

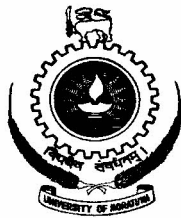
# **CONDUCTOR LOSSES DUE TO NON-LINEAR LOADS**

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by

**M.L.D. DAMINDA DARSHANA**

**Supervised by: Dr.J.P.Karunadasa**



**Department of Electrical Engineering  
University of Moratuwa, Sri Lanka**

University of Moratuwa

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## Abstract

With the heavy use of sophisticated equipment several problems arise related to electricity, within the user's premises and to the nearby users and to the utility. People tend to use the equipment, which save time, reduce labor and increase productivity of the office/industrial environment. Those equipment such as fax machine, photocopiers, printers, computers, CFLs, VSDs etc. comprises with electronic circuits, which consume harmonics.

When Harmonics are injected to the system several problems such as frequent breaker tripping, Error in meter readings, mal operation of relays, capacitor bank blasting, Telephone interference, overheating of conductors and transformers, over loading of neutral conductor, **higher losses in conductors and transformers** etc. can happen. Harmonic currents generated by modern office/industrial equipment cause power system heating and add to user power bills.

The aim of this study was to analyze the harmonic related losses in several electrical systems and quantify its energy usage in cost wise.

How site selection was done, the type of equipment used to gather data and the process of data analysis which are the key elements which this study is based upon are described in separate chapters.

The analysis shows that building-wiring losses related to powering non-linear electronic load equipment might be more than double the losses for linear load equipment. Current related power losses such as  $I^2R$ , Skin Effect of conductors, Proximity Effect of Conductors are considered.

A special emphasis is made upon the underlined theories, which the study is based upon which includes defining harmonics, generating sources, their adverse impacts, adopted methods of measuring or identifying, other methods of eliminating etc.