APPLICATION OF ARTIFICIAL NEURAL NETWORK FOR VOLTAGE STABILITY ASSESSMENT

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ABSTRACT

This report presents an application of Artificial Neural Network model for prediction of voltage stability condition in power system network. Voltage stability analysis involves the determination of stability factor, i.e. L-factor. The ANN by using the Back-Propagation method was selected. The ANN model developed has three layers i.e. input layer, hidden layer and output layer.

The same sets of data have used in the training and the same other sets of data for testing process. All those sets of data were obtained by the Load Flow programme. Real, reactive power, V_{load} and δ_{load} have been used as input nodes and L-factor values as output node.

Tests were carried out and the results were compared on the basic of learning rate, momentum, number of hidden node and iteration. From the results, it shows that the artificial neural network can be used to predict the level of voltage stability condition.

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CHAPTER 1

INTRODUCTION

1.1 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 importance 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].

In this report, a voltage stability factor with respect to a load bus is formulated from the voltage equation derived from a two bus network and it is computed using thevenin equivalent circuit of the power system referred to a load bus. The power system is said stable condition if the L-factor approach to 0. If L-factor approach to 1.0, voltage collapse and power system become unstable.

Presently, load flow programme are the most common tool in assessing voltage stability analysis in power system. Load flow (or power flow) is the solution for the normal balanced three-phase steady-state operating condition of an electric power system. In general, load flow calculation is performed for power system planning and operational and in connection with system control. The data obtained from load-flow studies are used for the studies of normal operating mode, contingency analysis and stability.