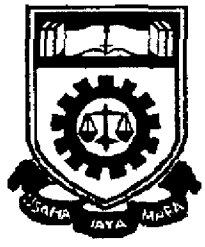
VOLTAGE STABILITY FACTOR PREDICTION IN POWER SYSTEM USING ARTIFICIAL NEURAL NETWORK

Thesis presented in partial fulfillment for the award of the Bachelor of Electrical Engineering (Honours) of INSTITUT TEKNOLOGI MARA



NORLIDA BINTI HJ. MUSA
Faculty of Electrical Engineering
INSTITUT TEKNOLOGI MARA
40450 Shah Alam
Selangor Darul Ehsan
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ABSTRACT

This thesis presents the applications of artificial neural network (ANN) to predict the voltage stability level of power system network. Two types of neural network have been used i.e. Back-propagation and Radial Basis Function Network. Both ANN models developed have three layers i.e. input layer, hidden layer and output layer. To determine the level of voltage stability, it is measured by using voltage stability factor, i.e. L-factor, developed by Jasmon.

In both networks, the same sets of data have been used in the training and the same other sets of data for testing process. All those sets of data are generated by the Second Order Newton Raphson (SONR) load flow simulation. Real and reactive power have been used as input nodes and L-factor values as output node.

Tests are carried out and the results are compared on the basis of learning rate, momentum and number of hidden node. From the results, it shows that the artificial neural network can be used to predict voltage stability level for power system, with an advantage using Radial Bassis Function Network since it performed better than Back-propagation Network.

CONTENTS

CHAPTER 1

INTRODUCTION

Voltage stability is now becoming a major concern in designing, planning and operating electric power system. With the continuing rise in demand of electrical energy for the use of industrial and domestic, power system will continue to grow both in size and complexity and voltage stability will likely to increase in importance. Therefore an uninterrupted power supply is required and it will an important to develop a special control aid to provide greater flexibility for effective operation of power system.

Voltage stability is concerned with the ability of a power system to maintain acceptable voltages at all buses in the system under normal condition and after being subjected to a disturbance [1].

The main part of voltage stability problem is the voltage drop that occurs when the power system being disturb by a heavy load, and one serious type of voltage instabilty is voltage collapse. Voltage collapse is characterised by decreasing in voltage magnitude of power system buses. A system voltage may collapse if the load increases beyond the limit allowed or the supply system is weakened by a disturbance. Voltage collapse point is the maximum voltage stability limit allowed by the available