#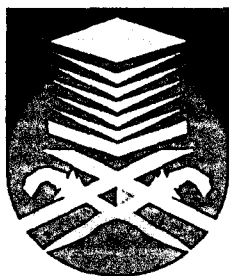 EVOLUTIONARY PROGRAMMING WITH GAUSSIAN AND CAUCHY MUTATION TECHNIQUE IN OPTIMAL REACTIVE POWER DISPATCH IN LOAD MARGIN ENHANCEMENT

Thesis is presented in partial fulfillment for the award of the

Bachelor of Engineering (Hons) Electrical

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ABSTRACT

This report present evolutionary programming (EP) with Gaussian and Cauchy mutation technique in optimal reactive power dispatch (ORPD) in load margin enhancement. In this study, evolutionary programming is implemented in optimal reactive power dispatch in term of enhancement of load margin. The program will determine the voltage stability in the system. In this research, two types of mutation technique that is Gaussian and Cauchy mutation technique are implemented in evolutionary programming in order to find the best technique to be adaptive in the system. In order to achieve the objective, the proposed technique are tested on IEEE14, IEEE26, IEEE30 reliability test system (RTS) to ensure the reliability of the proposed technique.

Index term

Evolutionary Programming, Optimal Reactive Power Dispatch, Load margin, Technique of Mutation

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INTRODUCTION

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1.1   BACKGROUND OF STUDIES

In power system, voltage stability is the important task to consider ensuring the system is not collapse because of the instability of power system. It is important the systems are operated in a safe mode. Voltage collapse when there are disturbance, increase in load demand, or change in operating condition that causing uncontrolled drop in voltage magnitude [1]. The important part in measuring voltage stability is the analysis of load margin whereby the analysis can determine the voltage collapse to occur. In this report, Evolutionary Programming is proposed because of potentially finding optimum solution and increase loadibility. In [2], EP technique can give promising result in voltage stability margin and voltage profile improvement by optimizing transmission loss. Two mutation techniques are implemented in (EP) that is Gaussian and Cauchy mutation to accelerate the optimizing process. This mutation technique will formed a new population from existing population every generation generated. Thus, it enhanced in finding optimal solution by evolving a population over a number in generation. Reference [3] stated that Cauchy mutation is better in escaping local optima and Gaussian mutation is better in local convergence. Thus, this paper will show either these mutation can implement in optimal reactive power dispatch (ORPD) using evolutionary programming (EP). The important of voltage stability is important because it can avoid voltage collapse that occurs in variably following a large disturbance or large load increase reactive power consumption and voltage drop. The voltage drop cause initial load reduction triggering control mechanism for load restoration. It is the dynamic of this control that often lead to voltage instability and collapse.