



# **NEUTRAL CURRENT MITIGATION IN LOW VOLTAGE INSTALLATIONS**

A dissertation submitted to the  
Department of Electrical Engineering, University of Moratuwa  
in partial fulfillment of the requirements for the  
Degree of Master of Science

By  
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## Abstract

Power quality problems with the ever increasing use of electrical and electronic loads has risen to a greater extent. It is quite common to blame the supply authority for lower power quality issues. CEB and LECO the main utilities in Sri Lanka are blamed of this problem. But what the consumers do not understand is that power generation is not low in power quality. It is the consumer himself, who makes the network a poor quality one. The bitter part is that consumers are in the losing side due to this poor network quality, which they take time to realize.

This research was intended to consider the energy loss caused due to unbalance and heavy neutral currents. Heavy neutral currents can be for two reasons. First may be due to unbalance in the network and second could be due to presence of harmonics. This current is a loss to the system in terms of cable losses, over capacity network requirement and added operation and maintenance cost. In turn presence of harmonics and unbalance currents distorts the voltage supplied to other equipment which in turn produces unbalance currents.

Several solution has been found by engineers to this problem. Finding the correct solution is important in this concept. The solution can be easily divided into two categories as energy efficient solutions and energy inefficient solution. For an example if a facility is having high neutral current with high temperature in the neutral current, one solution will be to overrate the neutral cable to accommodate the extra current. But on the other hand this will be an inefficient solution, which is trying to accommodate the waste energy comfortably. But if a solution is looked into reducing the neutral current by phase balancing or reducing harmonics, this will be an energy efficient solution. I have extensively discussed energy efficient solutions as a rectification to this problem and other solutions should be discouraged.

The case studies done at varying consumer location proved a much promising solution to, this problem with a sustainable saving from the bills. I have also



implemented a logical unit which will reduce the time consumed for manual phase swapping by fast load flow analysis of the network.

## Declaration

The work submitted in this dissertation is the result of my own investigation, except where otherwise stated.

It has not already been accepted for any degree, and is also not being concurrently submitted for any other degree.

M I S Ameer  
1<sup>st</sup> MARCH 2010

We endorse the declaration by the candidate.

Reinzie Fernando

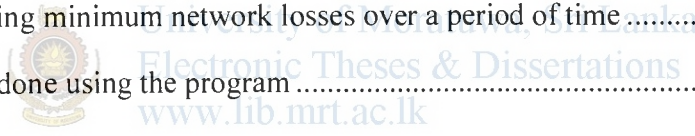
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Upul Jayatunga

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