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**DEVELOPMENT OF A MATRIX BASED UTILITY SCALE FEEDER  
RECONFIGURATION ALGORITHM FOR SUPPLY RESTORATION**

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Degree of Master of Science in Electrical Engineering

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Dissertation submitted in partial fulfillment of the requirements for the  
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## **DECLARATION OF THE CANDIDATE & SUPERVISOR**

I declare that this is my own work, and this dissertation does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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Dr. J. V. U. P. Jayatunga

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Dr. P. S. N. De Silva

## **ABSTRACT**

Handling of supply outages are critical task in electricity distribution utilities. One of major expectation of any electricity customer is receiving continues electricity supply. Responsibility of a utility is also supplying electricity continuously with minimum outage time duration. Although unplanned outages cannot be reduced to zero, those can be managed and restored the supply as early as possible to minimize the outage time duration and minimize affected area. Outage time duration and the area affected is directly influenced to revenue loss of both utility and commercial customers.

In an event of unplanned supply outage, utilities have to carried out fault localization, fault isolation and supply restoration temporary, until the fault is cleared to restore the supply to the fault occurred, isolated section. These steps are currently done as manual method. In this research utility network was modeled as a matrix and above-mentioned fault localization, isolation and supply restoration were done by an algorithm to maximize the efficiency and minimize outage time period.

Centrally handling of outages were focused on this research. Matrix-based utility network model and algorithm for the network calculations was expected to validate through this research. The algorithm produces switching instructions to fault localization, faulty section isolation and supply restoration based on the outage massages were fed. It was simulated in MATLAB environment. Algorithm was developed considering hypothetical network and different test cases of possible fault scenarios. Outage data were fed to the algorithm manually and compared the results given by the algorithm with manual method results for the same outages. Algorithm validated by actual network data with manually fed outage cases. Algorithm results were tallied with the manual results. It shows that centralized matrix-based utility network representation and matrix-based algorithm is suitable to solve networks related issues more efficiently than manual & local methods.

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## **LIST OF ABBREVIATION**

|      |  |
|------|--|
| CEB  | - Ceylon Electricity Board                     |
| LECO | - Lanka Electricity Company (Private) Limited. |
| LBS  | - Load Break Switch                            |
| AR   | - Auto Recloser                                |
| PSS  | - Primary Sub-Station                          |
| MV   | - Medium Voltage                               |
| ID   | - Identification Number                        |
| LBC  | - Load Break Cutout                            |
| DDLO | - Drift Down Lift On switch                    |
| GIS  | - Geographic Information System                |