APPLICATION OF AN ARTIFICIAL NEURAL NETWORK FOR PREDICTING VOLTAGE HARMONIC

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ABSTRACT

The topic of harmonics has received increased attention over the pass several years due to the increased installation of harmonic-producing that is harmonic-sensitive equipment. It is one of the most common power quality problems. Power quality is an increasing concern for utilities and their commercial and industrial electrical power users.

This thesis provides multi-layered network based methods that is back propagation technique for predicting voltage harmonics in eight-bus industrial power system when two types of filter, single tune filter and high pass filter, are added to the certain bus-bar. In this thesis, the data for voltage harmonics in each bus has been verified by means of the computer simulation using Software for Power System (SPS) by Micromatrix Research Corporation.

The result obtained from this experiment showed that this method of predicting the voltage harmonics has the advantage, that it can determine the voltage harmonics with very low error.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Advances in power electronic technology have made it possible to control large amount of power efficiently than previously possible. However, the increase use of such equipment has created new problems - an increased of harmonic current levels. Furthermore, the common practice of installing power factor correction capacitor, generally, tends to amplify the harmonic current. Increased of harmonic currents results in increase voltage distortion and increased of rms current (may cause nuisance fuse blowing, breaker tripping, overheating of cables and equipment). [1]

Electrical engineers are interested in harmonics because of the distortion, disturbance and heating effects that they cause. In addition there is always a chance of system resonance causing voltage and current magnification in equipment.

The behaviour of harmonics is so complicated [2] that the conventional methods do not work so well to predict harmonics. That is due to the following characteristics.

(a) non - linearity of harmonics
(b) randomly - like behaviour of harmonics in very short range such as several seconds
(c) periodicity of harmonics in the daytime or at night

Actually the process of power system harmonics seems to be nonlinear and non-Gaussian since most of prediction approaches make an assumption that the