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CONDUCTOR LOSSES DUE TO NON-LINEAR LOADS

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

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by

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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.

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I endorse the declaration by the candidate.

UOM Verified Signature

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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, theirs adverse impacts, adopted methods of measuring or identifying, other methods of eliminating etc.

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