MODELING OF THE THREE PHASE INDUSTRIAL LOADS FOR HARMONIC ANALYSIS USING MATLAB/SIMULINK

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ABSTRACT

In IEEE Standard 1159 – 1995, harmonics are sinusoidal voltages or currents of a periodic wave or quantity having a frequency that is an integral multiple of the fundamental frequency of the supply system.

Harmonic generation can lead to serious power quality problem if it is not reduced to acceptable level. Electronic components content of non-linear loads contribute to serious harmonics injection to the main supply line.

The objectives of this project are to model of a simple three phase industrial networks for purposes of studying the harmonics analysis existing within a supply network due to the use of various non-linear loads. Modeling is based on   Power System Blockset (PSB) tool within the MATLAB/Simulink software, which is powerful software tool for various power engineering simulation. Various individual non-linear loads are modeled and simulated. Results from the basic model are then compared with similar model implemented using Pspice developed to ascertain its accuracy. Subsequently this basic model is being used in a simple three-phase system to study the effects of various loads on the operation of the supply network.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Power quality is a concept of growing importance for all electrical utilities, especially in industrial network. Electric power quality could be interpreted in a number of different ways observed by different users with various perspectives. For the consumers, the economic impact of power disturbances can range from several hundred dollars in repair or maintenance whether in replacing home appliances to millions dollars in product or production losses and cleanup. For utilities, system disturbances can lead to user dissatisfaction and revenue losses. Many have even concluded that problems are caused by power utility, but the main reason to the power quality problems is dependent on the existence of non-linear loads in a particular system [1,2].

Power electronics devices in the distribution system or industrial network can also contribute to these problems. In power electronics the use of switching is a major source of harmonics currents. When an end user connects load drawing short pulses of current, the current wave becomes distorted and harmonic currents begin to flow [3]. Amongst the largest sources of harmonics are converters. Converters use solid state switching devices to convert power from one frequency to another (usually between AC and DC). These switching devices maybe in the form diodes, thyristor or many other power electronic devices [5]. So, the primary focus of this work is to model an industrial network system and observed the non-linear current from various types of load. Various individual non-linear loads are modeled and simulated. Results from the basic model are then compared with similar model implemented using Pspice developed by others from reference [6] to ascertain its accuracy.