211	0.081
82.B	83.B	0.2299	0.2267	0.2180	0.2181	0.2181	0.2146	0.215	0.115
82.C	83.C	0.1742	0.1796	0.1865	0.1864	0.1864	0.1926	0.192	0.138
84.C	85.C	2.2346	1.8964	0.4680	0.4729	0.4729	0.0014	0.003	7.758
86.A	87.A	0.0205	0.0209	0.0211	0.0211	0.0211	0.0208	0.021	0.006
86.B	87.B	0.0225	0.0222	0.0216	0.0216	0.0216	0.0215	0.021	0.008
86.C	87.C	0.0175	0.0180	0.0184	0.0184	0.0184	0.0187	0.019	0.008
87.A	88.A	0.0185	0.0188	0.0189	0.0189	0.0189	0.0187	0.019	0.005
87.A	89.A	-0.0017	-0.0018	-0.0018	-0.0018	-0.0018	-0.0017	-0.002	0.000
87.B	89.B	0.0146	0.0145	0.0143	0.0143	0.0143	0.0144	0.014	0.003
87.C	89.C	0.0195	0.0200	0.0201	0.0201	0.0201	0.0202	0.020	0.006
89.B	90.B	0.0268	0.0267	0.0264	0.0264	0.0264	0.0264	0.026	0.005
89.A	91.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
89.B	91.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
89.C	91.C	0.0175	0.0179	0.0179	0.0179	0.0179	0.0179	0.018	0.005
91.C	92.C	0.0315	0.0321	0.0322	0.0322	0.0322	0.0320	0.032	0.008
91.A	93.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
91.B	93.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
91.C	93.C	-0.0015	-0.0016	-0.0015	-0.0015	-0.0015	-0.0015	-0.002	0.000
93.A	94.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.001	0.000
93.A	95.A	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
93.B	95.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
93.C	95.C	-0.0020	-0.0021	-0.0021	-0.0021	-0.0021	-0.0020	-0.002	0.000
95.B	96.B	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.001	0.000
97.A	98.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
97.B	98.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
97.C	98.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
98.A	99.A	-0.0031	-0.0032	-0.0032	-0.0032	-0.0032	-0.0032	-0.003	0.001
98.B	99.B	-0.0035	-0.0035	-0.0034	-0.0034	-0.0034	-0.0034	-0.003	0.000
98.C	99.C	-0.0037	-0.0038	-0.0038	-0.0038	-0.0038	-0.0037	-0.004	0.001
99.A	100.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
99.B	100.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
99.C	100.C	-0.0020	-0.0021	-0.0021	-0.0021	-0.0021	-0.0020	-0.002	0.000
100.A	450.A	-0.0046	-0.0046	-0.0046	-0.0046	-0.0046	-0.0046	-0.005	0.001
100.B	450.B	-0.0050	-0.0050	-0.0050	-0.0050	-0.0050	-0.0050	-0.005	0.001
100.C	450.C	-0.0054	-0.0055	-0.0055	-0.0055	-0.0055	-0.0054	-0.005	0.002
197.A	101.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
197.B	101.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
197.C	101.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
101.C	102.C	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
101.A	105.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
101.B	105.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
101.C	105.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
102.C	103.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
103.C	104.C	-0.0028	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.003	0.001
105.B	106.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
105.A	108.A	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
105.B	108.B	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.002	0.000
105.C	108.C	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.002	0.001
106.B	107.B	-0.0024	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.002	0.000
108.A	109.A	-0.0018	-0.0019	-0.0019	-0.0019	-0.0019	-0.0018	-0.002	0.000
108.A	300.A	-0.0057	-0.0058	-0.0058	-0.0058	-0.0058	-0.0057	-0.006	0.001
108.B	300.B	-0.0063	-0.0063	-0.0062	-0.0062	-0.0062	-0.0062	-0.006	0.001
108.C	300.C	-0.0068	-0.0069	-0.0068	-0.0068	-0.0068	-0.0068	-0.007	0.001
109.A	110.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
110.A	111.A	-0.0023	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.002	0.001
110.A	112.A	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.001	0.000
112.A	113.A	-0.0021	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.002	0.000
113.A	114.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
135.A	35.A	-0.0017	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000
135.B	35.B	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.002	0.001
135.C	35.C	-0.0023	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.002	0.001
152.A	52.A	1.4315	1.2733	0.6161	0.6180	0.6180	0.4999	0.498	2.230
152.B	52.B	0.8971	0.8460	0.6354	0.6365	0.6365	0.4727	0.476	1.257
152.C	52.C	0.5090	0.4405	0.2609	0.2605	0.2605	0.4948	0.488	0.622
160r.A	67.A	1.1318	1.0076	0.5036	0.5050	0.5050	0.4469	0.444	1.821
160r.B	67.B	0.7720	0.7445	0.6000	0.6007	0.6007	0.4802	0.482	0.838
160r.C	67.C	0.3234	0.2729	0.1741	0.1736	0.1736	0.3889	0.383	0.336

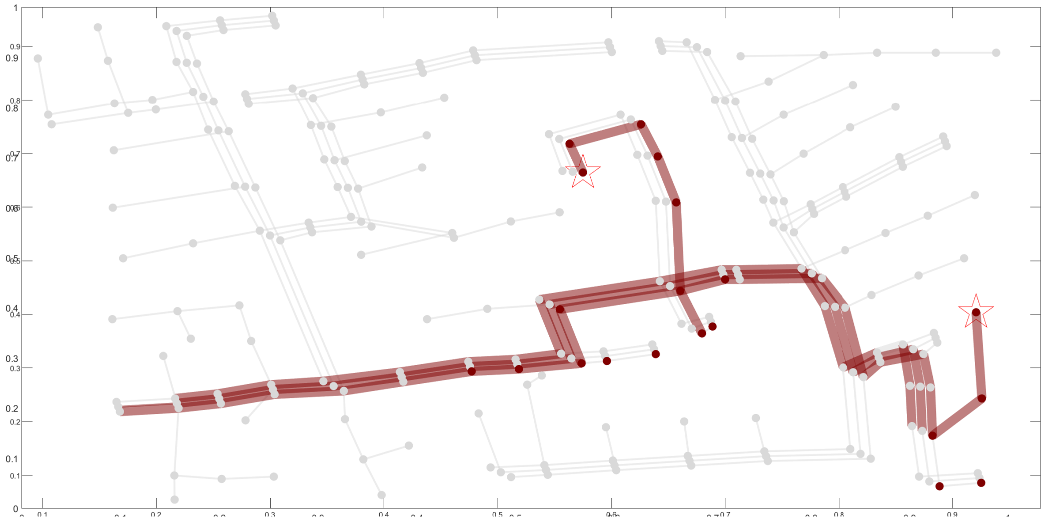

Figure K.10: Representation of M^P and M^Q values obtained for values higher than 0.5 when there is a single-phase perturbations at nodes 66, phase C and 85, phase C (synchronised). Load consumption with a rated power of 400 kW and 200 kVAr. (Scenario S6)

Table K.19: M^P values obtained for Scenario S6

Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
149.A	1.A	0.6302	0.5874	0.4434	0.4444	0.4444	0.3275	0.3296	-0.169
149.B	1.B	-0.7856	-0.7118	-0.2470	-0.2496	-0.2496	0.1664	0.1600	0.608
149.C	1.C	2.9786	2.6156	0.8330	0.8392	0.8392	0.2320	0.2336	12.498
1.B	2.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
1.C	3.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
1.A	7.A	0.4727	0.4406	0.3326	0.3333	0.3333	0.2456	0.2472	2.336
1.B	7.B	-0.5892	-0.5338	-0.1853	-0.1872	-0.1872	0.1248	0.1200	4.537
1.C	7.C	2.2339	1.9617	0.6248	0.6294	0.6294	0.1740	0.1752	17.201
3.C	4.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
3.C	5.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
5.C	6.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
7.A	8.A	0.3151	0.2937	0.2217	0.2222	0.2222	0.1637	0.1648	1.561
7.B	8.B	-0.3928	-0.3559	-0.1235	-0.1248	-0.1248	0.0832	0.0800	3.201
7.C	8.C	1.4893	1.3077	0.4165	0.4196	0.4196	0.1160	0.1168	12.030
8.B	12.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
8.A	9.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
8.A	13.A	0.4726	0.4405	0.3326	0.3333	0.3333	0.2456	0.2472	2.283
8.B	13.B	-0.5892	-0.5338	-0.1853	-0.1872	-0.1872	0.1248	0.1200	4.510
8.C	13.C	2.2339	1.9617	0.6247	0.6294	0.6294	0.1740	0.1752	17.145
9r.A	14.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000

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Nodes		Active power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
13.C	34.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
13.A	18.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
13.B	18.B	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
13.C	18.C	-0.0008	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.000
14.A	11.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
14.A	10.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
15.C	16.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
15.C	17.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
18.A	19.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
18.A	21.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
18.B	21.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
18.C	21.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
19.A	20.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
21.B	22.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
21.A	23.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
21.B	23.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
21.C	23.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
23.C	24.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
23.A	25.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
23.B	25.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
23.C	25.C	-0.0003	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
25r.A	26.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
25r.C	26.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
25.A	28.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
25.B	28.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
25.C	28.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
26.A	27.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
26.C	27.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
26.C	31.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
27.A	33.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
28.A	29.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
28.B	29.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
28.C	29.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
29.A	30.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
29.B	30.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
29.C	30.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
30.A	250.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
30.B	250.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
30.C	250.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
31.C	32.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
34.C	15.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000

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Nodes		Active power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
35.A	36.A	-0.0006	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	0.000
35.B	36.B	0.0006	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
35.A	40.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
35.B	40.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
35.C	40.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
36.A	37.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
36.B	38.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
38.B	39.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
40.C	41.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
40.A	42.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
40.B	42.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
40.C	42.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
42.B	43.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
42.A	44.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
42.B	44.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
42.C	44.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
44.A	45.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
44.A	47.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
44.B	47.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
44.C	47.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
45.A	46.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
47.A	48.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
47.B	48.B	-0.0003	-0.0003	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	0.000
47.C	48.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
47.A	49.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
47.B	49.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
47.C	49.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
49.A	50.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
49.B	50.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
49.C	50.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
50.A	51.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
50.B	51.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
50.C	51.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
51.A	151.A	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.000
51.B	151.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
51.C	151.C	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.001
52.A	53.A	0.3150	0.2936	0.2216	0.2221	0.2221	0.1637	0.1647	1.576
52.B	53.B	-0.3927	-0.3558	-0.1235	-0.1248	-0.1248	0.0831	0.0800	3.192
52.C	53.C	1.4893	1.3077	0.4164	0.4195	0.4195	0.1159	0.1168	11.923
53.A	54.A	0.1969	0.1835	0.1385	0.1388	0.1388	0.1023	0.1030	1.027
53.B	54.B	-0.2454	-0.2224	-0.0772	-0.0780	-0.0780	0.0520	0.0500	2.132

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Nodes		Active power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
53.C	54.C	0.9308	0.8173	0.2603	0.2622	0.2622	0.0725	0.0730	7.836
54.A	55.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	-0.0002	0.000
54.B	55.B	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.000
54.C	55.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
54.A	57.A	0.4645	0.4266	0.2975	0.2983	0.2983	0.1941	0.1960	2.400
54.B	57.B	-0.7015	-0.6283	-0.1597	-0.1623	-0.1623	0.2551	0.2488	6.140
54.C	57.C	2.7448	2.4144	0.7739	0.7797	0.7797	0.1861	0.1884	20.593
55.A	56.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	-0.0002	0.000
55.B	56.B	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.000
55.C	56.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
57.B	58.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
57.A	60.A	0.9954	0.9141	0.6374	0.6391	0.6391	0.4159	0.4199	5.001
57.B	60.B	-1.5032	-1.3463	-0.3423	-0.3477	-0.3477	0.5467	0.5331	13.432
57.C	60.C	5.8815	5.1737	1.6583	1.6707	1.6707	0.3988	0.4037	39.865
58.B	59.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
60.A	61.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.001
60.B	61.B	0.0006	0.0006	0.0005	0.0005	0.0005	0.0005	0.0005	0.001
60.C	61.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
60.A	62.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0000	0.001
60.B	62.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.0000	0.0000	0.000
60.C	62.C	1.2717	1.1256	0.2906	0.2937	0.2937	0.0020	0.0027	8.521
62.A	63.A	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.001
62.B	63.B	-0.0001	-0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
62.C	63.C	0.8902	0.7880	0.2034	0.2056	0.2056	0.0014	0.0019	6.386
63.A	64.A	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.001
63.B	64.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.0000	0.0000	0.000
63.C	64.C	1.7805	1.5760	0.4069	0.4112	0.4112	0.0028	0.0037	11.779
64.A	65.A	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.001
64.B	65.B	-0.0001	-0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
64.C	65.C	2.1620	1.9138	0.4941	0.4993	0.4993	0.0034	0.0046	14.282
65.A	66.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
65.B	66.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
65.C	66.C	1.6534	1.4635	0.3779	0.3819	0.3819	0.0026	0.0035	11.638
67.A	68.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
67.A	72.A	0.2913	0.2723	0.2074	0.2078	0.2078	0.1567	0.1576	0.376
67.B	72.B	-0.1879	-0.1495	0.0443	0.0433	0.0433	0.2173	0.2146	2.021
67.C	72.C	0.6907	0.6107	0.2752	0.2764	0.2764	0.1434	0.1441	1.534
67.A	97.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
67.B	97.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
67.C	97.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.001
68.A	69.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000

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Nodes		Active power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
69.A	70.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
70.A	71.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
72.C	73.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
72.A	76.A	0.2118	0.1980	0.1509	0.1511	0.1511	0.1139	0.1146	0.320
72.B	76.B	-0.1366	-0.1087	0.0322	0.0315	0.0315	0.1580	0.1561	1.574
72.C	76.C	0.5023	0.4441	0.2001	0.2010	0.2010	0.1043	0.1048	1.350
73.C	74.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
74.C	75.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
76.A	77.A	0.2606	0.2400	0.1659	0.1664	0.1664	0.1095	0.1105	0.399
76.B	77.B	-0.2370	-0.1998	-0.0065	-0.0076	-0.0076	0.1668	0.1641	2.074
76.C	77.C	0.9095	0.8015	0.3586	0.3601	0.3601	0.2045	0.2049	2.123
76.A	86.A	0.0171	0.0164	0.0160	0.0160	0.0160	0.0157	0.0157	0.010
76.B	86.B	0.0195	0.0204	0.0217	0.0217	0.0217	0.0229	0.0228	0.027
76.C	86.C	0.0157	0.0158	0.0151	0.0151	0.0151	0.0145	0.0145	0.010
77.A	78.A	0.0652	0.0600	0.0415	0.0416	0.0416	0.0274	0.0276	0.160
77.B	78.B	-0.0592	-0.0499	-0.0016	-0.0019	-0.0019	0.0417	0.0410	0.660
77.C	78.C	0.2274	0.2004	0.0896	0.0900	0.0900	0.0511	0.0512	0.817
78.A	79.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
78.B	79.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
78.C	79.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
78.A	80.A	0.3095	0.2850	0.1970	0.1975	0.1975	0.1300	0.1312	0.515
78.B	80.B	-0.2814	-0.2373	-0.0078	-0.0090	-0.0090	0.1981	0.1949	2.400
78.C	80.C	1.0800	0.9518	0.4258	0.4276	0.4276	0.2428	0.2434	2.772
80.A	81.A	0.1140	0.1050	0.0726	0.0728	0.0728	0.0479	0.0483	0.271
80.B	81.B	-0.1037	-0.0874	-0.0029	-0.0033	-0.0033	0.0730	0.0718	1.065
80.C	81.C	0.3979	0.3506	0.1569	0.1576	0.1576	0.0895	0.0897	1.407
81.A	82.A	0.0779	0.0736	0.0693	0.0694	0.0694	0.0658	0.0660	0.082
81.B	82.B	0.0918	0.0969	0.1054	0.1054	0.1054	0.1134	0.1132	0.187
81.C	82.C	0.1314	0.1322	0.1291	0.1291	0.1291	0.1265	0.1264	0.048
81.C	84.C	3.1543	2.6665	0.6574	0.6644	0.6644	0.0047	0.0063	9.332
82.A	83.A	0.0779	0.0736	0.0693	0.0694	0.0694	0.0658	0.0660	0.082
82.B	83.B	0.0918	0.0969	0.1054	0.1054	0.1054	0.1134	0.1132	0.186
82.C	83.C	0.1314	0.1322	0.1291	0.1291	0.1291	0.1265	0.1264	0.048
84.C	85.C	2.2197	1.8764	0.4626	0.4675	0.4675	0.0033	0.0044	8.628
86.A	87.A	0.0086	0.0082	0.0079	0.0079	0.0079	0.0077	0.0077	0.006
86.B	87.B	0.0106	0.0111	0.0118	0.0118	0.0118	0.0125	0.0125	0.018
86.C	87.C	0.0145	0.0146	0.0142	0.0142	0.0142	0.0139	0.0139	0.006
87.A	88.A	0.0194	0.0190	0.0190	0.0190	0.0190	0.0190	0.0190	0.005
87.A	89.A	0.0002	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
87.B	89.B	0.0157	0.0160	0.0165	0.0165	0.0165	0.0169	0.0169	0.010
87.C	89.C	0.0005	0.0005	0.0004	0.0004	0.0004	0.0004	0.0004	0.001

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Nodes		Active power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
89.B	90.B	0.0267	0.0271	0.0272	0.0272	0.0272	0.0274	0.0274	0.008
89.A	91.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
89.B	91.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
89.C	91.C	0.0083	0.0085	0.0086	0.0085	0.0085	0.0086	0.0086	0.005
91.C	92.C	0.0320	0.0327	0.0330	0.0329	0.0329	0.0332	0.0332	0.016
91.A	93.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
91.B	93.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
91.C	93.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
93.A	94.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
93.A	95.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
93.B	95.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
93.C	95.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
95.B	96.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
97.A	98.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
97.B	98.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
97.C	98.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
98.A	99.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
98.B	99.B	-0.0004	-0.0004	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	0.000
98.C	99.C	0.0002	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003	0.001
99.A	100.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
99.B	100.B	-0.0002	-0.0002	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
99.C	100.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.000
100.A	450.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
100.B	450.B	-0.0006	-0.0006	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.001
100.C	450.C	0.0003	0.0003	0.0004	0.0004	0.0004	0.0004	0.0004	0.002
197.A	101.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
197.B	101.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
197.C	101.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.001
101.C	102.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
101.A	105.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
101.B	105.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
101.C	105.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.001
102.C	103.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
103.C	104.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
105.B	106.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
105.A	108.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
105.B	108.B	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
105.C	108.C	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.001
106.B	107.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
108.A	109.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
108.A	300.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000

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Nodes		Active power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
108.B	300.B	-0.0008	-0.0008	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.001
108.C	300.C	0.0004	0.0004	0.0005	0.0005	0.0005	0.0005	0.0005	0.002
109.A	110.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
110.A	111.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
110.A	112.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
112.A	113.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
113.A	114.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
135.A	35.A	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.000
135.B	35.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
135.C	35.C	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
152.A	52.A	0.6300	0.5872	0.4433	0.4442	0.4442	0.3273	0.3295	2.945
152.B	52.B	-0.7854	-0.7117	-0.2470	-0.2495	-0.2495	0.1663	0.1599	5.736
152.C	52.C	2.9785	2.6155	0.8329	0.8391	0.8391	0.2319	0.2335	22.016
160r.A	67.A	0.3168	0.2926	0.2106	0.2110	0.2110	0.1481	0.1492	0.369
160r.B	67.B	-0.2172	-0.1744	0.0397	0.0385	0.0385	0.2319	0.2289	2.318
160r.C	67.C	0.9051	0.8101	0.4178	0.4191	0.4191	0.2785	0.2789	1.373

Table K.20: M^Q values obtained for Scenario S6

Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
149.A	1.A	1.3523	1.2568	0.8781	0.8804	0.8804	0.5290	0.535	-0.461
149.B	1.B	0.3161	0.3270	0.3767	0.3765	0.3765	0.4602	0.459	0.092
149.C	1.C	4.6684	3.9776	0.9223	0.9309	0.9309	0.4853	0.475	19.082
1.B	2.B	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.001	0.000
1.C	3.C	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
1.A	7.A	1.0142	0.9426	0.6586	0.6603	0.6603	0.3967	0.401	6.354
1.B	7.B	0.2371	0.2452	0.2825	0.2823	0.2823	0.3452	0.344	0.687
1.C	7.C	3.5014	2.9832	0.6917	0.6982	0.6982	0.3639	0.356	26.263
3.C	4.C	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.001	0.000
3.C	5.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
5.C	6.C	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
7.A	8.A	0.6761	0.6284	0.4390	0.4402	0.4402	0.2645	0.267	4.244
7.B	8.B	0.1581	0.1635	0.1884	0.1882	0.1882	0.2301	0.229	0.485
7.C	8.C	2.3342	1.9888	0.4611	0.4655	0.4655	0.2426	0.237	18.369
8.B	12.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
8.A	9.A	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
8.A	13.A	1.0142	0.9425	0.6585	0.6602	0.6602	0.3967	0.401	6.210
8.B	13.B	0.2371	0.2452	0.2825	0.2823	0.2823	0.3452	0.344	0.683

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
8.C	13.C	3.5014	2.9832	0.6917	0.6982	0.6982	0.3639	0.356	26.178
9r.A	14.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
13.C	34.C	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.001	0.000
13.A	18.A	-0.0057	-0.0057	-0.0056	-0.0056	-0.0056	-0.0056	-0.006	0.001
13.B	18.B	-0.0047	-0.0047	-0.0047	-0.0047	-0.0047	-0.0047	-0.005	0.000
13.C	18.C	-0.0050	-0.0050	-0.0051	-0.0051	-0.0051	-0.0052	-0.005	0.004
14.A	11.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
14.A	10.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
15.C	16.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.002	0.000
15.C	17.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
18.A	19.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
18.A	21.A	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0020	-0.002	0.000
18.B	21.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
18.C	21.C	-0.0018	-0.0018	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.001
19.A	20.A	-0.0014	-0.0014	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
21.B	22.B	-0.0021	-0.0021	-0.0022	-0.0022	-0.0022	-0.0022	-0.002	0.000
21.A	23.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
21.B	23.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
21.C	23.C	-0.0015	-0.0015	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
23.C	24.C	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0023	-0.002	0.001
23.A	25.A	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
23.B	25.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
23.C	25.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.001
25r.A	26.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000
25r.C	26.C	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000
25.A	28.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
25.B	28.B	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0012	-0.001	0.000
25.C	28.C	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0013	-0.001	0.001
26.A	27.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
26.C	27.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
26.C	31.C	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
27.A	33.A	-0.0020	-0.0020	-0.0021	-0.0021	-0.0021	-0.0021	-0.002	0.000
28.A	29.A	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0020	-0.002	0.000
28.B	29.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
28.C	29.C	-0.0018	-0.0018	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.001
29.A	30.A	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.002	0.000
29.B	30.B	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.002	0.000
29.C	30.C	-0.0021	-0.0021	-0.0022	-0.0022	-0.0022	-0.0022	-0.002	0.000
30.A	250.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
30.B	250.B	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0012	-0.001	0.000
30.C	250.C	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0013	-0.001	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
31.C	32.C	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
34.C	15.C	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	0.000	0.000
35.A	36.A	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0033	-0.003	0.001
35.B	36.B	-0.0033	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.003	0.000
35.A	40.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
35.B	40.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
35.C	40.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.001
36.A	37.A	-0.0013	-0.0013	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
36.B	38.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
38.B	39.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
40.C	41.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.001
40.A	42.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
40.B	42.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
40.C	42.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.001
42.B	43.B	-0.0020	-0.0020	-0.0021	-0.0021	-0.0021	-0.0021	-0.002	0.000
42.A	44.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
42.B	44.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
42.C	44.C	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0012	-0.001	0.001
44.A	45.A	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.001	0.000
44.A	47.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
44.B	47.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
44.C	47.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.001
45.A	46.A	-0.0013	-0.0013	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
47.A	48.A	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.001	0.000
47.B	48.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
47.C	48.C	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
47.A	49.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
47.B	49.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
47.C	49.C	-0.0015	-0.0015	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.001
49.A	50.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
49.B	50.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
49.C	50.C	-0.0015	-0.0015	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
50.A	51.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
50.B	51.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
50.C	51.C	-0.0015	-0.0015	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.001
51.A	151.A	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.002	0.001
51.B	151.B	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.003	0.000
51.C	151.C	-0.0030	-0.0031	-0.0031	-0.0031	-0.0031	-0.0032	-0.003	0.002
52.A	53.A	0.6759	0.6281	0.4389	0.4400	0.4400	0.2643	0.267	4.287
52.B	53.B	0.1580	0.1634	0.1883	0.1881	0.1881	0.2300	0.229	0.483
52.C	53.C	2.3344	1.9889	0.4611	0.4655	0.4655	0.2425	0.237	18.207

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
53.A	54.A	0.4224	0.3926	0.2743	0.2750	0.2750	0.1652	0.167	2.794
53.B	54.B	0.0987	0.1021	0.1177	0.1176	0.1176	0.1437	0.143	0.323
53.C	54.C	1.4590	1.2431	0.2882	0.2909	0.2909	0.1516	0.148	11.966
54.A	55.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000
54.B	55.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
54.C	55.C	-0.0015	-0.0015	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.001
54.A	57.A	1.2741	1.1850	0.8224	0.8245	0.8245	0.4881	0.494	6.974
54.B	57.B	0.2293	0.2418	0.3221	0.3217	0.3217	0.4332	0.431	1.308
54.C	57.C	3.9745	3.3749	0.7408	0.7482	0.7482	0.3666	0.358	29.110
55.A	56.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000
55.B	56.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
55.C	56.C	-0.0015	-0.0015	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.002
57.B	58.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
57.A	60.A	2.7301	2.5392	1.7622	1.7668	1.7668	1.0460	1.058	14.532
57.B	60.B	0.4913	0.5182	0.6902	0.6892	0.6892	0.9281	0.924	2.862
57.C	60.C	8.5170	7.2319	1.5874	1.6034	1.6034	0.7855	0.766	56.356
58.B	59.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.001	0.000
60.A	61.A	-0.0039	-0.0039	-0.0039	-0.0039	-0.0039	-0.0038	-0.004	0.001
60.B	61.B	-0.0035	-0.0035	-0.0035	-0.0035	-0.0035	-0.0035	-0.004	0.001
60.C	61.C	-0.0029	-0.0029	-0.0031	-0.0031	-0.0031	-0.0032	-0.003	0.000
60.A	62.A	-0.0164	-0.0163	-0.0159	-0.0160	-0.0160	-0.0156	-0.016	0.006
60.B	62.B	-0.0153	-0.0153	-0.0154	-0.0154	-0.0154	-0.0155	-0.016	0.001
60.C	62.C	0.6150	0.5426	0.1289	0.1304	0.1304	-0.0146	-0.014	4.225
62.A	63.A	-0.0115	-0.0114	-0.0112	-0.0112	-0.0112	-0.0109	-0.011	0.004
62.B	63.B	-0.0107	-0.0108	-0.0108	-0.0108	-0.0108	-0.0109	-0.011	0.001
62.C	63.C	0.4306	0.3800	0.0903	0.0913	0.0913	-0.0102	-0.010	3.167
63.A	64.A	-0.0230	-0.0229	-0.0224	-0.0224	-0.0224	-0.0219	-0.022	0.008
63.B	64.B	-0.0216	-0.0216	-0.0217	-0.0217	-0.0217	-0.0218	-0.022	0.001
63.C	64.C	0.8615	0.7601	0.1807	0.1828	0.1828	-0.0204	-0.020	5.843
64.A	65.A	-0.0280	-0.0279	-0.0272	-0.0272	-0.0272	-0.0266	-0.027	0.011
64.B	65.B	-0.0263	-0.0263	-0.0263	-0.0263	-0.0263	-0.0264	-0.026	0.000
64.C	65.C	1.0465	0.9234	0.2196	0.2222	0.2222	-0.0247	-0.024	7.087
65.A	66.A	-0.0215	-0.0214	-0.0208	-0.0208	-0.0208	-0.0203	-0.020	0.009
65.B	66.B	-0.0202	-0.0202	-0.0202	-0.0202	-0.0202	-0.0202	-0.020	0.000
65.C	66.C	0.8006	0.7065	0.1681	0.1701	0.1701	-0.0189	-0.018	5.777
67.A	68.A	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.001	0.000
67.A	72.A	0.7328	0.6918	0.5321	0.5331	0.5331	0.3869	0.389	0.965
67.B	72.B	0.2805	0.2859	0.3122	0.3120	0.3120	0.3542	0.354	0.367
67.C	72.C	0.6586	0.5535	0.2214	0.2218	0.2218	0.3107	0.306	1.226
67.A	97.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
67.B	97.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
67.C	97.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.001
68.A	69.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.001	0.000
69.A	70.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
70.A	71.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.001	0.000
72.C	73.C	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.001	0.000
72.A	76.A	0.5329	0.5031	0.3870	0.3876	0.3876	0.2814	0.283	0.821
72.B	76.B	0.2040	0.2080	0.2270	0.2269	0.2269	0.2576	0.257	0.286
72.C	76.C	0.4790	0.4025	0.1610	0.1613	0.1613	0.2260	0.223	1.079
73.C	74.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0015	-0.001	0.000
74.C	75.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0017	-0.002	0.001
76.A	77.A	0.8150	0.7635	0.5470	0.5482	0.5482	0.3507	0.354	1.225
76.B	77.B	0.2944	0.2979	0.3120	0.3119	0.3119	0.3434	0.343	0.252
76.C	77.C	1.1007	0.9210	0.2943	0.2958	0.2958	0.2892	0.285	2.457
76.A	86.A	0.0371	0.0359	0.0348	0.0348	0.0348	0.0339	0.034	0.021
76.B	86.B	0.0306	0.0309	0.0314	0.0314	0.0314	0.0319	0.032	0.011
76.C	86.C	0.0258	0.0271	0.0283	0.0283	0.0283	0.0294	0.029	0.027
77.A	78.A	0.2037	0.1909	0.1367	0.1370	0.1370	0.0877	0.088	0.490
77.B	78.B	0.0736	0.0745	0.0780	0.0780	0.0780	0.0858	0.086	0.080
77.C	78.C	0.2752	0.2303	0.0736	0.0739	0.0739	0.0723	0.071	0.946
78.A	79.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
78.B	79.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
78.C	79.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0016	-0.002	0.000
78.A	80.A	0.9677	0.9066	0.6495	0.6510	0.6510	0.4164	0.420	1.582
78.B	80.B	0.3495	0.3537	0.3705	0.3704	0.3704	0.4077	0.407	0.291
78.C	80.C	1.3072	1.0937	0.3495	0.3513	0.3513	0.3434	0.338	3.207
80.A	81.A	0.3565	0.3340	0.2393	0.2398	0.2398	0.1534	0.155	0.833
80.B	81.B	0.1288	0.1303	0.1365	0.1365	0.1365	0.1502	0.150	0.129
80.C	81.C	0.4816	0.4030	0.1288	0.1294	0.1294	0.1265	0.125	1.628
81.A	82.A	0.2342	0.2263	0.2168	0.2169	0.2169	0.2086	0.209	0.173
81.B	82.B	0.2110	0.2133	0.2144	0.2145	0.2145	0.2167	0.217	0.049
81.C	82.C	0.1696	0.1779	0.1873	0.1872	0.1872	0.1963	0.196	0.222
81.C	84.C	3.1951	2.7005	0.6637	0.6707	0.6707	0.0019	0.004	9.461
82.A	83.A	0.2342	0.2263	0.2168	0.2169	0.2169	0.2086	0.209	0.174
82.B	83.B	0.2110	0.2133	0.2145	0.2145	0.2145	0.2167	0.217	0.049
82.C	83.C	0.1696	0.1779	0.1873	0.1872	0.1872	0.1963	0.196	0.222
84.C	85.C	2.2485	1.9004	0.4671	0.4720	0.4720	0.0013	0.003	8.747
86.A	87.A	0.0227	0.0219	0.0212	0.0212	0.0212	0.0205	0.021	0.015
86.B	87.B	0.0210	0.0212	0.0214	0.0214	0.0214	0.0217	0.022	0.006
86.C	87.C	0.0170	0.0178	0.0185	0.0185	0.0185	0.0191	0.019	0.017
87.A	88.A	0.0189	0.0186	0.0185	0.0186	0.0186	0.0185	0.019	0.005
87.A	89.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
87.B	89.B	0.0137	0.0139	0.0142	0.0142	0.0142	0.0146	0.015	0.007
87.C	89.C	0.0187	0.0193	0.0198	0.0198	0.0198	0.0204	0.020	0.014
89.B	90.B	0.0261	0.0264	0.0265	0.0265	0.0265	0.0267	0.027	0.008
89.A	91.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
89.B	91.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
89.C	91.C	0.0174	0.0178	0.0180	0.0179	0.0179	0.0181	0.018	0.009
91.C	92.C	0.0312	0.0320	0.0322	0.0322	0.0322	0.0324	0.032	0.016
91.A	93.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
91.B	93.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
91.C	93.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0016	-0.002	0.000
93.A	94.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.001	0.000
93.A	95.A	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
93.B	95.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
93.C	95.C	-0.0020	-0.0020	-0.0021	-0.0021	-0.0021	-0.0021	-0.002	0.000
95.B	96.B	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.001	0.000
97.A	98.A	-0.0016	-0.0015	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
97.B	98.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
97.C	98.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.001
98.A	99.A	-0.0031	-0.0031	-0.0031	-0.0031	-0.0031	-0.0031	-0.003	0.001
98.B	99.B	-0.0034	-0.0035	-0.0035	-0.0035	-0.0035	-0.0035	-0.003	0.000
98.C	99.C	-0.0037	-0.0038	-0.0038	-0.0038	-0.0038	-0.0038	-0.004	0.001
99.A	100.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
99.B	100.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.000
99.C	100.C	-0.0020	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.002	0.001
100.A	450.A	-0.0046	-0.0045	-0.0045	-0.0045	-0.0045	-0.0046	-0.005	0.001
100.B	450.B	-0.0050	-0.0051	-0.0050	-0.0050	-0.0050	-0.0050	-0.005	0.001
100.C	450.C	-0.0054	-0.0055	-0.0055	-0.0055	-0.0055	-0.0055	-0.005	0.002
197.A	101.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.001	0.000
197.B	101.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
197.C	101.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.001
101.C	102.C	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
101.A	105.A	-0.0016	-0.0015	-0.0016	-0.0016	-0.0016	-0.0016	-0.002	0.000
101.B	105.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.002	0.000
101.C	105.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.002	0.001
102.C	103.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.001
103.C	104.C	-0.0028	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.003	0.001
105.B	106.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.001	0.000
105.A	108.A	-0.0019	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000
105.B	108.B	-0.0020	-0.0021	-0.0020	-0.0020	-0.0020	-0.0020	-0.002	0.000
105.C	108.C	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.002	0.001
106.B	107.B	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.0024	-0.002	0.001

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
108.A	109.A	-0.0019	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000
108.A	300.A	-0.0057	-0.0056	-0.0057	-0.0057	-0.0057	-0.0057	-0.006	0.001
108.B	300.B	-0.0062	-0.0063	-0.0063	-0.0063	-0.0063	-0.0063	-0.006	0.001
108.C	300.C	-0.0067	-0.0069	-0.0068	-0.0068	-0.0068	-0.0068	-0.007	0.002
109.A	110.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.001	0.000
110.A	111.A	-0.0024	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.002	0.000
110.A	112.A	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.001	0.000
112.A	113.A	-0.0022	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.002	0.000
113.A	114.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.001	0.000
135.A	35.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.002	0.000
135.B	35.B	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.002	0.000
135.C	35.C	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.0024	-0.002	0.001
152.A	52.A	1.3518	1.2563	0.8777	0.8800	0.8800	0.5287	0.534	8.010
152.B	52.B	0.3159	0.3268	0.3765	0.3763	0.3763	0.4600	0.459	0.868
152.C	52.C	4.6687	3.9778	0.9222	0.9309	0.9309	0.4850	0.475	33.620
160r.A	67.A	0.9902	0.9309	0.6919	0.6933	0.6933	0.4750	0.479	1.125
160r.B	67.B	0.4140	0.4189	0.4354	0.4353	0.4353	0.4707	0.470	0.293
160r.C	67.C	0.9534	0.8112	0.3377	0.3386	0.3386	0.4028	0.398	1.349

K.0.3 Considering OLTCs connected without capacitors compensation and meshing the network from the switch between nodes S54A and S94A

Table K.21: M^P values obtained for Scenario S1

Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
149.A	1.A	-0.0022	-0.0040	-0.0023	-0.0023	-0.0023	-0.0004	-0.0005	0.000
149.B	1.B	-0.0002	-0.0002	0.0000	0.0000	0.0000	0.0002	0.0002	0.000
149.C	1.C	0.6796	0.5863	0.1406	0.1420	0.1420	0.0011	0.0015	2.970
1.B	2.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
1.C	3.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
1.A	7.A	-0.0017	-0.0030	-0.0017	-0.0017	-0.0017	-0.0003	-0.0003	0.027
1.B	7.B	-0.0002	-0.0001	0.0000	0.0000	0.0000	0.0001	0.0001	0.002
1.C	7.C	0.5097	0.4397	0.1054	0.1065	0.1065	0.0008	0.0011	4.547
3.C	4.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
3.C	5.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
5.C	6.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
7.A	8.A	-0.0011	-0.0020	-0.0012	-0.0012	-0.0012	-0.0002	-0.0002	0.021
7.B	8.B	-0.0001	-0.0001	0.0000	0.0000	0.0000	0.0001	0.0001	0.002
7.C	8.C	0.3398	0.2931	0.0703	0.0710	0.0710	0.0006	0.0007	3.194
8.B	12.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
8.A	9.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
8.A	13.A	-0.0017	-0.0030	-0.0017	-0.0017	-0.0017	-0.0003	-0.0003	0.028
8.B	13.B	-0.0002	-0.0001	0.0000	0.0000	0.0000	0.0002	0.0001	0.002
8.C	13.C	0.5097	0.4397	0.1054	0.1065	0.1065	0.0008	0.0011	4.557
9r.A	14.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
13.C	34.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
13.A	18.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
13.B	18.B	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
13.C	18.C	-0.0008	-0.0008	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.000
14.A	11.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
14.A	10.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
15.C	16.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
15.C	17.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
18.A	19.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
18.A	21.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
18.B	21.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
18.C	21.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
19.A	20.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
21.B	22.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
21.A	23.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
21.B	23.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
21.C	23.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
23.C	24.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
23.A	25.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
23.B	25.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
23.C	25.C	-0.0003	-0.0003	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
25r.A	26.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
25r.C	26.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
25.A	28.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
25.B	28.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
25.C	28.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
26.A	27.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
26.C	27.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
26.C	31.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
27.A	33.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
28.A	29.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
28.B	29.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
28.C	29.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
29.A	30.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
29.B	30.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
29.C	30.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
30.A	250.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
30.B	250.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
30.C	250.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
31.C	32.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
34.C	15.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
35.A	36.A	-0.0006	-0.0006	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	0.000
35.B	36.B	0.0006	0.0006	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
35.A	40.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
35.B	40.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
35.C	40.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
36.A	37.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
36.B	38.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
38.B	39.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
40.C	41.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
40.A	42.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
40.B	42.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
40.C	42.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
42.B	43.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
42.A	44.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
42.B	44.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
42.C	44.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
44.A	45.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
44.A	47.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
44.B	47.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
44.C	47.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
45.A	46.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
47.A	48.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
47.B	48.B	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	0.000
47.C	48.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
47.A	49.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
47.B	49.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
47.C	49.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
49.A	50.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
49.B	50.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
49.C	50.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
50.A	51.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
50.B	51.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
50.C	51.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
51.A	151.A	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.000
51.B	151.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
51.C	151.C	0.0004	0.0004	0.0004	0.0004	0.0004	0.0005	0.0005	0.000
52.A	53.A	-0.0011	-0.0020	-0.0012	-0.0012	-0.0012	-0.0002	-0.0002	0.021
52.B	53.B	-0.0001	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.001
52.C	53.C	0.3398	0.2931	0.0703	0.0710	0.0710	0.0006	0.0007	3.173
53.A	54.A	-0.0007	-0.0013	-0.0007	-0.0007	-0.0007	-0.0001	-0.0001	0.013
53.B	54.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.001
53.C	54.C	0.2124	0.1832	0.0439	0.0444	0.0444	0.0004	0.0005	2.089
54.A	55.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	-0.0002	0.000
54.B	55.B	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.000
54.C	55.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
54.A	57.A	0.1203	0.1970	0.1639	0.1641	0.1641	0.0738	0.0742	0.403
54.B	57.B	-0.0007	-0.0007	-0.0005	-0.0005	-0.0005	-0.0004	-0.0004	0.001
54.C	57.C	0.5596	0.4778	0.1126	0.1138	0.1138	0.0009	0.0011	3.309
55.A	56.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	-0.0002	0.000
55.B	56.B	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.000
55.C	56.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
57.B	58.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
57.A	60.A	0.2578	0.4222	0.3512	0.3516	0.3516	0.1582	0.1590	0.760
57.B	60.B	-0.0014	-0.0014	-0.0011	-0.0011	-0.0011	-0.0009	-0.0009	0.002
57.C	60.C	1.1991	1.0238	0.2413	0.2439	0.2439	0.0018	0.0024	6.679
58.B	59.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
60.A	61.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
60.B	61.B	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
60.C	61.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
60.A	62.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
60.B	62.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
60.C	62.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
62.A	63.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
62.B	63.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
62.C	63.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
63.A	64.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
63.B	64.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
63.C	64.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
64.A	65.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
64.B	65.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
64.C	65.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
65.A	66.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
65.B	66.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
65.C	66.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
67.A	68.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
67.A	72.A	0.0946	0.1565	0.1331	0.1332	0.1332	0.0601	0.0604	0.316
67.B	72.B	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
67.C	72.C	0.4171	0.3512	0.0859	0.0868	0.0868	0.0006	0.0008	0.858
67.A	97.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
67.B	97.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
67.C	97.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
68.A	69.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
69.A	70.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
70.A	71.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
72.C	73.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
72.A	76.A	0.0688	0.1138	0.0968	0.0969	0.0969	0.0437	0.0439	0.257
72.B	76.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
72.C	76.C	0.3033	0.2554	0.0625	0.0631	0.0631	0.0004	0.0006	0.828
73.C	74.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
74.C	75.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
76.A	77.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
76.B	77.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
76.C	77.C	0.6528	0.5560	0.1380	0.1395	0.1395	0.0008	0.0011	1.589
76.A	86.A	0.0451	0.1234	0.1863	0.1859	0.1859	0.1425	0.1416	0.450
76.B	86.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
76.C	86.C	0.0003	0.0003	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
77.A	78.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
77.B	78.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
77.C	78.C	0.1632	0.1390	0.0345	0.0349	0.0349	0.0002	0.0003	0.681
78.A	79.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
78.B	79.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
78.C	79.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
78.A	80.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
78.B	80.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
78.C	80.C	0.7752	0.6603	0.1639	0.1656	0.1656	0.0009	0.0013	2.278
80.A	81.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
80.B	81.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
80.C	81.C	0.2856	0.2433	0.0604	0.0610	0.0610	0.0003	0.0005	1.224
81.A	82.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
81.B	82.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
81.C	82.C	-0.0002	-0.0002	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
81.C	84.C	3.1394	2.6741	0.6645	0.6714	0.6714	0.0047	0.0064	8.803
82.A	83.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
82.B	83.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
82.C	83.C	-0.0002	-0.0002	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
84.C	85.C	2.2092	1.8818	0.4676	0.4725	0.4725	0.0033	0.0045	8.597
86.A	87.A	0.0290	0.0789	0.1190	0.1188	0.1188	0.0911	0.0905	0.307
86.B	87.B	-0.0001	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
86.C	87.C	-0.0003	-0.0003	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
87.A	88.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
87.A	89.A	0.0177	0.0482	0.0727	0.0726	0.0726	0.0557	0.0553	0.207
87.B	89.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
87.C	89.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0001	-0.0001	0.000
89.B	90.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
89.A	91.A	0.0145	0.0394	0.0595	0.0594	0.0594	0.0455	0.0453	0.174
89.B	91.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
89.C	91.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
91.C	92.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
91.A	93.A	0.0145	0.0394	0.0595	0.0594	0.0594	0.0455	0.0453	0.170
91.B	93.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
91.C	93.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
93.A	94.A	0.0507	0.1393	0.2105	0.2101	0.2101	0.1609	0.1600	0.483
93.A	95.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
93.B	95.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
93.C	95.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
95.B	96.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
97.A	98.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
97.B	98.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
97.C	98.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
98.A	99.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
98.B	99.B	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	0.001
98.C	99.C	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
99.A	100.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
99.B	100.B	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
99.C	100.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.000
100.A	450.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
100.B	450.B	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.001
100.C	450.C	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.001
197.A	101.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
197.B	101.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
197.C	101.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
101.C	102.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
101.A	105.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
101.B	105.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
101.C	105.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
102.C	103.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
103.C	104.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
105.B	106.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
105.A	108.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
105.B	108.B	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
105.C	108.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
106.B	107.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
108.A	109.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
108.A	300.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
108.B	300.B	-0.0008	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.001
108.C	300.C	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.001
109.A	110.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
110.A	111.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
110.A	112.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
112.A	113.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
113.A	114.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
135.A	35.A	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.000
135.B	35.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
135.C	35.C	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
152.A	52.A	-0.0022	-0.0040	-0.0023	-0.0023	-0.0023	-0.0004	-0.0005	0.039
152.B	52.B	-0.0001	-0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.002
152.C	52.C	0.6796	0.5863	0.1406	0.1420	0.1420	0.0011	0.0015	5.889
160r.A	67.A	0.1329	0.2146	0.1765	0.1767	0.1767	0.0765	0.0770	0.388
160r.B	67.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
160r.C	67.C	0.5173	0.4297	0.1005	0.1016	0.1016	-0.0001	0.0001	0.750
54.A	94.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000

Table K.22: M^Q values obtained for Scenario S1

Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
149.A	1.A	-0.0031	-0.0046	-0.0040	-0.0040	-0.0040	-0.0026	-0.0026	0.000
149.B	1.B	-0.0028	-0.0028	-0.0028	-0.0028	-0.0028	-0.0028	-0.0028	0.000
149.C	1.C	1.5608	1.3427	0.3180	0.3213	0.3213	-0.0003	0.0005	6.835
1.B	2.B	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.000
1.C	3.C	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
1.A	7.A	-0.0023	-0.0035	-0.0030	-0.0030	-0.0030	-0.0019	-0.0020	0.016
1.B	7.B	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
1.C	7.C	1.1706	1.0070	0.2385	0.2410	0.2410	-0.0002	0.0004	10.463
3.C	4.C	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	0.000
3.C	5.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0014	-0.0014	0.000
5.C	6.C	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
7.A	8.A	-0.0016	-0.0023	-0.0020	-0.0020	-0.0020	-0.0013	-0.0013	0.012
7.B	8.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
7.C	8.C	0.7804	0.6714	0.1590	0.1607	0.1607	-0.0001	0.0002	7.351
8.B	12.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
8.A	9.A	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
8.A	13.A	-0.0024	-0.0035	-0.0030	-0.0030	-0.0030	-0.0019	-0.0020	0.017
8.B	13.B	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.000
8.C	13.C	1.1707	1.0071	0.2385	0.2410	0.2410	-0.0002	0.0004	10.487
9r.A	14.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
13.C	34.C	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
13.A	18.A	-0.0057	-0.0057	-0.0057	-0.0057	-0.0057	-0.0057	-0.0057	0.000
13.B	18.B	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	0.000
13.C	18.C	-0.0052	-0.0052	-0.0052	-0.0052	-0.0052	-0.0053	-0.0053	0.001
14.A	11.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
14.A	10.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
15.C	16.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0016	-0.0016	0.000
15.C	17.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0015	-0.0015	0.000
18.A	19.A	-0.0011	-0.0011	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
18.A	21.A	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.000
18.B	21.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0018	-0.0018	0.000
18.C	21.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.001
19.A	20.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
21.B	22.B	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	0.000
21.A	23.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
21.B	23.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
21.C	23.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.001
23.C	24.C	-0.0022	-0.0022	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	0.001
23.A	25.A	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
23.B	25.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
23.C	25.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0018	-0.0018	0.001
25r.A	26.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000
25r.C	26.C	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000
25.A	28.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
25.B	28.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
25.C	28.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
26.A	27.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
26.C	27.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
26.C	31.C	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
27.A	33.A	-0.0021	-0.0020	-0.0020	-0.0020	-0.0020	-0.0021	-0.0021	0.000
28.A	29.A	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.000
28.B	29.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0018	-0.0018	0.000
28.C	29.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
29.A	30.A	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	0.000
29.B	30.B	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	0.000
29.C	30.C	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	0.000
30.A	250.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
30.B	250.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
30.C	250.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
31.C	32.C	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
34.C	15.C	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	0.000
35.A	36.A	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	0.000
35.B	36.B	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	0.000
35.A	40.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
35.B	40.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
35.C	40.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0015	-0.0015	0.000
36.A	37.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
36.B	38.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
38.B	39.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
40.C	41.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0014	-0.0014	0.000
40.A	42.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
40.B	42.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
40.C	42.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0015	-0.0015	0.000
42.B	43.B	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.000
42.A	44.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
42.B	44.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
42.C	44.C	-0.0011	-0.0011	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
44.A	45.A	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	0.000
44.A	47.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
44.B	47.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
44.C	47.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0015	-0.0015	0.000
45.A	46.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
47.A	48.A	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.000
47.B	48.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
47.C	48.C	-0.0009	-0.0009	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
47.A	49.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
47.B	49.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
47.C	49.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.001
49.A	50.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
49.B	50.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
49.C	50.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
50.A	51.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
50.B	51.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
50.C	51.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.001
51.A	151.A	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	0.000
51.B	151.B	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	0.000
51.C	151.C	-0.0031	-0.0031	-0.0032	-0.0032	-0.0032	-0.0032	-0.0032	0.001
52.A	53.A	-0.0016	-0.0024	-0.0020	-0.0020	-0.0020	-0.0013	-0.0013	0.013
52.B	53.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
52.C	53.C	0.7806	0.6715	0.1591	0.1607	0.1607	-0.0001	0.0002	7.302
53.A	54.A	-0.0010	-0.0015	-0.0013	-0.0013	-0.0013	-0.0008	-0.0008	0.008
53.B	54.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
53.C	54.C	0.4879	0.4197	0.0994	0.1005	0.1005	-0.0001	0.0002	4.808
54.A	55.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000
54.B	55.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
54.C	55.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.001
54.A	57.A	0.0991	0.2318	0.2715	0.2713	0.2713	0.1618	0.1617	0.564
54.B	57.B	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	0.000
54.C	57.C	1.4487	1.3246	0.3772	0.3805	0.3805	0.0069	0.0088	8.539
55.A	56.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000
55.B	56.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
55.C	56.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
57.B	58.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
57.A	60.A	0.2123	0.4966	0.5817	0.5814	0.5814	0.3467	0.3465	1.063
57.B	60.B	-0.0050	-0.0050	-0.0050	-0.0050	-0.0050	-0.0049	-0.0049	0.000
57.C	60.C	3.1045	2.8386	0.8083	0.8155	0.8155	0.0148	0.0188	17.235
58.B	59.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
60.A	61.A	-0.0039	-0.0039	-0.0038	-0.0038	-0.0038	-0.0038	-0.0038	0.001
60.B	61.B	-0.0035	-0.0035	-0.0035	-0.0035	-0.0035	-0.0035	-0.0035	0.000
60.C	61.C	-0.0030	-0.0030	-0.0031	-0.0031	-0.0031	-0.0032	-0.0032	0.002
60.A	62.A	-0.0160	-0.0160	-0.0158	-0.0158	-0.0158	-0.0157	-0.0157	0.004
60.B	62.B	-0.0154	-0.0154	-0.0154	-0.0154	-0.0154	-0.0155	-0.0155	0.000
60.C	62.C	-0.0146	-0.0146	-0.0151	-0.0151	-0.0151	-0.0154	-0.0154	0.011
62.A	63.A	-0.0112	-0.0112	-0.0111	-0.0111	-0.0111	-0.0110	-0.0110	0.005
62.B	63.B	-0.0108	-0.0108	-0.0108	-0.0108	-0.0108	-0.0108	-0.0108	0.001
62.C	63.C	-0.0102	-0.0102	-0.0105	-0.0105	-0.0105	-0.0108	-0.0108	0.011
63.A	64.A	-0.0224	-0.0224	-0.0222	-0.0222	-0.0222	-0.0219	-0.0219	0.006
63.B	64.B	-0.0215	-0.0215	-0.0216	-0.0216	-0.0216	-0.0216	-0.0216	0.000
63.C	64.C	-0.0204	-0.0205	-0.0211	-0.0211	-0.0211	-0.0216	-0.0216	0.016
64.A	65.A	-0.0272	-0.0272	-0.0269	-0.0269	-0.0269	-0.0266	-0.0266	0.007

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
64.B	65.B	-0.0261	-0.0261	-0.0262	-0.0262	-0.0262	-0.0263	-0.0263	0.000
64.C	65.C	-0.0248	-0.0249	-0.0256	-0.0256	-0.0256	-0.0262	-0.0262	0.019
65.A	66.A	-0.0208	-0.0208	-0.0206	-0.0206	-0.0206	-0.0203	-0.0203	0.006
65.B	66.B	-0.0200	-0.0200	-0.0200	-0.0200	-0.0200	-0.0201	-0.0201	0.001
65.C	66.C	-0.0189	-0.0190	-0.0196	-0.0196	-0.0196	-0.0201	-0.0201	0.015
67.A	68.A	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	0.000
67.A	72.A	0.0789	0.1868	0.2220	0.2219	0.2219	0.1318	0.1317	0.470
67.B	72.B	-0.0017	-0.0018	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
67.C	72.C	1.0871	0.9859	0.2922	0.2948	0.2948	0.0056	0.0071	2.228
67.A	97.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
67.B	97.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
67.C	97.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
68.A	69.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	0.000
69.A	70.A	-0.0014	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
70.A	71.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	0.000
72.C	73.C	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	0.000
72.A	76.A	0.0574	0.1359	0.1615	0.1614	0.1614	0.0959	0.0958	0.382
72.B	76.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
72.C	76.C	0.7906	0.7170	0.2125	0.2144	0.2144	0.0041	0.0052	2.150
73.C	74.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0015	-0.0015	0.000
74.C	75.C	-0.0016	-0.0017	-0.0016	-0.0016	-0.0016	-0.0017	-0.0017	0.000
76.A	77.A	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025	0.000
76.B	77.B	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	0.000
76.C	77.C	1.4644	1.2469	0.3078	0.3110	0.3110	-0.0005	0.0002	3.569
76.A	86.A	0.0993	0.2801	0.4254	0.4246	0.4246	0.3243	0.3223	1.038
76.B	86.B	-0.0044	-0.0044	-0.0044	-0.0044	-0.0044	-0.0044	-0.0044	0.000
76.C	86.C	-0.0047	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	0.000
77.A	78.A	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
77.B	78.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
77.C	78.C	0.3661	0.3117	0.0770	0.0778	0.0778	-0.0001	0.0001	1.530
78.A	79.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
78.B	79.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
78.C	79.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
78.A	80.A	-0.0030	-0.0030	-0.0030	-0.0030	-0.0030	-0.0030	-0.0030	0.000
78.B	80.B	-0.0027	-0.0027	-0.0027	-0.0027	-0.0027	-0.0027	-0.0027	0.000
78.C	80.C	1.7390	1.4807	0.3655	0.3694	0.3694	-0.0006	0.0003	5.118
80.A	81.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	0.000
80.B	81.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
80.C	81.C	0.6407	0.5455	0.1347	0.1361	0.1361	-0.0002	0.0001	2.749
81.A	82.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.001
81.B	82.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
81.C	82.C	-0.0016	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.001
81.C	84.C	3.1800	2.7082	0.6709	0.6779	0.6779	0.0020	0.0037	8.925
82.A	83.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.001
82.B	83.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
82.C	83.C	-0.0016	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.001
84.C	85.C	2.2378	1.9058	0.4722	0.4771	0.4771	0.0014	0.0026	8.716
86.A	87.A	0.0644	0.1820	0.2765	0.2760	0.2760	0.2108	0.2095	0.723
86.B	87.B	-0.0026	-0.0026	-0.0026	-0.0026	-0.0026	-0.0026	-0.0026	0.000
86.C	87.C	-0.0030	-0.0031	-0.0031	-0.0031	-0.0031	-0.0031	-0.0031	0.000
87.A	88.A	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.000
87.A	89.A	0.0394	0.1112	0.1690	0.1687	0.1687	0.1288	0.1280	0.487
87.B	89.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
87.C	89.C	-0.0018	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
89.B	90.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
89.A	91.A	0.0322	0.0910	0.1383	0.1380	0.1380	0.1054	0.1047	0.410
89.B	91.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
89.C	91.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
91.C	92.C	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
91.A	93.A	0.0322	0.0910	0.1383	0.1380	0.1380	0.1054	0.1047	0.400
91.B	93.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
91.C	93.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
93.A	94.A	0.0502	0.1400	0.2122	0.2118	0.2118	0.1620	0.1610	0.489
93.A	95.A	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
93.B	95.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
93.C	95.C	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0021	-0.0021	0.000
95.B	96.B	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	0.000
97.A	98.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
97.B	98.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
97.C	98.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
98.A	99.A	-0.0032	-0.0032	-0.0031	-0.0031	-0.0031	-0.0031	-0.0031	0.000
98.B	99.B	-0.0035	-0.0035	-0.0035	-0.0035	-0.0035	-0.0035	-0.0035	0.000
98.C	99.C	-0.0037	-0.0038	-0.0038	-0.0038	-0.0038	-0.0038	-0.0038	0.001
99.A	100.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
99.B	100.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
99.C	100.C	-0.0020	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.000
100.A	450.A	-0.0046	-0.0046	-0.0045	-0.0046	-0.0046	-0.0046	-0.0046	0.001
100.B	450.B	-0.0051	-0.0051	-0.0050	-0.0050	-0.0050	-0.0050	-0.0050	0.000
100.C	450.C	-0.0054	-0.0055	-0.0055	-0.0055	-0.0055	-0.0055	-0.0055	0.001
197.A	101.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
197.B	101.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
197.C	101.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
101.C	102.C	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
101.A	105.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
101.B	105.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
101.C	105.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
102.C	103.C	-0.0013	-0.0014	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
103.C	104.C	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	0.001
105.B	106.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
105.A	108.A	-0.0019	-0.0019	-0.0018	-0.0018	-0.0018	-0.0019	-0.0019	0.000
105.B	108.B	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.000
105.C	108.C	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	0.000
106.B	107.B	-0.0023	-0.0023	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	0.000
108.A	109.A	-0.0019	-0.0019	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.001
108.A	300.A	-0.0058	-0.0057	-0.0057	-0.0057	-0.0057	-0.0057	-0.0057	0.001
108.B	300.B	-0.0063	-0.0063	-0.0063	-0.0063	-0.0063	-0.0063	-0.0063	0.000
108.C	300.C	-0.0068	-0.0069	-0.0069	-0.0069	-0.0069	-0.0069	-0.0069	0.001
109.A	110.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.001
110.A	111.A	-0.0024	-0.0024	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	0.001
110.A	112.A	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	0.000
112.A	113.A	-0.0022	-0.0022	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.001
113.A	114.A	-0.0014	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
135.A	35.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000
135.B	35.B	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	0.000
135.C	35.C	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	0.001
152.A	52.A	-0.0032	-0.0047	-0.0041	-0.0041	-0.0041	-0.0026	-0.0026	0.024
152.B	52.B	-0.0028	-0.0028	-0.0028	-0.0028	-0.0028	-0.0028	-0.0028	0.000
152.C	52.C	1.5611	1.3430	0.3181	0.3215	0.3215	-0.0003	0.0005	13.553
160r.A	67.A	0.1154	0.2640	0.3013	0.3012	0.3012	0.1709	0.1709	0.523
160r.B	67.B	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	0.000
160r.C	67.C	1.3973	1.2784	0.3876	0.3909	0.3909	0.0083	0.0104	2.013
54.A	94.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000

Table K.23: M^P values obtained for Scenario S2

Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
149.A	1.A	-0.0005	-0.0005	-0.0005	-0.0004	-0.0004	-0.0005	-0.0005	0.000
149.B	1.B	0.0007	0.0007	0.0007	0.0005	0.0004	0.0007	0.0007	0.000
149.C	1.C	0.9964	0.8253	1.0011	0.3095	0.0928	0.9964	0.9964	2.622
1.B	2.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
1.C	3.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
1.A	7.A	-0.0004	-0.0003	-0.0004	-0.0003	-0.0003	-0.0004	-0.0004	0.001
1.B	7.B	0.0005	0.0005	0.0005	0.0004	0.0003	0.0005	0.0005	0.002
1.C	7.C	0.7473	0.6190	0.7508	0.2322	0.0696	0.7473	0.7473	5.863
3.C	4.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
3.C	5.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
5.C	6.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
7.A	8.A	-0.0003	-0.0002	-0.0002	-0.0002	-0.0002	-0.0003	-0.0003	0.001
7.B	8.B	0.0004	0.0003	0.0004	0.0002	0.0002	0.0004	0.0004	0.001
7.C	8.C	0.4982	0.4127	0.5005	0.1548	0.0464	0.4982	0.4982	4.090
8.B	12.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
8.A	9.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
8.A	13.A	-0.0004	-0.0003	-0.0004	-0.0003	-0.0003	-0.0004	-0.0004	0.001
8.B	13.B	0.0005	0.0005	0.0005	0.0004	0.0003	0.0005	0.0005	0.002
8.C	13.C	0.7473	0.6190	0.7508	0.2321	0.0696	0.7473	0.7473	5.879
9r.A	14.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
13.C	34.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
13.A	18.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
13.B	18.B	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
13.C	18.C	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.000
14.A	11.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
14.A	10.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
15.C	16.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
15.C	17.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
18.A	19.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
18.A	21.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
18.B	21.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
18.C	21.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
19.A	20.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
21.B	22.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
21.A	23.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
21.B	23.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
21.C	23.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
23.C	24.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
23.A	25.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
23.B	25.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
23.C	25.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
25r.A	26.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
25r.C	26.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
25.A	28.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
25.B	28.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
25.C	28.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
26.A	27.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
26.C	27.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
26.C	31.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
27.A	33.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
28.A	29.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
28.B	29.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
28.C	29.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
29.A	30.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
29.B	30.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
29.C	30.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
30.A	250.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
30.B	250.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
30.C	250.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
31.C	32.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
34.C	15.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
35.A	36.A	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	0.000
35.B	36.B	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
35.A	40.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
35.B	40.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
35.C	40.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
36.A	37.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
36.B	38.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
38.B	39.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
40.C	41.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
40.A	42.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
40.B	42.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
40.C	42.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
42.B	43.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
42.A	44.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
42.B	44.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
42.C	44.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
44.A	45.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
44.A	47.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
44.B	47.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
44.C	47.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
45.A	46.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
47.A	48.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
47.B	48.B	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	0.000
47.C	48.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
47.A	49.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
47.B	49.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
47.C	49.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
49.A	50.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
49.B	50.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
49.C	50.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
50.A	51.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
50.B	51.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
50.C	51.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
51.A	151.A	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.000
51.B	151.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
51.C	151.C	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
52.A	53.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
52.B	53.B	0.0003	0.0003	0.0003	0.0002	0.0002	0.0003	0.0003	0.001
52.C	53.C	0.4982	0.4127	0.5005	0.1548	0.0464	0.4982	0.4982	4.120
53.A	54.A	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
53.B	54.B	0.0002	0.0002	0.0002	0.0001	0.0001	0.0002	0.0002	0.001
53.C	54.C	0.3114	0.2579	0.3128	0.0967	0.0290	0.3114	0.3114	2.709
54.A	55.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
54.B	55.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
54.C	55.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
54.A	57.A	-0.0396	-0.0328	-0.0398	-0.0122	-0.0036	-0.0396	-0.0396	0.332
54.B	57.B	0.0000	0.0000	0.0000	-0.0001	-0.0002	0.0000	0.0000	0.001
54.C	57.C	0.8412	0.6968	0.8452	0.2614	0.0784	0.8412	0.8412	6.031
55.A	56.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
55.B	56.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
55.C	56.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
57.B	58.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
57.A	60.A	-0.0849	-0.0703	-0.0853	-0.0261	-0.0076	-0.0849	-0.0849	0.673
57.B	60.B	-0.0001	-0.0001	-0.0001	-0.0003	-0.0005	-0.0001	-0.0001	0.002
57.C	60.C	1.8026	1.4932	1.8111	0.5602	0.1681	1.8026	1.8026	12.055
58.B	59.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
60.A	61.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
60.B	61.B	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
60.C	61.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
60.A	62.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
60.B	62.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
60.C	62.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
62.A	63.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
62.B	63.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
62.C	63.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
63.A	64.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
63.B	64.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
63.C	64.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
64.A	65.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
64.B	65.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
64.C	65.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
65.A	66.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
65.B	66.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
65.C	66.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
67.A	68.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
67.A	72.A	-0.0333	-0.0275	-0.0334	-0.0101	-0.0029	-0.0333	-0.0333	0.283
67.B	72.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
67.C	72.C	0.7147	0.5921	0.7181	0.2192	0.0649	0.7147	0.7147	2.879
67.A	97.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
67.B	97.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
67.C	97.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
68.A	69.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
69.A	70.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
70.A	71.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
72.C	73.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
72.A	76.A	-0.0242	-0.0200	-0.0243	-0.0074	-0.0021	-0.0242	-0.0242	0.215
72.B	76.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
72.C	76.C	0.5198	0.4306	0.5223	0.1594	0.0472	0.5198	0.5198	2.357
73.C	74.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
74.C	75.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
76.A	77.A	0.0004	0.0003	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
76.B	77.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
76.C	77.C	1.0871	0.9005	1.0923	0.3332	0.0984	1.0871	1.0871	4.452
76.A	86.A	0.0601	0.0498	0.0604	0.0187	0.0057	0.0601	0.0601	0.431
76.B	86.B	-0.0007	-0.0007	-0.0007	-0.0006	-0.0006	-0.0007	-0.0007	0.000
76.C	86.C	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
77.A	78.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
77.B	78.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
77.C	78.C	0.2718	0.2251	0.2730	0.0833	0.0246	0.2718	0.2718	1.510
78.A	79.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
78.B	79.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
78.C	79.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
78.A	80.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
78.B	80.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
78.C	80.C	1.2910	1.0694	1.2971	0.3956	0.1168	1.2910	1.2910	5.575
80.A	81.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
80.B	81.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
80.C	81.C	0.4756	0.3940	0.4779	0.1458	0.0430	0.4756	0.4756	2.584
81.A	82.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
81.B	82.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
81.C	82.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
81.C	84.C	5.2269	4.3297	5.2516	1.6025	0.4739	5.2269	5.2269	19.188
82.A	83.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
82.B	83.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
82.C	83.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
84.C	85.C	3.6781	3.0468	3.6956	1.1277	0.3335	3.6781	3.6781	16.472
86.A	87.A	0.0385	0.0320	0.0387	0.0122	0.0039	0.0385	0.0385	0.278
86.B	87.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
86.C	87.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
87.A	88.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
87.A	89.A	0.0236	0.0196	0.0237	0.0074	0.0024	0.0236	0.0236	0.177
87.B	89.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
87.C	89.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
89.B	90.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
89.A	91.A	0.0193	0.0160	0.0194	0.0061	0.0019	0.0193	0.0193	0.146
89.B	91.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
89.C	91.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
91.C	92.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
91.A	93.A	0.0193	0.0160	0.0194	0.0061	0.0019	0.0193	0.0193	0.145
91.B	93.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
91.C	93.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
93.A	94.A	0.0677	0.0561	0.0680	0.0209	0.0062	0.0677	0.0677	0.403
93.A	95.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
93.B	95.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
93.C	95.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0002	-0.0001	-0.0001	0.000
95.B	96.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
97.A	98.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
97.B	98.B	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	-0.0003	-0.0003	0.000
97.C	98.C	0.0002	0.0002	0.0002	0.0002	0.0001	0.0002	0.0002	0.000
98.A	99.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
98.B	99.B	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	0.000
98.C	99.C	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
99.A	100.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
99.B	100.B	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
99.C	100.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
100.A	450.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
100.B	450.B	-0.0008	-0.0008	-0.0008	-0.0007	-0.0007	-0.0008	-0.0008	0.001
100.C	450.C	0.0005	0.0005	0.0005	0.0004	0.0004	0.0005	0.0005	0.001

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
197.A	101.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
197.B	101.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
197.C	101.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
101.C	102.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
101.A	105.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
101.B	105.B	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	-0.0003	-0.0003	0.000
101.C	105.C	0.0002	0.0002	0.0002	0.0002	0.0001	0.0002	0.0002	0.000
102.C	103.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
103.C	104.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
105.B	106.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
105.A	108.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
105.B	108.B	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
105.C	108.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
106.B	107.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
108.A	109.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
108.A	300.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
108.B	300.B	-0.0010	-0.0009	-0.0010	-0.0009	-0.0009	-0.0010	-0.0010	0.001
108.C	300.C	0.0006	0.0006	0.0006	0.0006	0.0005	0.0006	0.0006	0.001
109.A	110.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
110.A	111.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
110.A	112.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
112.A	113.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
113.A	114.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
135.A	35.A	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.000
135.B	35.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
135.C	35.C	0.0004	0.0004	0.0004	0.0003	0.0003	0.0004	0.0004	0.000
152.A	52.A	-0.0005	-0.0004	-0.0004	-0.0004	-0.0004	-0.0005	-0.0005	0.001
152.B	52.B	0.0006	0.0006	0.0006	0.0004	0.0003	0.0006	0.0006	0.002
152.C	52.C	0.9964	0.8254	1.0011	0.3096	0.0928	0.9964	0.9964	7.620
160r.A	67.A	-0.0445	-0.0368	-0.0447	-0.0134	-0.0038	-0.0445	-0.0445	0.325
160r.B	67.B	0.0000	0.0000	0.0000	-0.0001	-0.0001	0.0000	0.0000	0.000
160r.C	67.C	0.9128	0.7561	0.9171	0.2797	0.0826	0.9128	0.9128	3.179
54.A	94.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000

Table K.24: M^Q values obtained for Scenario S2

Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
149.A	1.A	-0.0031	-0.0030	-0.0031	-0.0028	-0.0027	-0.0031	-0.0031	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
149.B	1.B	-0.0026	-0.0026	-0.0026	-0.0027	-0.0027	-0.0026	-0.0026	0.000
149.C	1.C	2.2982	1.9033	2.3090	0.7124	0.2119	2.2982	2.2982	6.054
1.B	2.B	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.000
1.C	3.C	-0.0011	-0.0010	-0.0011	-0.0010	-0.0010	-0.0011	-0.0011	0.000
1.A	7.A	-0.0023	-0.0023	-0.0023	-0.0021	-0.0020	-0.0023	-0.0023	0.003
1.B	7.B	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	0.001
1.C	7.C	1.7236	1.4275	1.7317	0.5343	0.1589	1.7236	1.7236	13.537
3.C	4.C	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	0.000
3.C	5.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
5.C	6.C	-0.0011	-0.0010	-0.0011	-0.0010	-0.0010	-0.0011	-0.0011	0.000
7.A	8.A	-0.0015	-0.0015	-0.0015	-0.0014	-0.0014	-0.0015	-0.0015	0.002
7.B	8.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0014	-0.0013	-0.0013	0.000
7.C	8.C	1.1491	0.9516	1.1545	0.3562	0.1059	1.1491	1.1491	9.443
8.B	12.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
8.A	9.A	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
8.A	13.A	-0.0023	-0.0022	-0.0023	-0.0021	-0.0020	-0.0023	-0.0023	0.003
8.B	13.B	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	0.001
8.C	13.C	1.7236	1.4274	1.7317	0.5343	0.1589	1.7236	1.7236	13.574
9r.A	14.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
13.C	34.C	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
13.A	18.A	-0.0057	-0.0057	-0.0057	-0.0057	-0.0057	-0.0057	-0.0057	0.000
13.B	18.B	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	0.000
13.C	18.C	-0.0054	-0.0054	-0.0054	-0.0054	-0.0053	-0.0054	-0.0054	0.001
14.A	11.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
14.A	10.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
15.C	16.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
15.C	17.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
18.A	19.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
18.A	21.A	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.000
18.B	21.B	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000
18.C	21.C	-0.0020	-0.0020	-0.0020	-0.0019	-0.0019	-0.0020	-0.0020	0.000
19.A	20.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
21.B	22.B	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	0.000
21.A	23.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
21.B	23.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
21.C	23.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
23.C	24.C	-0.0024	-0.0023	-0.0024	-0.0023	-0.0023	-0.0024	-0.0024	0.001
23.A	25.A	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
23.B	25.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
23.C	25.C	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000
25r.A	26.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
25r.C	26.C	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000
25.A	28.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
25.B	28.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
25.C	28.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
26.A	27.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
26.C	27.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
26.C	31.C	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
27.A	33.A	-0.0021	-0.0021	-0.0021	-0.0021	-0.0020	-0.0021	-0.0021	0.000
28.A	29.A	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.000
28.B	29.B	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000
28.C	29.C	-0.0020	-0.0020	-0.0020	-0.0019	-0.0019	-0.0020	-0.0020	0.000
29.A	30.A	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	0.000
29.B	30.B	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	0.000
29.C	30.C	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	0.000
30.A	250.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
30.B	250.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
30.C	250.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
31.C	32.C	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
34.C	15.C	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	0.000
35.A	36.A	-0.0033	-0.0033	-0.0033	-0.0034	-0.0034	-0.0033	-0.0033	0.000
35.B	36.B	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	0.000
35.A	40.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
35.B	40.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
35.C	40.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
36.A	37.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
36.B	38.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
38.B	39.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
40.C	41.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
40.A	42.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
40.B	42.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
40.C	42.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
42.B	43.B	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.000
42.A	44.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
42.B	44.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
42.C	44.C	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
44.A	45.A	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	0.000
44.A	47.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
44.B	47.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
44.C	47.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
45.A	46.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
47.A	48.A	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
47.B	48.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
47.C	48.C	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
47.A	49.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
47.B	49.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
47.C	49.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
49.A	50.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
49.B	50.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
49.C	50.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
50.A	51.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
50.B	51.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
50.C	51.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
51.A	151.A	-0.0024	-0.0024	-0.0023	-0.0024	-0.0024	-0.0024	-0.0024	0.000
51.B	151.B	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	0.000
51.C	151.C	-0.0033	-0.0033	-0.0033	-0.0032	-0.0032	-0.0033	-0.0033	0.001
52.A	53.A	-0.0015	-0.0014	-0.0015	-0.0014	-0.0013	-0.0015	-0.0015	0.001
52.B	53.B	-0.0013	-0.0013	-0.0013	-0.0014	-0.0014	-0.0013	-0.0013	0.000
52.C	53.C	1.1489	0.9515	1.1543	0.3561	0.1059	1.1489	1.1489	9.512
53.A	54.A	-0.0009	-0.0009	-0.0009	-0.0009	-0.0008	-0.0009	-0.0009	0.001
53.B	54.B	-0.0008	-0.0008	-0.0008	-0.0008	-0.0009	-0.0008	-0.0008	0.000
53.C	54.C	0.7181	0.5947	0.7215	0.2226	0.0662	0.7181	0.7181	6.255
54.A	55.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0018	-0.0017	-0.0017	0.000
54.B	55.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
54.C	55.C	-0.0017	-0.0017	-0.0017	-0.0016	-0.0016	-0.0017	-0.0017	0.001
54.A	57.A	-0.0751	-0.0626	-0.0755	-0.0247	-0.0089	-0.0751	-0.0751	0.611
54.B	57.B	-0.0022	-0.0021	-0.0021	-0.0022	-0.0022	-0.0022	-0.0022	0.000
54.C	57.C	1.8252	1.5115	1.8338	0.5655	0.1678	1.8252	1.8252	13.104
55.A	56.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0018	-0.0017	-0.0017	0.000
55.B	56.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
55.C	56.C	-0.0017	-0.0017	-0.0017	-0.0016	-0.0016	-0.0017	-0.0017	0.000
57.B	58.B	-0.0010	-0.0010	-0.0011	-0.0010	-0.0010	-0.0010	-0.0010	0.000
57.A	60.A	-0.1609	-0.1341	-0.1617	-0.0530	-0.0190	-0.1609	-0.1609	1.238
57.B	60.B	-0.0046	-0.0046	-0.0046	-0.0047	-0.0047	-0.0046	-0.0046	0.001
57.C	60.C	3.9111	3.2389	3.9296	1.2118	0.3596	3.9111	3.9111	26.193
58.B	59.B	-0.0010	-0.0010	-0.0011	-0.0010	-0.0010	-0.0010	-0.0010	0.000
60.A	61.A	-0.0037	-0.0037	-0.0037	-0.0038	-0.0038	-0.0037	-0.0037	0.000
60.B	61.B	-0.0036	-0.0036	-0.0036	-0.0035	-0.0035	-0.0036	-0.0036	0.000
60.C	61.C	-0.0034	-0.0034	-0.0034	-0.0033	-0.0033	-0.0034	-0.0034	0.002
60.A	62.A	-0.0151	-0.0151	-0.0151	-0.0153	-0.0154	-0.0151	-0.0151	0.003
60.B	62.B	-0.0156	-0.0157	-0.0157	-0.0156	-0.0155	-0.0156	-0.0156	0.001
60.C	62.C	-0.0166	-0.0164	-0.0165	-0.0161	-0.0158	-0.0166	-0.0166	0.010
62.A	63.A	-0.0106	-0.0106	-0.0106	-0.0107	-0.0108	-0.0106	-0.0106	0.002

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
62.B	63.B	-0.0109	-0.0110	-0.0110	-0.0109	-0.0109	-0.0109	-0.0109	0.001
62.C	63.C	-0.0116	-0.0115	-0.0116	-0.0113	-0.0111	-0.0116	-0.0116	0.000
63.A	64.A	-0.0211	-0.0212	-0.0211	-0.0214	-0.0215	-0.0211	-0.0211	0.007
63.B	64.B	-0.0219	-0.0219	-0.0219	-0.0218	-0.0218	-0.0219	-0.0219	0.002
63.C	64.C	-0.0232	-0.0230	-0.0232	-0.0225	-0.0221	-0.0232	-0.0232	0.015
64.A	65.A	-0.0256	-0.0257	-0.0256	-0.0259	-0.0261	-0.0256	-0.0256	0.007
64.B	65.B	-0.0266	-0.0266	-0.0266	-0.0265	-0.0264	-0.0266	-0.0266	0.004
64.C	65.C	-0.0282	-0.0280	-0.0281	-0.0273	-0.0269	-0.0282	-0.0282	0.017
65.A	66.A	-0.0196	-0.0196	-0.0196	-0.0198	-0.0200	-0.0196	-0.0196	0.005
65.B	66.B	-0.0203	-0.0203	-0.0204	-0.0203	-0.0202	-0.0203	-0.0203	0.002
65.C	66.C	-0.0216	-0.0214	-0.0215	-0.0209	-0.0206	-0.0216	-0.0216	0.013
67.A	68.A	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	0.000
67.A	72.A	-0.0633	-0.0527	-0.0636	-0.0205	-0.0072	-0.0633	-0.0633	0.523
67.B	72.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
67.C	72.C	1.5527	1.2859	1.5600	0.4747	0.1391	1.5527	1.5527	6.262
67.A	97.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
67.B	97.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
67.C	97.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.001
68.A	69.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	0.000
69.A	70.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
70.A	71.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	0.000
72.C	73.C	-0.0012	-0.0011	-0.0011	-0.0011	-0.0011	-0.0012	-0.0012	0.000
72.A	76.A	-0.0460	-0.0383	-0.0462	-0.0149	-0.0052	-0.0460	-0.0460	0.398
72.B	76.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
72.C	76.C	1.1292	0.9352	1.1345	0.3452	0.1011	1.1292	1.1292	5.127
73.C	74.C	-0.0015	-0.0015	-0.0015	-0.0014	-0.0014	-0.0015	-0.0015	0.001
74.C	75.C	-0.0017	-0.0017	-0.0017	-0.0016	-0.0016	-0.0017	-0.0017	0.001
76.A	77.A	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025	0.000
76.B	77.B	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	0.000
76.C	77.C	2.4399	2.0206	2.4515	0.7462	0.2188	2.4399	2.4399	10.001
76.A	86.A	0.1341	0.1104	0.1348	0.0386	0.0086	0.1341	0.1341	0.995
76.B	86.B	-0.0044	-0.0044	-0.0044	-0.0044	-0.0044	-0.0044	-0.0044	0.000
76.C	86.C	-0.0048	-0.0048	-0.0048	-0.0047	-0.0047	-0.0048	-0.0048	0.001
77.A	78.A	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
77.B	78.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
77.C	78.C	0.6100	0.5052	0.6129	0.1865	0.0547	0.6100	0.6100	3.392
78.A	79.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
78.B	79.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
78.C	79.C	-0.0016	-0.0016	-0.0016	-0.0015	-0.0015	-0.0016	-0.0016	0.000
78.A	80.A	-0.0030	-0.0030	-0.0030	-0.0030	-0.0030	-0.0030	-0.0030	0.000
78.B	80.B	-0.0027	-0.0027	-0.0027	-0.0027	-0.0027	-0.0027	-0.0027	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
78.C	80.C	2.8973	2.3994	2.9110	0.8861	0.2598	2.8973	2.8973	12.524
80.A	81.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	0.000
80.B	81.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
80.C	81.C	1.0674	0.8840	1.0725	0.3264	0.0957	1.0674	1.0674	5.805
81.A	82.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
81.B	82.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
81.C	82.C	-0.0018	-0.0018	-0.0018	-0.0017	-0.0017	-0.0018	-0.0018	0.001
81.C	84.C	5.2959	4.3864	5.3210	1.6218	0.4776	5.2959	5.2959	19.452
82.A	83.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.001
82.B	83.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
82.C	83.C	-0.0018	-0.0018	-0.0018	-0.0017	-0.0017	-0.0018	-0.0018	0.000
84.C	85.C	3.7266	3.0867	3.7443	1.1412	0.3361	3.7266	3.7266	16.698
86.A	87.A	0.0870	0.0716	0.0875	0.0249	0.0054	0.0870	0.0870	0.656
86.B	87.B	-0.0026	-0.0026	-0.0026	-0.0026	-0.0026	-0.0026	-0.0026	0.000
86.C	87.C	-0.0031	-0.0031	-0.0031	-0.0031	-0.0030	-0.0031	-0.0031	0.001
87.A	88.A	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.000
87.A	89.A	0.0532	0.0438	0.0534	0.0152	0.0033	0.0532	0.0532	0.417
87.B	89.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
87.C	89.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
89.B	90.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
89.A	91.A	0.0435	0.0358	0.0437	0.0124	0.0027	0.0435	0.0435	0.345
89.B	91.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
89.C	91.C	-0.0016	-0.0015	-0.0016	-0.0015	-0.0015	-0.0016	-0.0016	0.000
91.C	92.C	-0.0013	-0.0012	-0.0013	-0.0012	-0.0012	-0.0013	-0.0013	0.001
91.A	93.A	0.0435	0.0358	0.0437	0.0124	0.0027	0.0435	0.0435	0.341
91.B	93.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
91.C	93.C	-0.0016	-0.0015	-0.0016	-0.0015	-0.0015	-0.0016	-0.0016	0.000
93.A	94.A	0.0675	0.0557	0.0678	0.0201	0.0052	0.0675	0.0675	0.409
93.A	95.A	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
93.B	95.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
93.C	95.C	-0.0021	-0.0021	-0.0021	-0.0020	-0.0020	-0.0021	-0.0021	0.001
95.B	96.B	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	0.000
97.A	98.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
97.B	98.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
97.C	98.C	-0.0019	-0.0019	-0.0019	-0.0018	-0.0018	-0.0019	-0.0019	0.000
98.A	99.A	-0.0031	-0.0031	-0.0031	-0.0032	-0.0032	-0.0031	-0.0031	0.000
98.B	99.B	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	0.000
98.C	99.C	-0.0038	-0.0037	-0.0037	-0.0037	-0.0037	-0.0038	-0.0038	0.001
99.A	100.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
99.B	100.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
99.C	100.C	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	0.001

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 690min	t= 700min	t= 710min	t= 720min	t= 730min	t= 740min	t= 750min	
100.A	450.A	-0.0046	-0.0046	-0.0046	-0.0046	-0.0046	-0.0046	-0.0046	0.001
100.B	450.B	-0.0050	-0.0050	-0.0050	-0.0050	-0.0050	-0.0050	-0.0050	0.000
100.C	450.C	-0.0055	-0.0054	-0.0055	-0.0054	-0.0054	-0.0055	-0.0055	0.001
197.A	101.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
197.B	101.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
197.C	101.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
101.C	102.C	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
101.A	105.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
101.B	105.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
101.C	105.C	-0.0019	-0.0019	-0.0019	-0.0018	-0.0018	-0.0019	-0.0019	0.000
102.C	103.C	-0.0014	-0.0013	-0.0014	-0.0013	-0.0013	-0.0014	-0.0014	0.000
103.C	104.C	-0.0029	-0.0029	-0.0029	-0.0029	-0.0028	-0.0029	-0.0029	0.001
105.B	106.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
105.A	108.A	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
105.B	108.B	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	0.000
105.C	108.C	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	0.001
106.B	107.B	-0.0024	-0.0024	-0.0024	-0.0024	-0.0023	-0.0024	-0.0024	0.000
108.A	109.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0019	-0.0018	-0.0018	0.000
108.A	300.A	-0.0057	-0.0057	-0.0057	-0.0058	-0.0058	-0.0057	-0.0057	0.001
108.B	300.B	-0.0062	-0.0063	-0.0063	-0.0062	-0.0062	-0.0062	-0.0062	0.000
108.C	300.C	-0.0068	-0.0068	-0.0068	-0.0067	-0.0067	-0.0068	-0.0068	0.002
109.A	110.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
110.A	111.A	-0.0023	-0.0023	-0.0023	-0.0024	-0.0024	-0.0023	-0.0023	0.001
110.A	112.A	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	0.000
112.A	113.A	-0.0021	-0.0021	-0.0021	-0.0022	-0.0022	-0.0021	-0.0021	0.001
113.A	114.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
135.A	35.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000
135.B	35.B	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	0.000
135.C	35.C	-0.0025	-0.0024	-0.0024	-0.0024	-0.0024	-0.0025	-0.0025	0.000
152.A	52.A	-0.0029	-0.0029	-0.0029	-0.0028	-0.0027	-0.0029	-0.0029	0.003
152.B	52.B	-0.0027	-0.0027	-0.0027	-0.0027	-0.0027	-0.0027	-0.0027	0.001
152.C	52.C	2.2979	1.9030	2.3087	0.7122	0.2118	2.2979	2.2979	17.590
160r.A	67.A	-0.1083	-0.0901	-0.1088	-0.0348	-0.0119	-0.1083	-0.1083	0.768
160r.B	67.B	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	0.000
160r.C	67.C	1.9480	1.6133	1.9572	0.5955	0.1744	1.9480	1.9480	6.791
54.A	94.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000

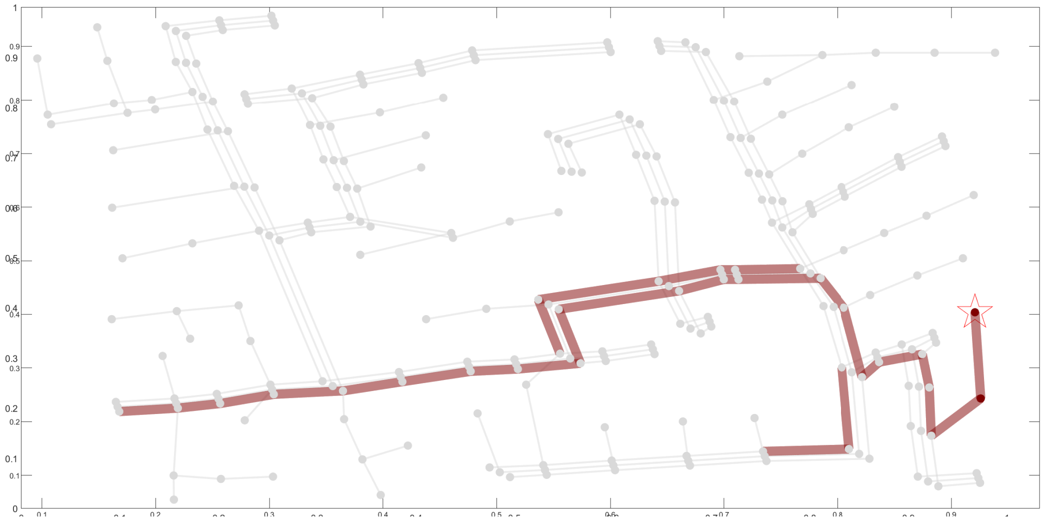

Figure K.11: Representation of M^P and M^Q values obtained for values higher than 0.5 when there is a single-phase perturbation at node 85, phase C. Load consumption with a rated power of 400 kW and 200 kVAr. (Scenario S1)

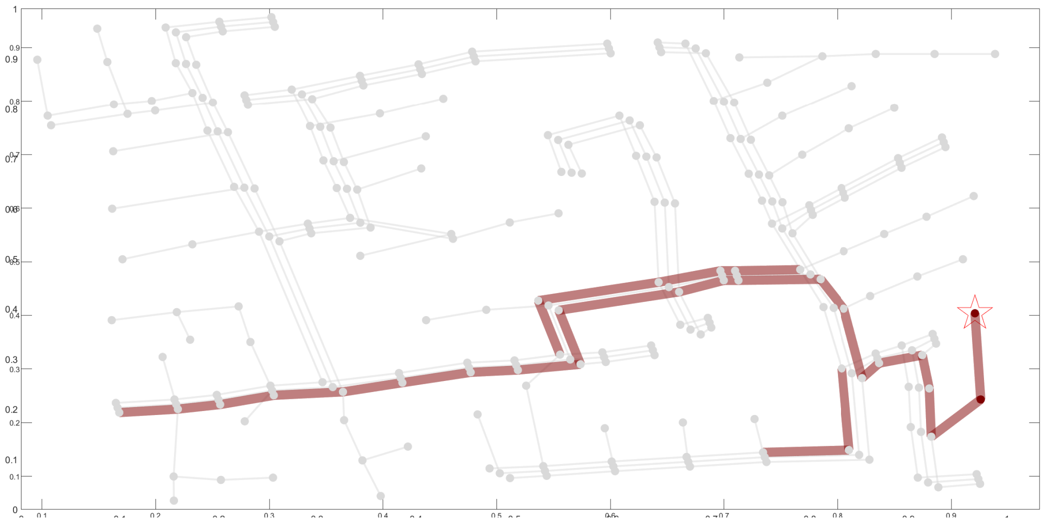

Figure K.12: Representation of M^P and M^Q values obtained for values higher than 0.5 when there is a single-phase perturbation at node 85, phase C. Photovoltaic generation with a rated power of 400 kVA at unity power factor. (Scenario S2)

Table K.25: M^P values obtained for Scenario S3

Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
149.A	1.A	-0.0040	-0.0056	-0.0043	-0.0043	-0.0043	-0.0026	-0.0026	0.000
149.B	1.B	-0.0028	-0.0028	-0.0028	-0.0028	-0.0028	-0.0028	-0.0028	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
149.C	1.C	1.5122	1.3092	0.3135	0.3168	0.3168	-0.0003	0.0005	7.873
1.B	2.B	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.000
1.C	3.C	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
1.A	7.A	-0.0030	-0.0042	-0.0032	-0.0032	-0.0032	-0.0019	-0.0020	0.024
1.B	7.B	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.000
1.C	7.C	1.1342	0.9819	0.2352	0.2376	0.2376	-0.0002	0.0004	10.034
3.C	4.C	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	0.000
3.C	5.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0014	-0.0014	0.000
5.C	6.C	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
7.A	8.A	-0.0020	-0.0028	-0.0021	-0.0021	-0.0021	-0.0013	-0.0013	0.018
7.B	8.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
7.C	8.C	0.7561	0.6546	0.1568	0.1584	0.1584	-0.0001	0.0002	7.020
8.B	12.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
8.A	9.A	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
8.A	13.A	-0.0030	-0.0042	-0.0032	-0.0032	-0.0032	-0.0019	-0.0020	0.025
8.B	13.B	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.000
8.C	13.C	1.1342	0.9819	0.2352	0.2376	0.2376	-0.0002	0.0004	10.085
9r.A	14.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
13.C	34.C	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
13.A	18.A	-0.0057	-0.0057	-0.0057	-0.0057	-0.0057	-0.0057	-0.0057	0.000
13.B	18.B	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	0.000
13.C	18.C	-0.0052	-0.0052	-0.0052	-0.0052	-0.0052	-0.0053	-0.0053	0.001
14.A	11.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
14.A	10.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
15.C	16.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0016	-0.0016	0.000
15.C	17.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0015	-0.0015	0.000
18.A	19.A	-0.0011	-0.0011	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
18.A	21.A	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.000
18.B	21.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0018	-0.0018	0.000
18.C	21.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
19.A	20.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
21.B	22.B	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	0.000
21.A	23.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
21.B	23.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
21.C	23.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.001
23.C	24.C	-0.0022	-0.0022	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	0.001
23.A	25.A	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
23.B	25.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
23.C	25.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0018	-0.0018	0.000
25r.A	26.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000
25r.C	26.C	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
25.A	28.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
25.B	28.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
25.C	28.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
26.A	27.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
26.C	27.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
26.C	31.C	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
27.A	33.A	-0.0021	-0.0020	-0.0020	-0.0020	-0.0020	-0.0021	-0.0021	0.000
28.A	29.A	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.000
28.B	29.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0018	-0.0018	0.000
28.C	29.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
29.A	30.A	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	0.000
29.B	30.B	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	0.000
29.C	30.C	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	0.001
30.A	250.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
30.B	250.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
30.C	250.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
31.C	32.C	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
34.C	15.C	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	0.000
35.A	36.A	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	0.000
35.B	36.B	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	0.000
35.A	40.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
35.B	40.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
35.C	40.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0015	-0.0015	0.000
36.A	37.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
36.B	38.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
38.B	39.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
40.C	41.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0014	-0.0014	0.000
40.A	42.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
40.B	42.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
40.C	42.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0015	-0.0015	0.000
42.B	43.B	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.000
42.A	44.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
42.B	44.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
42.C	44.C	-0.0011	-0.0011	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
44.A	45.A	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	0.000
44.A	47.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
44.B	47.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
44.C	47.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0015	-0.0015	0.000
45.A	46.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
47.A	48.A	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.000
47.B	48.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
47.C	48.C	-0.0009	-0.0009	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
47.A	49.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
47.B	49.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
47.C	49.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
49.A	50.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
49.B	50.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
49.C	50.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
50.A	51.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
50.B	51.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
50.C	51.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
51.A	151.A	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	0.000
51.B	151.B	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	0.000
51.C	151.C	-0.0031	-0.0031	-0.0032	-0.0032	-0.0032	-0.0032	-0.0032	0.001
52.A	53.A	-0.0020	-0.0029	-0.0022	-0.0022	-0.0022	-0.0013	-0.0013	0.019
52.B	53.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
52.C	53.C	0.7563	0.6547	0.1568	0.1585	0.1585	-0.0001	0.0002	6.994
53.A	54.A	-0.0013	-0.0018	-0.0013	-0.0013	-0.0013	-0.0008	-0.0008	0.011
53.B	54.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
53.C	54.C	0.4727	0.4092	0.0980	0.0991	0.0991	-0.0001	0.0002	4.604
54.A	55.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000
54.B	55.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
54.C	55.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.001
54.A	57.A	0.1843	0.3315	0.3180	0.3181	0.3181	0.1646	0.1650	0.548
54.B	57.B	-0.0023	-0.0024	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	0.000
54.C	57.C	1.4506	1.3328	0.3822	0.3855	0.3855	0.0070	0.0089	8.502
55.A	56.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000
55.B	56.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
55.C	56.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.001
57.B	58.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
57.A	60.A	0.3948	0.7102	0.6814	0.6816	0.6816	0.3527	0.3535	1.065
57.B	60.B	-0.0050	-0.0050	-0.0050	-0.0050	-0.0050	-0.0049	-0.0049	0.000
57.C	60.C	3.1086	2.8560	0.8190	0.8262	0.8262	0.0150	0.0190	17.170
58.B	59.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
60.A	61.A	-0.0039	-0.0039	-0.0039	-0.0039	-0.0039	-0.0038	-0.0038	0.000
60.B	61.B	-0.0035	-0.0035	-0.0035	-0.0035	-0.0035	-0.0035	-0.0035	0.000
60.C	61.C	-0.0030	-0.0031	-0.0031	-0.0031	-0.0031	-0.0032	-0.0032	0.002
60.A	62.A	-0.0160	-0.0160	-0.0158	-0.0158	-0.0158	-0.0156	-0.0157	0.002
60.B	62.B	-0.0153	-0.0153	-0.0154	-0.0154	-0.0154	-0.0155	-0.0155	0.001
60.C	62.C	0.6554	0.5668	0.1258	0.1272	0.1272	-0.0145	-0.0141	4.962
62.A	63.A	-0.0112	-0.0112	-0.0111	-0.0111	-0.0111	-0.0110	-0.0110	0.002
62.B	63.B	-0.0107	-0.0107	-0.0108	-0.0108	-0.0108	-0.0108	-0.0108	0.000

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
62.C	63.C	0.4589	0.3969	0.0881	0.0891	0.0891	-0.0101	-0.0099	3.752
63.A	64.A	-0.0224	-0.0225	-0.0222	-0.0222	-0.0222	-0.0219	-0.0219	0.003
63.B	64.B	-0.0215	-0.0215	-0.0216	-0.0216	-0.0216	-0.0216	-0.0216	0.000
63.C	64.C	0.9180	0.7939	0.1763	0.1783	0.1783	-0.0202	-0.0197	7.092
64.A	65.A	-0.0273	-0.0273	-0.0270	-0.0270	-0.0270	-0.0266	-0.0266	0.004
64.B	65.B	-0.0262	-0.0262	-0.0262	-0.0262	-0.0262	-0.0263	-0.0263	0.000
64.C	65.C	1.1152	0.9645	0.2143	0.2168	0.2168	-0.0245	-0.0239	8.766
65.A	66.A	-0.0209	-0.0210	-0.0207	-0.0207	-0.0207	-0.0204	-0.0204	0.004
65.B	66.B	-0.0201	-0.0201	-0.0201	-0.0201	-0.0201	-0.0201	-0.0201	0.000
65.C	66.C	0.8531	0.7379	0.1640	0.1659	0.1659	-0.0187	-0.0183	7.179
67.A	68.A	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	0.000
67.A	72.A	0.0732	0.1616	0.1981	0.1979	0.1979	0.1297	0.1292	0.495
67.B	72.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
67.C	72.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
67.A	97.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
67.B	97.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
67.C	97.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
68.A	69.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	0.000
69.A	70.A	-0.0014	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
70.A	71.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	0.000
72.C	73.C	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	0.000
72.A	76.A	0.0533	0.1175	0.1441	0.1439	0.1439	0.0943	0.0940	0.383
72.B	76.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
72.C	76.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
73.C	74.C	-0.0014	-0.0014	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
74.C	75.C	-0.0016	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
76.A	77.A	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025	0.000
76.B	77.B	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	0.000
76.C	77.C	-0.0027	-0.0027	-0.0027	-0.0027	-0.0027	-0.0027	-0.0027	0.000
76.A	86.A	0.1864	0.4111	0.5042	0.5037	0.5037	0.3300	0.3289	0.905
76.B	86.B	-0.0044	-0.0044	-0.0044	-0.0044	-0.0044	-0.0044	-0.0044	0.000
76.C	86.C	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	0.000
77.A	78.A	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
77.B	78.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
77.C	78.C	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.000
78.A	79.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
78.B	79.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
78.C	79.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
78.A	80.A	-0.0030	-0.0030	-0.0030	-0.0030	-0.0030	-0.0030	-0.0030	0.000
78.B	80.B	-0.0027	-0.0027	-0.0027	-0.0027	-0.0027	-0.0027	-0.0027	0.000
78.C	80.C	-0.0032	-0.0032	-0.0033	-0.0033	-0.0033	-0.0033	-0.0033	0.001

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
80.A	81.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	0.000
80.B	81.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
80.C	81.C	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
81.A	82.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
81.B	82.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
81.C	82.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
81.C	84.C	-0.0027	-0.0028	-0.0028	-0.0028	-0.0028	-0.0028	-0.0028	0.000
82.A	83.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
82.B	83.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
82.C	83.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
84.C	85.C	-0.0019	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	0.000
86.A	87.A	0.1210	0.2673	0.3278	0.3275	0.3275	0.2145	0.2137	0.648
86.B	87.B	-0.0026	-0.0026	-0.0026	-0.0026	-0.0026	-0.0026	-0.0026	0.000
86.C	87.C	-0.0030	-0.0031	-0.0031	-0.0031	-0.0031	-0.0031	-0.0031	0.000
87.A	88.A	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.000
87.A	89.A	0.0740	0.1633	0.2003	0.2001	0.2001	0.1311	0.1306	0.447
87.B	89.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
87.C	89.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
89.B	90.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
89.A	91.A	0.0605	0.1336	0.1639	0.1637	0.1637	0.1072	0.1069	0.381
89.B	91.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
89.C	91.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
91.C	92.C	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
91.A	93.A	0.0605	0.1336	0.1639	0.1637	0.1637	0.1072	0.1069	0.376
91.B	93.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
91.C	93.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
93.A	94.A	0.0935	0.2052	0.2514	0.2512	0.2512	0.1648	0.1643	0.467
93.A	95.A	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
93.B	95.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
93.C	95.C	-0.0020	-0.0020	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.000
95.B	96.B	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	0.000
97.A	98.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
97.B	98.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
97.C	98.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
98.A	99.A	-0.0032	-0.0032	-0.0031	-0.0031	-0.0031	-0.0031	-0.0031	0.001
98.B	99.B	-0.0035	-0.0035	-0.0035	-0.0035	-0.0035	-0.0035	-0.0035	0.000
98.C	99.C	-0.0037	-0.0038	-0.0038	-0.0038	-0.0038	-0.0038	-0.0038	0.000
99.A	100.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
99.B	100.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
99.C	100.C	-0.0020	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.001
100.A	450.A	-0.0046	-0.0046	-0.0045	-0.0045	-0.0045	-0.0046	-0.0046	0.001

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Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
100.B	450.B	-0.0051	-0.0051	-0.0050	-0.0050	-0.0050	-0.0050	-0.0050	0.000
100.C	450.C	-0.0054	-0.0055	-0.0055	-0.0055	-0.0055	-0.0055	-0.0055	0.001
197.A	101.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
197.B	101.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
197.C	101.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
101.C	102.C	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
101.A	105.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
101.B	105.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
101.C	105.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
102.C	103.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
103.C	104.C	-0.0028	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	0.001
105.B	106.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
105.A	108.A	-0.0019	-0.0019	-0.0018	-0.0018	-0.0018	-0.0019	-0.0019	0.000
105.B	108.B	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.000
105.C	108.C	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	0.001
106.B	107.B	-0.0023	-0.0023	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	0.000
108.A	109.A	-0.0019	-0.0019	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000
108.A	300.A	-0.0058	-0.0057	-0.0057	-0.0057	-0.0057	-0.0057	-0.0057	0.001
108.B	300.B	-0.0063	-0.0063	-0.0063	-0.0063	-0.0063	-0.0063	-0.0063	0.000
108.C	300.C	-0.0068	-0.0069	-0.0069	-0.0069	-0.0069	-0.0069	-0.0069	0.002
109.A	110.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
110.A	111.A	-0.0024	-0.0024	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	0.001
110.A	112.A	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	0.000
112.A	113.A	-0.0022	-0.0022	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.001
113.A	114.A	-0.0014	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.001
135.A	35.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000
135.B	35.B	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	0.000
135.C	35.C	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	0.001
152.A	52.A	-0.0041	-0.0057	-0.0043	-0.0043	-0.0043	-0.0026	-0.0026	0.034
152.B	52.B	-0.0028	-0.0028	-0.0028	-0.0028	-0.0028	-0.0028	-0.0028	0.000
152.C	52.C	1.5125	1.3094	0.3137	0.3169	0.3169	-0.0003	0.0005	12.971
160r.A	67.A	0.0942	0.2080	0.2551	0.2549	0.2549	0.1670	0.1664	0.612
160r.B	67.B	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	0.000
160r.C	67.C	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	0.000
54.A	94.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000

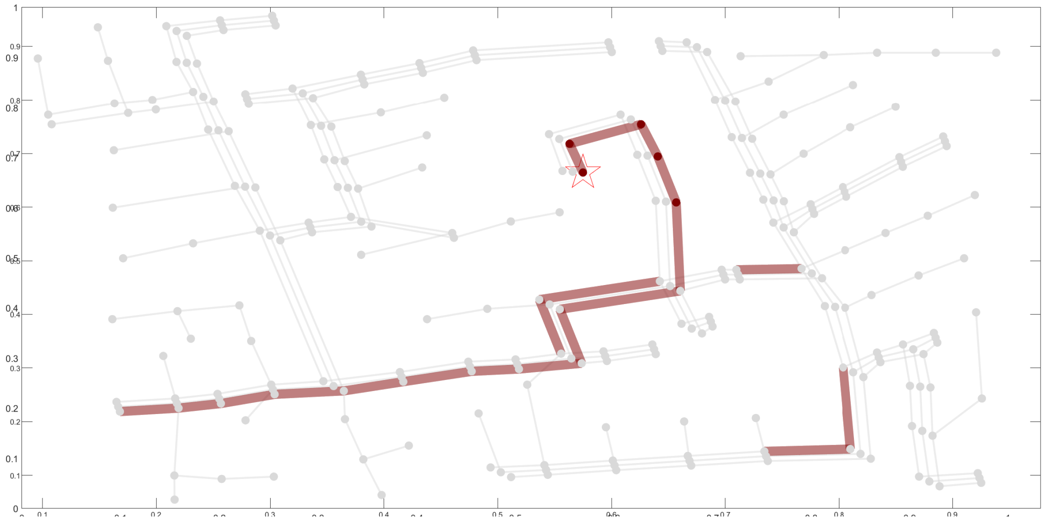

Figure K.13: Representation of M^P and M^Q values obtained for values higher than 0.5 when there is a single-phase perturbation at node 66, phase C. Load consumption with a rated power of 400 kW and 200 kVAr. (Scenario S3)

Table K.26: M^Q values obtained for Scenario S3

Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
149.A	1.A	-0.0031	-0.0030	-0.0031	-0.0028	-0.0027	-0.0031	-0.0031	0.000
149.B	1.B	-0.0026	-0.0026	-0.0026	-0.0027	-0.0027	-0.0026	-0.0026	0.000
149.C	1.C	2.2982	1.9033	2.3090	0.7124	0.2119	2.2982	2.2982	6.054
1.B	2.B	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.000
1.C	3.C	-0.0011	-0.0010	-0.0011	-0.0010	-0.0010	-0.0011	-0.0011	0.000
1.A	7.A	-0.0023	-0.0023	-0.0023	-0.0021	-0.0020	-0.0023	-0.0023	0.003
1.B	7.B	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	0.001
1.C	7.C	1.7236	1.4275	1.7317	0.5343	0.1589	1.7236	1.7236	13.537
3.C	4.C	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	0.000
3.C	5.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
5.C	6.C	-0.0011	-0.0010	-0.0011	-0.0010	-0.0010	-0.0011	-0.0011	0.000
7.A	8.A	-0.0015	-0.0015	-0.0015	-0.0014	-0.0014	-0.0015	-0.0015	0.002
7.B	8.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0014	-0.0013	-0.0013	0.000
7.C	8.C	1.1491	0.9516	1.1545	0.3562	0.1059	1.1491	1.1491	9.443
8.B	12.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
8.A	9.A	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
8.A	13.A	-0.0023	-0.0022	-0.0023	-0.0021	-0.0020	-0.0023	-0.0023	0.003
8.B	13.B	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	0.001
8.C	13.C	1.7236	1.4274	1.7317	0.5343	0.1589	1.7236	1.7236	13.574
9r.A	14.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
13.C	34.C	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
13.A	18.A	-0.0057	-0.0057	-0.0057	-0.0057	-0.0057	-0.0057	-0.0057	0.000
13.B	18.B	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	0.000
13.C	18.C	-0.0054	-0.0054	-0.0054	-0.0054	-0.0053	-0.0054	-0.0054	0.001
14.A	11.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
14.A	10.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
15.C	16.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
15.C	17.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
18.A	19.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
18.A	21.A	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.000
18.B	21.B	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000
18.C	21.C	-0.0020	-0.0020	-0.0020	-0.0019	-0.0019	-0.0020	-0.0020	0.000
19.A	20.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
21.B	22.B	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	0.000
21.A	23.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
21.B	23.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
21.C	23.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
23.C	24.C	-0.0024	-0.0023	-0.0024	-0.0023	-0.0023	-0.0024	-0.0024	0.001
23.A	25.A	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
23.B	25.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
23.C	25.C	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000
25r.A	26.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000
25r.C	26.C	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000
25.A	28.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
25.B	28.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
25.C	28.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
26.A	27.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
26.C	27.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
26.C	31.C	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
27.A	33.A	-0.0021	-0.0021	-0.0021	-0.0021	-0.0020	-0.0021	-0.0021	0.000
28.A	29.A	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.000
28.B	29.B	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000
28.C	29.C	-0.0020	-0.0020	-0.0020	-0.0019	-0.0019	-0.0020	-0.0020	0.000
29.A	30.A	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	0.000
29.B	30.B	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	0.000
29.C	30.C	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	0.000
30.A	250.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
30.B	250.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
30.C	250.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
31.C	32.C	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
34.C	15.C	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	0.000
35.A	36.A	-0.0033	-0.0033	-0.0033	-0.0034	-0.0034	-0.0033	-0.0033	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
35.B	36.B	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	0.000
35.A	40.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
35.B	40.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
35.C	40.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
36.A	37.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
36.B	38.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
38.B	39.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
40.C	41.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
40.A	42.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
40.B	42.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
40.C	42.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
42.B	43.B	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.000
42.A	44.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
42.B	44.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
42.C	44.C	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
44.A	45.A	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	0.000
44.A	47.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
44.B	47.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
44.C	47.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
45.A	46.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
47.A	48.A	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.000
47.B	48.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
47.C	48.C	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
47.A	49.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
47.B	49.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
47.C	49.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
49.A	50.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
49.B	50.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
49.C	50.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
50.A	51.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
50.B	51.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
50.C	51.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
51.A	151.A	-0.0024	-0.0024	-0.0023	-0.0024	-0.0024	-0.0024	-0.0024	0.000
51.B	151.B	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	0.000
51.C	151.C	-0.0033	-0.0033	-0.0033	-0.0032	-0.0032	-0.0033	-0.0033	0.001
52.A	53.A	-0.0015	-0.0014	-0.0015	-0.0014	-0.0013	-0.0015	-0.0015	0.001
52.B	53.B	-0.0013	-0.0013	-0.0013	-0.0014	-0.0014	-0.0013	-0.0013	0.000
52.C	53.C	1.1489	0.9515	1.1543	0.3561	0.1059	1.1489	1.1489	9.512
53.A	54.A	-0.0009	-0.0009	-0.0009	-0.0009	-0.0008	-0.0009	-0.0009	0.001
53.B	54.B	-0.0008	-0.0008	-0.0008	-0.0008	-0.0009	-0.0008	-0.0008	0.000
53.C	54.C	0.7181	0.5947	0.7215	0.2226	0.0662	0.7181	0.7181	6.255

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
54.A	55.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0018	-0.0017	-0.0017	0.000
54.B	55.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
54.C	55.C	-0.0017	-0.0017	-0.0017	-0.0016	-0.0016	-0.0017	-0.0017	0.001
54.A	57.A	-0.0751	-0.0626	-0.0755	-0.0247	-0.0089	-0.0751	-0.0751	0.611
54.B	57.B	-0.0022	-0.0021	-0.0021	-0.0022	-0.0022	-0.0022	-0.0022	0.000
54.C	57.C	1.8252	1.5115	1.8338	0.5655	0.1678	1.8252	1.8252	13.104
55.A	56.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0018	-0.0017	-0.0017	0.000
55.B	56.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
55.C	56.C	-0.0017	-0.0017	-0.0017	-0.0016	-0.0016	-0.0017	-0.0017	0.000
57.B	58.B	-0.0010	-0.0010	-0.0011	-0.0010	-0.0010	-0.0010	-0.0010	0.000
57.A	60.A	-0.1609	-0.1341	-0.1617	-0.0530	-0.0190	-0.1609	-0.1609	1.238
57.B	60.B	-0.0046	-0.0046	-0.0046	-0.0047	-0.0047	-0.0046	-0.0046	0.001
57.C	60.C	3.9111	3.2389	3.9296	1.2118	0.3596	3.9111	3.9111	26.193
58.B	59.B	-0.0010	-0.0010	-0.0011	-0.0010	-0.0010	-0.0010	-0.0010	0.000
60.A	61.A	-0.0037	-0.0037	-0.0037	-0.0038	-0.0038	-0.0037	-0.0037	0.000
60.B	61.B	-0.0036	-0.0036	-0.0036	-0.0035	-0.0035	-0.0036	-0.0036	0.000
60.C	61.C	-0.0034	-0.0034	-0.0034	-0.0033	-0.0033	-0.0034	-0.0034	0.002
60.A	62.A	-0.0151	-0.0151	-0.0151	-0.0153	-0.0154	-0.0151	-0.0151	0.003
60.B	62.B	-0.0156	-0.0157	-0.0157	-0.0156	-0.0155	-0.0156	-0.0156	0.001
60.C	62.C	-0.0166	-0.0164	-0.0165	-0.0161	-0.0158	-0.0166	-0.0166	0.010
62.A	63.A	-0.0106	-0.0106	-0.0106	-0.0107	-0.0108	-0.0106	-0.0106	0.002
62.B	63.B	-0.0109	-0.0110	-0.0110	-0.0109	-0.0109	-0.0109	-0.0109	0.001
62.C	63.C	-0.0116	-0.0115	-0.0116	-0.0113	-0.0111	-0.0116	-0.0116	0.000
63.A	64.A	-0.0211	-0.0212	-0.0211	-0.0214	-0.0215	-0.0211	-0.0211	0.007
63.B	64.B	-0.0219	-0.0219	-0.0219	-0.0218	-0.0218	-0.0219	-0.0219	0.002
63.C	64.C	-0.0232	-0.0230	-0.0232	-0.0225	-0.0221	-0.0232	-0.0232	0.015
64.A	65.A	-0.0256	-0.0257	-0.0256	-0.0259	-0.0261	-0.0256	-0.0256	0.007
64.B	65.B	-0.0266	-0.0266	-0.0266	-0.0265	-0.0264	-0.0266	-0.0266	0.004
64.C	65.C	-0.0282	-0.0280	-0.0281	-0.0273	-0.0269	-0.0282	-0.0282	0.017
65.A	66.A	-0.0196	-0.0196	-0.0196	-0.0198	-0.0200	-0.0196	-0.0196	0.005
65.B	66.B	-0.0203	-0.0203	-0.0204	-0.0203	-0.0202	-0.0203	-0.0203	0.002
65.C	66.C	-0.0216	-0.0214	-0.0215	-0.0209	-0.0206	-0.0216	-0.0216	0.013
67.A	68.A	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	0.000
67.A	72.A	-0.0633	-0.0527	-0.0636	-0.0205	-0.0072	-0.0633	-0.0633	0.523
67.B	72.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
67.C	72.C	1.5527	1.2859	1.5600	0.4747	0.1391	1.5527	1.5527	6.262
67.A	97.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
67.B	97.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
67.C	97.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.001
68.A	69.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	0.000
69.A	70.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
70.A	71.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	0.000
72.C	73.C	-0.0012	-0.0011	-0.0011	-0.0011	-0.0011	-0.0012	-0.0012	0.000
72.A	76.A	-0.0460	-0.0383	-0.0462	-0.0149	-0.0052	-0.0460	-0.0460	0.398
72.B	76.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
72.C	76.C	1.1292	0.9352	1.1345	0.3452	0.1011	1.1292	1.1292	5.127
73.C	74.C	-0.0015	-0.0015	-0.0015	-0.0014	-0.0014	-0.0015	-0.0015	0.001
74.C	75.C	-0.0017	-0.0017	-0.0017	-0.0016	-0.0016	-0.0017	-0.0017	0.001
76.A	77.A	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025	0.000
76.B	77.B	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	0.000
76.C	77.C	2.4399	2.0206	2.4515	0.7462	0.2188	2.4399	2.4399	10.001
76.A	86.A	0.1341	0.1104	0.1348	0.0386	0.0086	0.1341	0.1341	0.995
76.B	86.B	-0.0044	-0.0044	-0.0044	-0.0044	-0.0044	-0.0044	-0.0044	0.000
76.C	86.C	-0.0048	-0.0048	-0.0048	-0.0047	-0.0047	-0.0048	-0.0048	0.001
77.A	78.A	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
77.B	78.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
77.C	78.C	0.6100	0.5052	0.6129	0.1865	0.0547	0.6100	0.6100	3.392
78.A	79.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
78.B	79.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
78.C	79.C	-0.0016	-0.0016	-0.0016	-0.0015	-0.0015	-0.0016	-0.0016	0.000
78.A	80.A	-0.0030	-0.0030	-0.0030	-0.0030	-0.0030	-0.0030	-0.0030	0.000
78.B	80.B	-0.0027	-0.0027	-0.0027	-0.0027	-0.0027	-0.0027	-0.0027	0.000
78.C	80.C	2.8973	2.3994	2.9110	0.8861	0.2598	2.8973	2.8973	12.524
80.A	81.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	0.000
80.B	81.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
80.C	81.C	1.0674	0.8840	1.0725	0.3264	0.0957	1.0674	1.0674	5.805
81.A	82.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
81.B	82.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
81.C	82.C	-0.0018	-0.0018	-0.0018	-0.0017	-0.0017	-0.0018	-0.0018	0.001
81.C	84.C	5.2959	4.3864	5.3210	1.6218	0.4776	5.2959	5.2959	19.452
82.A	83.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.001
82.B	83.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
82.C	83.C	-0.0018	-0.0018	-0.0018	-0.0017	-0.0017	-0.0018	-0.0018	0.000
84.C	85.C	3.7266	3.0867	3.7443	1.1412	0.3361	3.7266	3.7266	16.698
86.A	87.A	0.0870	0.0716	0.0875	0.0249	0.0054	0.0870	0.0870	0.656
86.B	87.B	-0.0026	-0.0026	-0.0026	-0.0026	-0.0026	-0.0026	-0.0026	0.000
86.C	87.C	-0.0031	-0.0031	-0.0031	-0.0031	-0.0030	-0.0031	-0.0031	0.001
87.A	88.A	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.000
87.A	89.A	0.0532	0.0438	0.0534	0.0152	0.0033	0.0532	0.0532	0.417
87.B	89.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
87.C	89.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
89.B	90.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
89.A	91.A	0.0435	0.0358	0.0437	0.0124	0.0027	0.0435	0.0435	0.345
89.B	91.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
89.C	91.C	-0.0016	-0.0015	-0.0016	-0.0015	-0.0015	-0.0016	-0.0016	0.000
91.C	92.C	-0.0013	-0.0012	-0.0013	-0.0012	-0.0012	-0.0013	-0.0013	0.001
91.A	93.A	0.0435	0.0358	0.0437	0.0124	0.0027	0.0435	0.0435	0.341
91.B	93.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
91.C	93.C	-0.0016	-0.0015	-0.0016	-0.0015	-0.0015	-0.0016	-0.0016	0.000
93.A	94.A	0.0675	0.0557	0.0678	0.0201	0.0052	0.0675	0.0675	0.409
93.A	95.A	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
93.B	95.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
93.C	95.C	-0.0021	-0.0021	-0.0021	-0.0020	-0.0020	-0.0021	-0.0021	0.001
95.B	96.B	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	0.000
97.A	98.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
97.B	98.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
97.C	98.C	-0.0019	-0.0019	-0.0019	-0.0018	-0.0018	-0.0019	-0.0019	0.000
98.A	99.A	-0.0031	-0.0031	-0.0031	-0.0032	-0.0032	-0.0031	-0.0031	0.000
98.B	99.B	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	0.000
98.C	99.C	-0.0038	-0.0037	-0.0037	-0.0037	-0.0037	-0.0038	-0.0038	0.001
99.A	100.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
99.B	100.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
99.C	100.C	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	0.001
100.A	450.A	-0.0046	-0.0046	-0.0046	-0.0046	-0.0046	-0.0046	-0.0046	0.001
100.B	450.B	-0.0050	-0.0050	-0.0050	-0.0050	-0.0050	-0.0050	-0.0050	0.000
100.C	450.C	-0.0055	-0.0054	-0.0055	-0.0054	-0.0054	-0.0055	-0.0055	0.001
197.A	101.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
197.B	101.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
197.C	101.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
101.C	102.C	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
101.A	105.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
101.B	105.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
101.C	105.C	-0.0019	-0.0019	-0.0019	-0.0018	-0.0018	-0.0019	-0.0019	0.000
102.C	103.C	-0.0014	-0.0013	-0.0014	-0.0013	-0.0013	-0.0014	-0.0014	0.000
103.C	104.C	-0.0029	-0.0029	-0.0029	-0.0029	-0.0028	-0.0029	-0.0029	0.001
105.B	106.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
105.A	108.A	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
105.B	108.B	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	0.000
105.C	108.C	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	0.001
106.B	107.B	-0.0024	-0.0024	-0.0024	-0.0024	-0.0023	-0.0024	-0.0024	0.000
108.A	109.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0019	-0.0018	-0.0018	0.000
108.A	300.A	-0.0057	-0.0057	-0.0057	-0.0058	-0.0058	-0.0057	-0.0057	0.001
108.B	300.B	-0.0062	-0.0063	-0.0063	-0.0062	-0.0062	-0.0062	-0.0062	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
108.C	300.C	-0.0068	-0.0068	-0.0068	-0.0067	-0.0067	-0.0068	-0.0068	0.002
109.A	110.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
110.A	111.A	-0.0023	-0.0023	-0.0023	-0.0024	-0.0024	-0.0023	-0.0023	0.001
110.A	112.A	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	0.000
112.A	113.A	-0.0021	-0.0021	-0.0021	-0.0022	-0.0022	-0.0021	-0.0021	0.001
113.A	114.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
135.A	35.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000
135.B	35.B	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	0.000
135.C	35.C	-0.0025	-0.0024	-0.0024	-0.0024	-0.0024	-0.0025	-0.0025	0.000
152.A	52.A	-0.0029	-0.0029	-0.0029	-0.0028	-0.0027	-0.0029	-0.0029	0.003
152.B	52.B	-0.0027	-0.0027	-0.0027	-0.0027	-0.0027	-0.0027	-0.0027	0.001
152.C	52.C	2.2979	1.9030	2.3087	0.7122	0.2118	2.2979	2.2979	17.590
160r.A	67.A	-0.1083	-0.0901	-0.1088	-0.0348	-0.0119	-0.1083	-0.1083	0.768
160r.B	67.B	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	0.000
160r.C	67.C	1.9480	1.6133	1.9572	0.5955	0.1744	1.9480	1.9480	6.791
54.A	94.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000

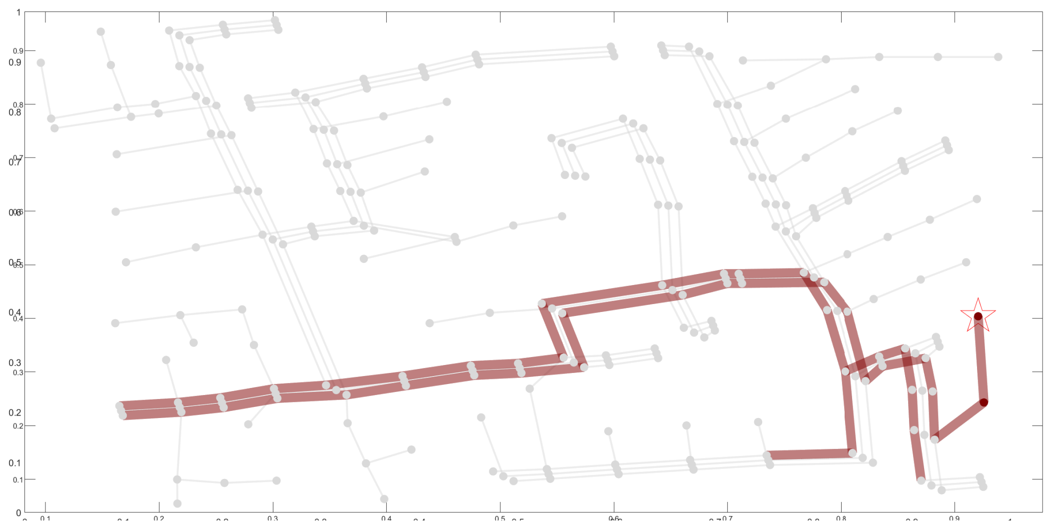

Figure K.14: Representation of M^P and M^Q values obtained for values higher than 0.5 when there is a two-phase perturbation at nodes 82, phase A and 85, phase C. Load consumption with a rated power of 400 kW and 200 kVAr. (Scenario S4)

Table K.27: M^P values obtained for Scenario S4

Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
149.A	1.A	0.0357	0.0383	0.0120	0.0121	0.0121	-0.0003	-0.0002	0.168
149.B	1.B	-0.0001	0.0000	0.0001	0.0001	0.0001	0.0002	0.0002	0.000
149.C	1.C	1.0334	0.8883	0.2149	0.2172	0.2172	0.0016	0.0022	4.833
1.B	2.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
1.C	3.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
1.A	7.A	0.0268	0.0287	0.0090	0.0091	0.0091	-0.0002	-0.0002	0.229
1.B	7.B	0.0000	0.0000	0.0001	0.0001	0.0001	0.0002	0.0002	0.002
1.C	7.C	0.7750	0.6662	0.1612	0.1629	0.1629	0.0012	0.0016	8.099
3.C	4.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
3.C	5.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
5.C	6.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
7.A	8.A	0.0178	0.0191	0.0060	0.0060	0.0060	-0.0001	-0.0001	0.161
7.B	8.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.001
7.C	8.C	0.5167	0.4442	0.1075	0.1086	0.1086	0.0008	0.0011	5.630
8.B	12.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
8.A	9.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
8.A	13.A	0.0268	0.0287	0.0090	0.0091	0.0091	-0.0002	-0.0002	0.230
8.B	13.B	0.0000	0.0000	0.0001	0.0001	0.0001	0.0002	0.0002	0.002
8.C	13.C	0.7750	0.6662	0.1612	0.1629	0.1629	0.0012	0.0016	7.905
9r.A	14.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
13.C	34.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
13.A	18.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
13.B	18.B	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
13.C	18.C	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.000
14.A	11.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
14.A	10.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
15.C	16.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
15.C	17.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
18.A	19.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
18.A	21.A	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
18.B	21.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
18.C	21.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
19.A	20.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
21.B	22.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
21.A	23.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
21.B	23.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
21.C	23.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
23.C	24.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
23.A	25.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
23.B	25.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000

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Nodes		Active power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
23.C	25.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
25r.A	26.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
25r.C	26.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
25.A	28.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
25.B	28.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
25.C	28.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
26.A	27.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
26.C	27.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
26.C	31.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
27.A	33.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
28.A	29.A	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
28.B	29.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
28.C	29.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
29.A	30.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
29.B	30.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
29.C	30.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
30.A	250.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
30.B	250.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
30.C	250.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
31.C	32.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
34.C	15.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
35.A	36.A	-0.0006	-0.0006	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	0.000
35.B	36.B	0.0006	0.0006	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
35.A	40.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
35.B	40.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
35.C	40.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
36.A	37.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
36.B	38.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
38.B	39.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
40.C	41.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
40.A	42.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
40.B	42.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
40.C	42.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
42.B	43.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
42.A	44.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
42.B	44.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
42.C	44.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
44.A	45.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
44.A	47.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
44.B	47.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
44.C	47.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000

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Nodes		Active power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
45.A	46.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
47.A	48.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
47.B	48.B	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	0.000
47.C	48.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
47.A	49.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
47.B	49.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
47.C	49.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
49.A	50.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
49.B	50.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
49.C	50.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
50.A	51.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
50.B	51.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
50.C	51.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
51.A	151.A	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.000
51.B	151.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
51.C	151.C	0.0004	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
52.A	53.A	0.0178	0.0191	0.0060	0.0060	0.0060	-0.0001	-0.0001	0.160
52.B	53.B	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.001
52.C	53.C	0.5167	0.4442	0.1075	0.1086	0.1086	0.0008	0.0011	5.586
53.A	54.A	0.0111	0.0120	0.0037	0.0038	0.0038	-0.0001	-0.0001	0.106
53.B	54.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.001
53.C	54.C	0.3230	0.2776	0.0672	0.0679	0.0679	0.0005	0.0007	3.650
54.A	55.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	-0.0002	0.000
54.B	55.B	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.000
54.C	55.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
54.A	57.A	-0.0493	0.0966	0.0486	0.0486	0.0486	0.0000	0.0000	0.447
54.B	57.B	-0.0005	-0.0004	-0.0004	-0.0004	-0.0004	-0.0003	-0.0003	0.001
54.C	57.C	0.7592	0.6561	0.1586	0.1602	0.1602	0.0013	0.0017	4.156
55.A	56.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	-0.0002	0.000
55.B	56.B	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.000
55.C	56.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
57.B	58.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
57.A	60.A	-0.1055	0.2070	0.1042	0.1042	0.1042	0.0000	-0.0001	0.877
57.B	60.B	-0.0010	-0.0009	-0.0008	-0.0008	-0.0008	-0.0007	-0.0007	0.001
57.C	60.C	1.6269	1.4060	0.3398	0.3433	0.3433	0.0027	0.0036	8.337
58.B	59.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
60.A	61.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
60.B	61.B	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
60.C	61.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
60.A	62.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
60.B	62.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000

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Nodes		Active power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
60.C	62.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
62.A	63.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
62.B	63.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
62.C	63.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
63.A	64.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
63.B	64.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
63.C	64.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
64.A	65.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
64.B	65.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
64.C	65.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
65.A	66.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
65.B	66.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
65.C	66.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
67.A	68.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
67.A	72.A	-0.0327	0.0771	0.0373	0.0373	0.0373	0.0000	0.0000	0.274
67.B	72.B	-0.0003	-0.0003	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
67.C	72.C	0.5700	0.4861	0.1216	0.1229	0.1229	0.0010	0.0013	1.299
67.A	97.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
67.B	97.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
67.C	97.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
68.A	69.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
69.A	70.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
70.A	71.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
72.C	73.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
72.A	76.A	-0.0238	0.0561	0.0271	0.0271	0.0271	0.0000	0.0000	0.230
72.B	76.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
72.C	76.C	0.4146	0.3536	0.0885	0.0894	0.0894	0.0007	0.0009	1.206
73.C	74.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
74.C	75.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
76.A	77.A	-0.0912	-0.0748	-0.0175	-0.0177	-0.0177	0.0002	0.0002	0.294
76.B	77.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
76.C	77.C	1.1330	0.9627	0.2404	0.2429	0.2429	0.0015	0.0021	2.663
76.A	86.A	0.1278	0.1505	0.0556	0.0557	0.0557	0.0005	0.0006	0.340
76.B	86.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
76.C	86.C	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
77.A	78.A	-0.0228	-0.0187	-0.0044	-0.0044	-0.0044	0.0001	0.0001	0.108
77.B	78.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
77.C	78.C	0.2833	0.2407	0.0601	0.0607	0.0607	0.0004	0.0005	1.156
78.A	79.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
78.B	79.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
78.C	79.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000

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Nodes		Active power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
78.A	80.A	-0.1083	-0.0888	-0.0208	-0.0210	-0.0210	0.0003	0.0002	0.360
78.B	80.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
78.C	80.C	1.3455	1.1433	0.2854	0.2884	0.2884	0.0018	0.0025	3.831
80.A	81.A	-0.0399	-0.0327	-0.0077	-0.0078	-0.0078	0.0001	0.0001	0.179
80.B	81.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
80.C	81.C	0.4957	0.4212	0.1052	0.1062	0.1062	0.0007	0.0009	2.078
81.A	82.A	0.3776	0.3239	0.0820	0.0828	0.0828	0.0008	0.0010	1.283
81.B	82.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
81.C	82.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
81.C	84.C	3.1507	2.6732	0.6631	0.6700	0.6700	0.0047	0.0064	8.834
82.A	83.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
82.B	83.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
82.C	83.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
84.C	85.C	2.2172	1.8812	0.4667	0.4715	0.4715	0.0033	0.0045	8.487
86.A	87.A	0.0817	0.0962	0.0357	0.0357	0.0357	0.0006	0.0006	0.250
86.B	87.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
86.C	87.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
87.A	88.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
87.A	89.A	0.0499	0.0588	0.0218	0.0218	0.0218	0.0003	0.0004	0.181
87.B	89.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
87.C	89.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
89.B	90.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
89.A	91.A	0.0408	0.0481	0.0178	0.0179	0.0179	0.0003	0.0003	0.158
89.B	91.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
89.C	91.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
91.C	92.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
91.A	93.A	0.0408	0.0481	0.0178	0.0179	0.0179	0.0003	0.0003	0.158
91.B	93.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
91.C	93.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
93.A	94.A	0.1443	0.1700	0.0626	0.0628	0.0628	0.0003	0.0004	0.462
93.A	95.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
93.B	95.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
93.C	95.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
95.B	96.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
97.A	98.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
97.B	98.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
97.C	98.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
98.A	99.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
98.B	99.B	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	0.000
98.C	99.C	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
99.A	100.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000

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Nodes		Active power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
99.B	100.B	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
99.C	100.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
100.A	450.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
100.B	450.B	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.000
100.C	450.C	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
197.A	101.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
197.B	101.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
197.C	101.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
101.C	102.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
101.A	105.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
101.B	105.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
101.C	105.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
102.C	103.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
103.C	104.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
105.B	106.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
105.A	108.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
105.B	108.B	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
105.C	108.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
106.B	107.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
108.A	109.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
108.A	300.A	0.0003	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
108.B	300.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
108.C	300.C	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
109.A	110.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
110.A	111.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
110.A	112.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
112.A	113.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
113.A	114.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
135.A	35.A	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.000
135.B	35.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
135.C	35.C	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
152.A	52.A	0.0357	0.0383	0.0120	0.0121	0.0121	-0.0003	-0.0002	0.295
152.B	52.B	0.0000	0.0000	0.0001	0.0001	0.0001	0.0002	0.0002	0.002
152.C	52.C	1.0335	0.8884	0.2150	0.2172	0.2172	0.0016	0.0022	10.505
160r.A	67.A	-0.0915	0.0465	0.0335	0.0333	0.0333	0.0001	0.0001	0.323
160r.B	67.B	-0.0002	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
160r.C	67.C	0.7751	0.6693	0.1682	0.1699	0.1699	0.0010	0.0014	1.277
54.A	94.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000

Table K.28: M^Q values obtained for Scenario S4

Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
149.A	1.A	1.3405	1.1774	0.2941	0.2971	0.2971	-0.0004	0.0003	5.829
149.B	1.B	-0.0024	-0.0024	-0.0026	-0.0026	-0.0026	-0.0027	-0.0027	0.000
149.C	1.C	1.1067	0.9427	0.2218	0.2242	0.2242	-0.0008	-0.0003	5.187
1.B	2.B	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.000
1.C	3.C	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
1.A	7.A	1.0054	0.8831	0.2206	0.2229	0.2229	-0.0003	0.0002	7.963
1.B	7.B	-0.0018	-0.0018	-0.0019	-0.0019	-0.0019	-0.0021	-0.0021	0.003
1.C	7.C	0.8300	0.7071	0.1664	0.1682	0.1682	-0.0006	-0.0002	8.693
3.C	4.C	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	0.000
3.C	5.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0014	-0.0014	0.000
5.C	6.C	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
7.A	8.A	0.6702	0.5887	0.1471	0.1486	0.1486	-0.0002	0.0002	5.593
7.B	8.B	-0.0012	-0.0012	-0.0013	-0.0013	-0.0013	-0.0014	-0.0014	0.002
7.C	8.C	0.5534	0.4714	0.1109	0.1121	0.1121	-0.0004	-0.0001	6.044
8.B	12.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
8.A	9.A	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
8.A	13.A	1.0054	0.8831	0.2206	0.2229	0.2229	-0.0003	0.0002	8.009
8.B	13.B	-0.0018	-0.0018	-0.0019	-0.0019	-0.0019	-0.0021	-0.0021	0.003
8.C	13.C	0.8300	0.7071	0.1664	0.1682	0.1682	-0.0006	-0.0002	8.486
9r.A	14.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
13.C	34.C	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
13.A	18.A	-0.0056	-0.0056	-0.0057	-0.0057	-0.0057	-0.0057	-0.0057	0.001
13.B	18.B	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	0.001
13.C	18.C	-0.0052	-0.0052	-0.0052	-0.0052	-0.0052	-0.0053	-0.0053	0.000
14.A	11.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
14.A	10.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
15.C	16.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0016	-0.0016	0.000
15.C	17.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0015	-0.0015	0.000
18.A	19.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
18.A	21.A	-0.0020	-0.0020	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.000
18.B	21.B	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000
18.C	21.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
19.A	20.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0014	-0.0014	0.000
21.B	22.B	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	0.000
21.A	23.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
21.B	23.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
21.C	23.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
23.C	24.C	-0.0022	-0.0022	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	0.000
23.A	25.A	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
23.B	25.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
23.C	25.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0018	-0.0018	0.000
25r.A	26.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000
25r.C	26.C	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000
25.A	28.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
25.B	28.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
25.C	28.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
26.A	27.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
26.C	27.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
26.C	31.C	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
27.A	33.A	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.000
28.A	29.A	-0.0020	-0.0020	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.000
28.B	29.B	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000
28.C	29.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.001
29.A	30.A	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	0.000
29.B	30.B	-0.0021	-0.0021	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	0.000
29.C	30.C	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	0.001
30.A	250.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
30.B	250.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
30.C	250.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
31.C	32.C	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
34.C	15.C	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	0.000
35.A	36.A	-0.0033	-0.0033	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	0.001
35.B	36.B	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	0.000
35.A	40.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
35.B	40.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
35.C	40.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0015	-0.0015	0.000
36.A	37.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
36.B	38.B	-0.0011	-0.0011	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
38.B	39.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
40.C	41.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0014	-0.0014	0.000
40.A	42.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
40.B	42.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
40.C	42.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0015	-0.0015	0.000
42.B	43.B	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.000
42.A	44.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
42.B	44.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
42.C	44.C	-0.0011	-0.0011	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
44.A	45.A	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	0.000
44.A	47.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
44.B	47.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
44.C	47.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0015	-0.0015	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
45.A	46.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
47.A	48.A	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.000
47.B	48.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
47.C	48.C	-0.0009	-0.0009	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
47.A	49.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
47.B	49.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
47.C	49.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
49.A	50.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
49.B	50.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
49.C	50.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
50.A	51.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
50.B	51.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
50.C	51.C	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
51.A	151.A	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	0.000
51.B	151.B	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	0.000
51.C	151.C	-0.0031	-0.0031	-0.0032	-0.0032	-0.0032	-0.0032	-0.0032	0.001
52.A	53.A	0.6703	0.5888	0.1471	0.1486	0.1486	-0.0002	0.0002	5.584
52.B	53.B	-0.0012	-0.0012	-0.0013	-0.0013	-0.0013	-0.0014	-0.0014	0.001
52.C	53.C	0.5535	0.4715	0.1110	0.1122	0.1122	-0.0004	-0.0001	5.998
53.A	54.A	0.4189	0.3680	0.0919	0.0929	0.0929	-0.0001	0.0001	3.678
53.B	54.B	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0009	-0.0009	0.001
53.C	54.C	0.3459	0.2947	0.0694	0.0701	0.0701	-0.0003	-0.0001	3.919
54.A	55.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0018	-0.0018	0.000
54.B	55.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
54.C	55.C	-0.0015	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.001
54.A	57.A	0.5702	0.9200	0.2942	0.2957	0.2957	-0.0014	-0.0012	2.825
54.B	57.B	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	0.000
54.C	57.C	0.9397	0.6739	0.1417	0.1435	0.1435	-0.0010	-0.0005	5.159
55.A	56.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0018	-0.0018	0.000
55.B	56.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
55.C	56.C	-0.0015	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
57.B	58.B	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0010	-0.0010	0.000
57.A	60.A	1.2218	1.9715	0.6304	0.6338	0.6338	-0.0030	-0.0025	5.540
57.B	60.B	-0.0047	-0.0046	-0.0047	-0.0047	-0.0047	-0.0048	-0.0048	0.001
57.C	60.C	2.0137	1.4441	0.3037	0.3076	0.3076	-0.0022	-0.0011	10.347
58.B	59.B	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0010	-0.0010	0.000
60.A	61.A	-0.0037	-0.0037	-0.0037	-0.0037	-0.0037	-0.0038	-0.0038	0.002
60.B	61.B	-0.0035	-0.0035	-0.0035	-0.0035	-0.0035	-0.0035	-0.0035	0.000
60.C	61.C	-0.0030	-0.0031	-0.0031	-0.0031	-0.0031	-0.0032	-0.0032	0.002
60.A	62.A	-0.0150	-0.0150	-0.0152	-0.0152	-0.0152	-0.0155	-0.0155	0.007
60.B	62.B	-0.0158	-0.0158	-0.0156	-0.0156	-0.0156	-0.0155	-0.0155	0.004

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
60.C	62.C	-0.0146	-0.0146	-0.0151	-0.0151	-0.0151	-0.0155	-0.0155	0.012
62.A	63.A	-0.0105	-0.0105	-0.0106	-0.0106	-0.0106	-0.0108	-0.0108	0.000
62.B	63.B	-0.0111	-0.0111	-0.0110	-0.0110	-0.0110	-0.0109	-0.0109	0.002
62.C	63.C	-0.0102	-0.0102	-0.0106	-0.0106	-0.0106	-0.0108	-0.0108	0.008
63.A	64.A	-0.0211	-0.0209	-0.0213	-0.0213	-0.0213	-0.0217	-0.0217	0.000
63.B	64.B	-0.0221	-0.0221	-0.0219	-0.0219	-0.0219	-0.0217	-0.0217	0.007
63.C	64.C	-0.0204	-0.0205	-0.0211	-0.0211	-0.0211	-0.0216	-0.0216	0.016
64.A	65.A	-0.0256	-0.0254	-0.0258	-0.0258	-0.0258	-0.0263	-0.0263	0.000
64.B	65.B	-0.0268	-0.0268	-0.0266	-0.0266	-0.0266	-0.0264	-0.0264	0.009
64.C	65.C	-0.0247	-0.0249	-0.0256	-0.0256	-0.0256	-0.0263	-0.0263	0.020
65.A	66.A	-0.0196	-0.0194	-0.0198	-0.0198	-0.0198	-0.0201	-0.0201	0.008
65.B	66.B	-0.0205	-0.0205	-0.0203	-0.0203	-0.0203	-0.0202	-0.0202	0.004
65.C	66.C	-0.0189	-0.0190	-0.0196	-0.0196	-0.0196	-0.0201	-0.0201	0.015
67.A	68.A	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	0.000
67.A	72.A	0.4456	0.6993	0.2256	0.2269	0.2269	-0.0011	-0.0009	1.747
67.B	72.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
67.C	72.C	0.6972	0.4936	0.1087	0.1101	0.1101	-0.0008	-0.0004	1.593
67.A	97.A	-0.0014	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
67.B	97.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
67.C	97.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
68.A	69.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	0.000
69.A	70.A	-0.0013	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
70.A	71.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	0.000
72.C	73.C	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	0.000
72.A	76.A	0.3241	0.5086	0.1641	0.1650	0.1650	-0.0008	-0.0007	1.465
72.B	76.B	-0.0013	-0.0013	-0.0012	-0.0012	-0.0012	-0.0013	-0.0013	0.000
72.C	76.C	0.5071	0.3590	0.0790	0.0801	0.0801	-0.0006	-0.0003	1.479
73.C	74.C	-0.0014	-0.0015	-0.0014	-0.0014	-0.0014	-0.0015	-0.0015	0.000
74.C	75.C	-0.0016	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
76.A	77.A	1.2525	1.0735	0.2706	0.2734	0.2734	-0.0005	0.0002	4.027
76.B	77.B	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	0.000
76.C	77.C	0.9373	0.7918	0.1940	0.1961	0.1961	-0.0014	-0.0009	2.209
76.A	86.A	0.2904	0.3427	0.1236	0.1239	0.1239	-0.0035	-0.0033	0.784
76.B	86.B	-0.0045	-0.0044	-0.0044	-0.0044	-0.0044	-0.0044	-0.0044	0.000
76.C	86.C	-0.0047	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	0.000
77.A	78.A	0.3131	0.2684	0.0677	0.0684	0.0684	-0.0001	0.0000	1.482
77.B	78.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
77.C	78.C	0.2343	0.1980	0.0485	0.0490	0.0490	-0.0003	-0.0002	0.959
78.A	79.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
78.B	79.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
78.C	79.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
78.A	80.A	1.4873	1.2748	0.3214	0.3247	0.3247	-0.0006	0.0002	4.930
78.B	80.B	-0.0028	-0.0027	-0.0027	-0.0027	-0.0027	-0.0027	-0.0027	0.000
78.C	80.C	1.1131	0.9403	0.2304	0.2329	0.2329	-0.0016	-0.0010	3.178
80.A	81.A	0.5480	0.4697	0.1184	0.1196	0.1196	-0.0002	0.0001	2.449
80.B	81.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
80.C	81.C	0.4101	0.3464	0.0849	0.0858	0.0858	-0.0006	-0.0004	1.724
81.A	82.A	0.8875	0.7608	0.1910	0.1930	0.1930	-0.0002	0.0003	3.022
81.B	82.B	-0.0015	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
81.C	82.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
81.C	84.C	3.1914	2.7073	0.6695	0.6765	0.6765	0.0020	0.0037	8.956
82.A	83.A	-0.0015	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.001
82.B	83.B	-0.0015	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.001
82.C	83.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
84.C	85.C	2.2459	1.9052	0.4712	0.4761	0.4761	0.0014	0.0026	8.604
86.A	87.A	0.1887	0.2228	0.0802	0.0804	0.0804	-0.0025	-0.0024	0.589
86.B	87.B	-0.0026	-0.0026	-0.0026	-0.0026	-0.0026	-0.0026	-0.0026	0.000
86.C	87.C	-0.0030	-0.0031	-0.0031	-0.0031	-0.0031	-0.0031	-0.0031	0.000
87.A	88.A	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.000
87.A	89.A	0.1153	0.1361	0.0490	0.0491	0.0491	-0.0015	-0.0014	0.426
87.B	89.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
87.C	89.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
89.B	90.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
89.A	91.A	0.0944	0.1114	0.0401	0.0402	0.0402	-0.0012	-0.0012	0.372
89.B	91.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
89.C	91.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
91.C	92.C	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
91.A	93.A	0.0944	0.1114	0.0401	0.0402	0.0402	-0.0012	-0.0012	0.373
91.B	93.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
91.C	93.C	-0.0015	-0.0016	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
93.A	94.A	0.1452	0.1712	0.0623	0.0625	0.0625	-0.0009	-0.0008	0.469
93.A	95.A	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
93.B	95.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
93.C	95.C	-0.0020	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.000
95.B	96.B	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	0.000
97.A	98.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
97.B	98.B	-0.0018	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
97.C	98.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
98.A	99.A	-0.0031	-0.0032	-0.0032	-0.0032	-0.0032	-0.0032	-0.0032	0.000
98.B	99.B	-0.0035	-0.0035	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	0.000
98.C	99.C	-0.0037	-0.0038	-0.0038	-0.0038	-0.0038	-0.0038	-0.0038	0.000
99.A	100.A	-0.0017	-0.0017	-0.0018	-0.0018	-0.0018	-0.0017	-0.0017	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
99.B	100.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
99.C	100.C	-0.0020	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.000
100.A	450.A	-0.0046	-0.0047	-0.0047	-0.0047	-0.0047	-0.0047	-0.0047	0.001
100.B	450.B	-0.0051	-0.0050	-0.0050	-0.0050	-0.0050	-0.0050	-0.0050	0.001
100.C	450.C	-0.0054	-0.0055	-0.0055	-0.0055	-0.0055	-0.0055	-0.0055	0.001
197.A	101.A	-0.0014	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
197.B	101.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
197.C	101.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
101.C	102.C	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
101.A	105.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
101.B	105.B	-0.0018	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
101.C	105.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
102.C	103.C	-0.0013	-0.0014	-0.0013	-0.0013	-0.0013	-0.0014	-0.0013	0.000
103.C	104.C	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	0.001
105.B	106.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
105.A	108.A	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.001
105.B	108.B	-0.0021	-0.0021	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	0.001
105.C	108.C	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	0.000
106.B	107.B	-0.0024	-0.0024	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	0.001
108.A	109.A	-0.0018	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.001
108.A	300.A	-0.0057	-0.0058	-0.0058	-0.0058	-0.0058	-0.0058	-0.0058	0.002
108.B	300.B	-0.0064	-0.0063	-0.0062	-0.0062	-0.0062	-0.0063	-0.0063	0.002
108.C	300.C	-0.0068	-0.0069	-0.0069	-0.0069	-0.0069	-0.0069	-0.0069	0.001
109.A	110.A	-0.0012	-0.0012	-0.0013	-0.0013	-0.0013	-0.0012	-0.0012	0.000
110.A	111.A	-0.0023	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	0.001
110.A	112.A	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	0.000
112.A	113.A	-0.0021	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	0.001
113.A	114.A	-0.0013	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
135.A	35.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000
135.B	35.B	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	0.001
135.C	35.C	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	0.000
152.A	52.A	1.3406	1.1776	0.2942	0.2972	0.2972	-0.0004	0.0003	10.266
152.B	52.B	-0.0025	-0.0025	-0.0026	-0.0026	-0.0026	-0.0027	-0.0027	0.003
152.C	52.C	1.1070	0.9430	0.2220	0.2243	0.2243	-0.0008	-0.0003	11.278
160r.A	67.A	0.5197	0.8356	0.2719	0.2733	0.2733	-0.0016	-0.0014	1.961
160r.B	67.B	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	0.000
160r.C	67.C	0.8332	0.5625	0.1196	0.1212	0.1212	-0.0011	-0.0006	1.376
54.A	94.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000

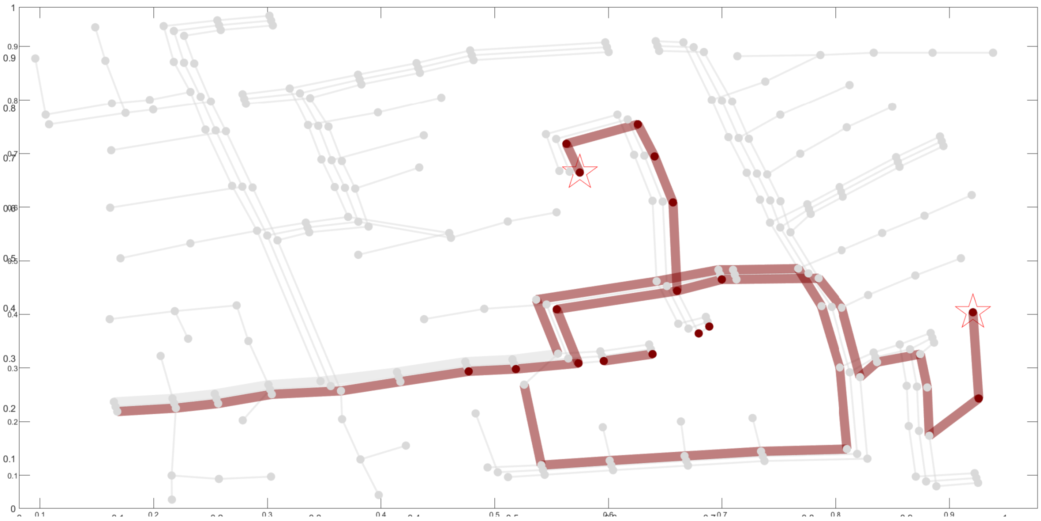

Figure K.15: Representation of M^P and M^Q values obtained for values higher than 0.5 when there is a single-phase perturbations at nodes 66, phase C and 85, phase C (synchronised). Load consumption with a rated power of 400 kW and 200 kVAr. (Scenario S6)

Table K.29: M^P values obtained for Scenario S6

Nodes		Active power magnitude $P_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
149.A	1.A	-0.0118	-0.0243	-0.0065	-0.0065	-0.0065	-0.0005	-0.0006	-0.013
149.B	1.B	-0.0007	-0.0006	-0.0002	-0.0002	-0.0002	0.0002	0.0002	0.000
149.C	1.C	2.6709	2.3268	0.5744	0.5804	0.5804	0.0040	0.0054	12.416
1.B	2.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
1.C	3.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
1.A	7.A	-0.0089	-0.0182	-0.0049	-0.0049	-0.0049	-0.0004	-0.0004	0.183
1.B	7.B	-0.0005	-0.0004	-0.0001	-0.0001	-0.0001	0.0001	0.0001	0.004
1.C	7.C	2.0032	1.7452	0.4308	0.4353	0.4353	0.0030	0.0041	16.727
3.C	4.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
3.C	5.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
5.C	6.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
7.A	8.A	-0.0059	-0.0121	-0.0033	-0.0033	-0.0033	-0.0003	-0.0003	0.125
7.B	8.B	-0.0003	-0.0003	-0.0001	-0.0001	-0.0001	0.0001	0.0001	0.003
7.C	8.C	1.3354	1.1635	0.2872	0.2902	0.2902	0.0020	0.0027	11.670
8.B	12.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
8.A	9.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
8.A	13.A	-0.0089	-0.0182	-0.0049	-0.0049	-0.0049	-0.0004	-0.0004	0.184
8.B	13.B	-0.0005	-0.0004	-0.0001	-0.0001	-0.0001	0.0001	0.0001	0.004
8.C	13.C	2.0032	1.7452	0.4308	0.4353	0.4353	0.0030	0.0041	16.722
9r.A	14.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000

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Nodes		Active power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
13.C	34.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
13.A	18.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
13.B	18.B	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
13.C	18.C	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0007	-0.0007	0.000
14.A	11.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
14.A	10.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
15.C	16.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
15.C	17.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
18.A	19.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
18.A	21.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
18.B	21.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
18.C	21.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
19.A	20.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
21.B	22.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
21.A	23.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
21.B	23.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
21.C	23.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
23.C	24.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
23.A	25.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
23.B	25.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
23.C	25.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	-0.0002	0.000
25r.A	26.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
25r.C	26.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
25.A	28.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
25.B	28.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
25.C	28.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
26.A	27.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
26.C	27.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
26.C	31.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
27.A	33.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
28.A	29.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
28.B	29.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
28.C	29.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
29.A	30.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
29.B	30.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
29.C	30.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
30.A	250.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
30.B	250.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
30.C	250.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
31.C	32.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
34.C	15.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000

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Nodes		Active power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
35.A	36.A	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0005	-0.0005	0.000
35.B	36.B	0.0006	0.0006	0.0006	0.0006	0.0006	0.0005	0.0005	0.000
35.A	40.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
35.B	40.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
35.C	40.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
36.A	37.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
36.B	38.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
38.B	39.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
40.C	41.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
40.A	42.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
40.B	42.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
40.C	42.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
42.B	43.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
42.A	44.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
42.B	44.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
42.C	44.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
44.A	45.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
44.A	47.A	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
44.B	47.B	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
44.C	47.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
45.A	46.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
47.A	48.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
47.B	48.B	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	0.000
47.C	48.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
47.A	49.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
47.B	49.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
47.C	49.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
49.A	50.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
49.B	50.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
49.C	50.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
50.A	51.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
50.B	51.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
50.C	51.C	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
51.A	151.A	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.000
51.B	151.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
51.C	151.C	0.0004	0.0004	0.0004	0.0004	0.0004	0.0005	0.0005	0.000
52.A	53.A	-0.0060	-0.0122	-0.0033	-0.0033	-0.0033	-0.0003	-0.0003	0.125
52.B	53.B	-0.0002	-0.0002	0.0000	0.0000	0.0000	0.0001	0.0001	0.002
52.C	53.C	1.3354	1.1635	0.2872	0.2902	0.2902	0.0020	0.0027	11.600
53.A	54.A	-0.0037	-0.0076	-0.0020	-0.0021	-0.0021	-0.0002	-0.0002	0.084
53.B	54.B	-0.0001	-0.0001	0.0000	0.0000	0.0000	0.0001	0.0001	0.001

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Nodes		Active power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
53.C	54.C	0.8347	0.7272	0.1795	0.1814	0.1814	0.0013	0.0017	7.639
54.A	55.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	-0.0002	0.000
54.B	55.B	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.000
54.C	55.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
54.A	57.A	0.4155	0.7084	0.3123	0.3128	0.3128	0.0775	0.0785	2.285
54.B	57.B	-0.0010	-0.0010	-0.0007	-0.0007	-0.0007	-0.0004	-0.0004	0.002
54.C	57.C	2.2217	1.9130	0.4729	0.4779	0.4779	0.0031	0.0042	13.768
55.A	56.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	-0.0002	0.000
55.B	56.B	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.000
55.C	56.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
57.B	58.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
57.A	60.A	0.8903	1.5180	0.6692	0.6703	0.6703	0.1660	0.1681	4.620
57.B	60.B	-0.0020	-0.0021	-0.0014	-0.0014	-0.0014	-0.0009	-0.0009	0.004
57.C	60.C	4.7607	4.0994	1.0133	1.0241	1.0241	0.0067	0.0090	27.796
58.B	59.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
60.A	61.A	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.001
60.B	61.B	0.0006	0.0006	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
60.C	61.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
60.A	62.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0000	0.001
60.B	62.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.0000	0.0000	0.000
60.C	62.C	1.2622	1.1139	0.2933	0.2964	0.2964	0.0020	0.0027	8.777
62.A	63.A	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
62.B	63.B	-0.0001	-0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
62.C	63.C	0.8836	0.7798	0.2053	0.2075	0.2075	0.0014	0.0019	6.563
63.A	64.A	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.001
63.B	64.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.0000	0.0000	0.000
63.C	64.C	1.7672	1.5596	0.4107	0.4150	0.4150	0.0028	0.0038	12.140
64.A	65.A	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
64.B	65.B	-0.0001	-0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
64.C	65.C	2.1459	1.8938	0.4987	0.5040	0.5040	0.0034	0.0046	14.722
65.A	66.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
65.B	66.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
65.C	66.C	1.6411	1.4483	0.3814	0.3854	0.3854	0.0026	0.0035	11.968
67.A	68.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
67.A	72.A	0.1973	0.3776	0.1794	0.1795	0.1795	0.0589	0.0591	0.873
67.B	72.B	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
67.C	72.C	0.3937	0.3235	0.0801	0.0810	0.0810	0.0006	0.0008	0.878
67.A	97.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
67.B	97.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
67.C	97.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
68.A	69.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000

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Nodes		Active power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
69.A	70.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
70.A	71.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
72.C	73.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
72.A	76.A	0.1435	0.2747	0.1305	0.1305	0.1305	0.0429	0.0430	0.736
72.B	76.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
72.C	76.C	0.2863	0.2353	0.0583	0.0589	0.0589	0.0004	0.0006	0.781
73.C	74.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
74.C	75.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
76.A	77.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
76.B	77.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
76.C	77.C	0.6547	0.5559	0.1368	0.1383	0.1383	0.0008	0.0011	1.515
76.A	86.A	0.1481	0.4415	0.2690	0.2683	0.2683	0.1396	0.1383	0.755
76.B	86.B	-0.0005	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
76.C	86.C	0.0003	0.0003	0.0003	0.0003	0.0003	0.0004	0.0004	0.001
77.A	78.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
77.B	78.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
77.C	78.C	0.1637	0.1390	0.0342	0.0346	0.0346	0.0002	0.0003	0.646
78.A	79.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
78.B	79.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
78.C	79.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
78.A	80.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000
78.B	80.B	-0.0001	-0.0001	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
78.C	80.C	0.7775	0.6601	0.1625	0.1642	0.1642	0.0009	0.0013	2.059
80.A	81.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
80.B	81.B	0.0000	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
80.C	81.C	0.2864	0.2432	0.0599	0.0605	0.0605	0.0003	0.0005	1.127
81.A	82.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
81.B	82.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
81.C	82.C	-0.0002	-0.0002	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
81.C	84.C	3.1485	2.6735	0.6589	0.6659	0.6659	0.0047	0.0064	7.534
82.A	83.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
82.B	83.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
82.C	83.C	-0.0002	-0.0002	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.001
84.C	85.C	2.2156	1.8814	0.4637	0.4686	0.4686	0.0033	0.0045	7.602
86.A	87.A	0.0946	0.2816	0.1717	0.1713	0.1713	0.0892	0.0884	0.570
86.B	87.B	-0.0001	-0.0001	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
86.C	87.C	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002	-0.0002	0.000
87.A	88.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
87.A	89.A	0.0578	0.1721	0.1049	0.1047	0.1047	0.0545	0.0540	0.411
87.B	89.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
87.C	89.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0001	-0.0001	0.000

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Nodes		Active power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
89.B	90.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
89.A	91.A	0.0473	0.1408	0.0858	0.0856	0.0856	0.0446	0.0442	0.358
89.B	91.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
89.C	91.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
91.C	92.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
91.A	93.A	0.0473	0.1408	0.0858	0.0856	0.0856	0.0446	0.0442	0.362
91.B	93.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
91.C	93.C	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
93.A	94.A	0.1672	0.4992	0.3040	0.3033	0.3033	0.1577	0.1562	1.089
93.A	95.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
93.B	95.B	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.000
93.C	95.C	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
95.B	96.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
97.A	98.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
97.B	98.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
97.C	98.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
98.A	99.A	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
98.B	99.B	-0.0004	-0.0004	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	0.001
98.C	99.C	0.0002	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
99.A	100.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
99.B	100.B	-0.0002	-0.0002	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
99.C	100.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.000
100.A	450.A	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
100.B	450.B	-0.0006	-0.0006	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.001
100.C	450.C	0.0003	0.0003	0.0004	0.0004	0.0004	0.0004	0.0004	0.001
197.A	101.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
197.B	101.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
197.C	101.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
101.C	102.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
101.A	105.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
101.B	105.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
101.C	105.C	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
102.C	103.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
103.C	104.C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
105.B	106.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
105.A	108.A	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.000
105.B	108.B	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	0.000
105.C	108.C	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.000
106.B	107.B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
108.A	109.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
108.A	300.A	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.000

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Nodes		Active power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kW							M^P
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
108.B	300.B	-0.0008	-0.0008	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.001
108.C	300.C	0.0004	0.0004	0.0005	0.0005	0.0005	0.0005	0.0005	0.001
109.A	110.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
110.A	111.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
110.A	112.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
112.A	113.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
113.A	114.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
135.A	35.A	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.000
135.B	35.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
135.C	35.C	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.000
152.A	52.A	-0.0119	-0.0244	-0.0065	-0.0066	-0.0066	-0.0005	-0.0006	0.239
152.B	52.B	-0.0004	-0.0004	-0.0001	-0.0001	-0.0001	0.0002	0.0002	0.004
152.C	52.C	2.6708	2.3268	0.5744	0.5804	0.5804	0.0040	0.0054	21.421
160r.A	67.A	0.2730	0.5087	0.2372	0.2374	0.2374	0.0751	0.0753	0.985
160r.B	67.B	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	0.000
160r.C	67.C	0.4771	0.3794	0.0909	0.0919	0.0919	-0.0001	0.0000	0.886
54.A	94.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000

Table K.30: M^Q values obtained for Scenario S6

Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
149.A	1.A	-0.0077	-0.0179	-0.0072	-0.0072	-0.0072	-0.0027	-0.0027	-0.008
149.B	1.B	-0.0028	-0.0028	-0.0028	-0.0028	-0.0028	-0.0028	-0.0028	0.000
149.C	1.C	6.1368	5.3223	1.3115	1.3254	1.3254	0.0063	0.0094	28.543
1.B	2.B	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.000
1.C	3.C	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
1.A	7.A	-0.0058	-0.0134	-0.0054	-0.0054	-0.0054	-0.0020	-0.0020	0.117
1.B	7.B	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.000
1.C	7.C	4.6026	3.9918	0.9836	0.9941	0.9941	0.0047	0.0070	38.453
3.C	4.C	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	0.000
3.C	5.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0014	-0.0014	0.000
5.C	6.C	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
7.A	8.A	-0.0039	-0.0090	-0.0036	-0.0036	-0.0036	-0.0013	-0.0014	0.080
7.B	8.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
7.C	8.C	3.0685	2.6612	0.6558	0.6627	0.6627	0.0031	0.0047	26.829
8.B	12.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
8.A	9.A	-0.0010	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
8.A	13.A	-0.0058	-0.0135	-0.0054	-0.0054	-0.0054	-0.0020	-0.0020	0.118

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
8.B	13.B	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.000
8.C	13.C	4.6027	3.9918	0.9837	0.9941	0.9941	0.0047	0.0070	38.440
9r.A	14.A	-0.0018	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
13.C	34.C	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
13.A	18.A	-0.0057	-0.0057	-0.0057	-0.0057	-0.0057	-0.0057	-0.0057	0.001
13.B	18.B	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	0.000
13.C	18.C	-0.0051	-0.0051	-0.0052	-0.0052	-0.0052	-0.0053	-0.0053	0.003
14.A	11.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
14.A	10.A	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
15.C	16.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0016	-0.0016	0.001
15.C	17.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0015	-0.0015	0.001
18.A	19.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0010	-0.0010	0.000
18.A	21.A	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.000
18.B	21.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
18.C	21.C	-0.0018	-0.0018	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.001
19.A	20.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
21.B	22.B	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	0.000
21.A	23.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
21.B	23.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
21.C	23.C	-0.0015	-0.0015	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
23.C	24.C	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0023	-0.0023	0.001
23.A	25.A	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
23.B	25.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
23.C	25.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0018	-0.0018	0.001
25r.A	26.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000
25r.C	26.C	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000
25.A	28.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
25.B	28.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
25.C	28.C	-0.0012	-0.0012	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.001
26.A	27.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
26.C	27.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
26.C	31.C	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
27.A	33.A	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0021	-0.0021	0.000
28.A	29.A	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.000
28.B	29.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
28.C	29.C	-0.0018	-0.0018	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.001
29.A	30.A	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	0.000
29.B	30.B	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	0.000
29.C	30.C	-0.0021	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	0.000
30.A	250.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
30.B	250.B	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
30.C	250.C	-0.0012	-0.0012	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
31.C	32.C	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
34.C	15.C	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	0.000
35.A	36.A	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	0.001
35.B	36.B	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	-0.0034	0.000
35.A	40.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
35.B	40.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
35.C	40.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0015	-0.0015	0.001
36.A	37.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
36.B	38.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
38.B	39.B	-0.0013	-0.0013	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
40.C	41.C	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0014	-0.0014	0.000
40.A	42.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
40.B	42.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
40.C	42.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0015	-0.0015	0.001
42.B	43.B	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.000
42.A	44.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
42.B	44.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
42.C	44.C	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0012	-0.0012	0.001
44.A	45.A	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	0.000
44.A	47.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
44.B	47.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
44.C	47.C	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0015	-0.0015	0.001
45.A	46.A	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
47.A	48.A	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.000
47.B	48.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
47.C	48.C	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0010	-0.0010	0.000
47.A	49.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
47.B	49.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
47.C	49.C	-0.0015	-0.0015	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.001
49.A	50.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
49.B	50.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
49.C	50.C	-0.0015	-0.0015	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.001
50.A	51.A	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
50.B	51.B	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
50.C	51.C	-0.0015	-0.0015	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
51.A	151.A	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	0.001
51.B	151.B	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	0.000
51.C	151.C	-0.0031	-0.0031	-0.0031	-0.0031	-0.0031	-0.0032	-0.0032	0.001
52.A	53.A	-0.0040	-0.0091	-0.0036	-0.0037	-0.0037	-0.0013	-0.0014	0.081
52.B	53.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
52.C	53.C	3.0687	2.6614	0.6559	0.6628	0.6628	0.0031	0.0047	26.668
53.A	54.A	-0.0025	-0.0057	-0.0023	-0.0023	-0.0023	-0.0008	-0.0009	0.055
53.B	54.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
53.C	54.C	1.9179	1.6634	0.4099	0.4143	0.4143	0.0020	0.0029	17.561
54.A	55.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000
54.B	55.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
54.C	55.C	-0.0015	-0.0015	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.001
54.A	57.A	0.3479	0.8344	0.4513	0.4511	0.4511	0.1640	0.1642	2.428
54.B	57.B	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	-0.0023	-0.0023	0.000
54.C	57.C	5.6648	5.2196	1.3802	1.3931	1.3931	0.0200	0.0251	35.030
55.A	56.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000
55.B	56.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
55.C	56.C	-0.0015	-0.0015	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
57.B	58.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
57.A	60.A	0.7454	1.7879	0.9671	0.9666	0.9666	0.3513	0.3518	4.909
57.B	60.B	-0.0051	-0.0052	-0.0051	-0.0051	-0.0051	-0.0049	-0.0049	0.001
57.C	60.C	12.1390	11.1850	2.9576	2.9854	2.9854	0.0429	0.0537	70.723
58.B	59.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
60.A	61.A	-0.0039	-0.0039	-0.0039	-0.0039	-0.0039	-0.0038	-0.0038	0.001
60.B	61.B	-0.0035	-0.0035	-0.0035	-0.0035	-0.0035	-0.0035	-0.0035	0.000
60.C	61.C	-0.0029	-0.0029	-0.0030	-0.0030	-0.0030	-0.0032	-0.0032	0.004
60.A	62.A	-0.0164	-0.0165	-0.0160	-0.0160	-0.0160	-0.0157	-0.0157	0.006
60.B	62.B	-0.0152	-0.0152	-0.0153	-0.0153	-0.0153	-0.0155	-0.0155	0.001
60.C	62.C	0.6104	0.5370	0.1304	0.1319	0.1319	-0.0144	-0.0141	4.352
62.A	63.A	-0.0115	-0.0115	-0.0112	-0.0112	-0.0112	-0.0110	-0.0110	0.004
62.B	63.B	-0.0107	-0.0107	-0.0107	-0.0107	-0.0107	-0.0108	-0.0108	0.001
62.C	63.C	0.4274	0.3760	0.0913	0.0924	0.0924	-0.0101	-0.0098	3.254
63.A	64.A	-0.0230	-0.0231	-0.0225	-0.0225	-0.0225	-0.0219	-0.0219	0.008
63.B	64.B	-0.0214	-0.0214	-0.0215	-0.0215	-0.0215	-0.0216	-0.0216	0.001
63.C	64.C	0.8550	0.7522	0.1828	0.1849	0.1849	-0.0202	-0.0197	6.022
64.A	65.A	-0.0281	-0.0281	-0.0274	-0.0274	-0.0274	-0.0266	-0.0266	0.010
64.B	65.B	-0.0261	-0.0261	-0.0262	-0.0262	-0.0262	-0.0263	-0.0263	0.000
64.C	65.C	1.0387	0.9138	0.2221	0.2247	0.2247	-0.0245	-0.0239	7.305
65.A	66.A	-0.0215	-0.0216	-0.0209	-0.0209	-0.0209	-0.0204	-0.0204	0.008
65.B	66.B	-0.0201	-0.0200	-0.0200	-0.0200	-0.0200	-0.0201	-0.0201	0.000
65.C	66.C	0.7946	0.6991	0.1700	0.1720	0.1720	-0.0187	-0.0182	5.941
67.A	68.A	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	0.000
67.A	72.A	0.2064	0.5442	0.3054	0.3050	0.3050	0.1292	0.1286	1.138
67.B	72.B	-0.0018	-0.0018	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
67.C	72.C	1.1565	1.1007	0.3058	0.3085	0.3085	0.0056	0.0070	2.569
67.A	97.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
67.B	97.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
67.C	97.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
68.A	69.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	0.000
69.A	70.A	-0.0014	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
70.A	71.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	0.000
72.C	73.C	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	0.000
72.A	76.A	0.1501	0.3958	0.2221	0.2218	0.2218	0.0939	0.0935	0.959
72.B	76.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
72.C	76.C	0.8411	0.8005	0.2224	0.2243	0.2243	0.0040	0.0051	2.287
73.C	74.C	-0.0014	-0.0014	-0.0015	-0.0015	-0.0015	-0.0014	-0.0014	0.000
74.C	75.C	-0.0016	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.001
76.A	77.A	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025	0.000
76.B	77.B	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	0.000
76.C	77.C	1.4686	1.2466	0.3051	0.3084	0.3084	-0.0005	0.0003	3.404
76.A	86.A	0.3371	1.0143	0.6161	0.6146	0.6146	0.3177	0.3146	1.741
76.B	86.B	-0.0044	-0.0044	-0.0044	-0.0044	-0.0044	-0.0044	-0.0044	0.000
76.C	86.C	-0.0047	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	-0.0048	0.001
77.A	78.A	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
77.B	78.B	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	0.000
77.C	78.C	0.3672	0.3116	0.0763	0.0771	0.0771	-0.0001	0.0001	1.452
78.A	79.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
78.B	79.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
78.C	79.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
78.A	80.A	-0.0030	-0.0030	-0.0030	-0.0030	-0.0030	-0.0030	-0.0030	0.000
78.B	80.B	-0.0027	-0.0027	-0.0027	-0.0027	-0.0027	-0.0027	-0.0027	0.000
78.C	80.C	1.7440	1.4804	0.3624	0.3662	0.3662	-0.0006	0.0003	4.625
80.A	81.A	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	0.000
80.B	81.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
80.C	81.C	0.6425	0.5454	0.1335	0.1349	0.1349	-0.0002	0.0001	2.531
81.A	82.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.001
81.B	82.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
81.C	82.C	-0.0016	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.001
81.C	84.C	3.1892	2.7076	0.6652	0.6723	0.6723	0.0020	0.0037	7.639
82.A	83.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.001
82.B	83.B	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
82.C	83.C	-0.0016	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.001
84.C	85.C	2.2443	1.9054	0.4681	0.4731	0.4731	0.0014	0.0026	7.707
86.A	87.A	0.2191	0.6597	0.4006	0.3996	0.3996	0.2065	0.2045	1.343
86.B	87.B	-0.0026	-0.0026	-0.0026	-0.0026	-0.0026	-0.0026	-0.0026	0.000
86.C	87.C	-0.0030	-0.0031	-0.0031	-0.0031	-0.0031	-0.0031	-0.0031	0.000
87.A	88.A	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
87.A	89.A	0.1339	0.4031	0.2448	0.2442	0.2442	0.1262	0.1249	0.967
87.B	89.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
87.C	89.C	-0.0018	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
89.B	90.B	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	-0.0010	0.000
89.A	91.A	0.1095	0.3298	0.2003	0.1998	0.1998	0.1032	0.1022	0.844
89.B	91.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
89.C	91.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
91.C	92.C	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
91.A	93.A	0.1095	0.3298	0.2003	0.1998	0.1998	0.1032	0.1022	0.852
91.B	93.B	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.000
91.C	93.C	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	-0.0015	0.000
93.A	94.A	0.1684	0.5049	0.3070	0.3063	0.3063	0.1587	0.1572	1.104
93.A	95.A	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
93.B	95.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
93.C	95.C	-0.0020	-0.0020	-0.0021	-0.0021	-0.0021	-0.0020	-0.0020	0.000
95.B	96.B	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	0.000
97.A	98.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
97.B	98.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
97.C	98.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
98.A	99.A	-0.0032	-0.0031	-0.0031	-0.0031	-0.0031	-0.0031	-0.0031	0.001
98.B	99.B	-0.0035	-0.0035	-0.0035	-0.0035	-0.0035	-0.0035	-0.0035	0.000
98.C	99.C	-0.0038	-0.0038	-0.0038	-0.0038	-0.0038	-0.0038	-0.0038	0.000
99.A	100.A	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
99.B	100.B	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
99.C	100.C	-0.0020	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.000
100.A	450.A	-0.0046	-0.0045	-0.0045	-0.0045	-0.0045	-0.0046	-0.0046	0.001
100.B	450.B	-0.0051	-0.0051	-0.0051	-0.0051	-0.0051	-0.0050	-0.0050	0.000
100.C	450.C	-0.0055	-0.0056	-0.0055	-0.0055	-0.0055	-0.0055	-0.0055	0.001
197.A	101.A	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	-0.0014	0.000
197.B	101.B	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
197.C	101.C	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
101.C	102.C	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
101.A	105.A	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	-0.0016	0.000
101.B	105.B	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	-0.0017	0.000
101.C	105.C	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	-0.0019	0.000
102.C	103.C	-0.0013	-0.0014	-0.0014	-0.0014	-0.0014	-0.0013	-0.0013	0.000
103.C	104.C	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	-0.0029	0.001
105.B	106.B	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	-0.0009	0.000
105.A	108.A	-0.0019	-0.0018	-0.0018	-0.0018	-0.0018	-0.0019	-0.0019	0.000
105.B	108.B	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.000
105.C	108.C	-0.0022	-0.0023	-0.0023	-0.0023	-0.0023	-0.0022	-0.0022	0.000

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Nodes		Reactive power magnitude $Q_{ij}^{path}(t_k, t_{k+1})$ in kVAr							M^Q
		t= 640min	t= 650min	t= 660min	t= 670min	t= 680min	t= 690min	t= 700min	
106.B	107.B	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	-0.0024	-0.0024	0.000
108.A	109.A	-0.0019	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.001
108.A	300.A	-0.0058	-0.0057	-0.0057	-0.0057	-0.0057	-0.0057	-0.0057	0.001
108.B	300.B	-0.0063	-0.0063	-0.0063	-0.0063	-0.0063	-0.0063	-0.0063	0.000
108.C	300.C	-0.0068	-0.0069	-0.0069	-0.0069	-0.0069	-0.0068	-0.0068	0.001
109.A	110.A	-0.0013	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	-0.0012	0.000
110.A	111.A	-0.0024	-0.0024	-0.0023	-0.0023	-0.0023	-0.0023	-0.0023	0.000
110.A	112.A	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	0.000
112.A	113.A	-0.0022	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	-0.0021	0.001
113.A	114.A	-0.0014	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	-0.0013	0.001
135.A	35.A	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018	0.000
135.B	35.B	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	-0.0022	0.000
135.C	35.C	-0.0023	-0.0023	-0.0024	-0.0024	-0.0024	-0.0024	-0.0024	0.001
152.A	52.A	-0.0079	-0.0181	-0.0073	-0.0073	-0.0073	-0.0027	-0.0027	0.154
152.B	52.B	-0.0028	-0.0028	-0.0028	-0.0028	-0.0028	-0.0028	-0.0028	0.000
152.C	52.C	6.1374	5.3228	1.3117	1.3256	1.3256	0.0063	0.0094	49.247
160r.A	67.A	0.2913	0.7453	0.4114	0.4110	0.4110	0.1674	0.1669	1.314
160r.B	67.B	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	-0.0020	0.000
160r.C	67.C	1.4972	1.4457	0.4077	0.4111	0.4111	0.0082	0.0103	2.763
54.A	94.A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000