REACTIVE POWER DISPATCH INCOOPERATING VOLTAGE STABILITY IMPROVEMENT USING ARTIFICIAL NEURAL NETWORK.

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ABSTRACT

This thesis presents the development of an Artificial Neural Network (ANN) based technique for reactive power dispatch that aims to improve voltage stability of a power system. In this study, a multi-layer feed forward ANN with error back propagation algorithm was used. The proposed method was tested on two models, which are the 6 bus, and IEEE 14 bus interconnected systems. The testing and training data were generated by Fast Decoupled Load Flow method and the voltage stability at a load bus was measured by evaluating the voltage stability index, i.e. L-factor, developed in reference [1].

The results show that the ANN could be used to determine the value of reactive power and to predict voltage stability level for power system, since they are in close agreement with the calculating results.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

One of the major problems faced by power system operators is the reactive power dispatch imposed on electric power utilities for a continuous and reliable supply of energy. Major power load require a significant amount of reactive power that has to be supplied while maintaining load bus voltages within their permissible operating limits. In order to maintain desired levels of voltages and reactive power flow under various operating conditions and system configuration, power system operator may utilize a number of control tools such as switching var sources, changing generator voltages, and/or adjusting transformer tap settings. By adjusting an optimal of these controls, the redistribution of the reactive power would minimize transmission losses. By looking to the 1965 North East and 1977 New York City blackout has been proved to be the reactive power problem. The 1987 Tokyo blackout also was believed to be due to a reactive-power shortage and a voltage at the summer peak load [2].

In the past, the voltage and reactive power control problem was often considered as a small issue which could be solved on a local basis using locally available compensation devices. However, the continuous increase of the load demand has brought the transmission systems to operate near to their own security limits. Moreover, the growing complexity and interconnection of the networks has made the traditional local voltage regulation a very difficult task. Hence, in the planning studies the voltage and reactive power control problem has now become an important issue, which must be tackled and solved on the overall system.

Voltage and reactive power violations can be detected from the load flow analysis results. System operators are then redefined the reactive power generated by each generating limit available in the system. Many techniques have been developed in