MINIMIZATION OF POWER LOSS BY EVOLUTIONARY PROGRAMMING USING THYRISTOR CONTROLLED SERIES COMPENSATORS (TCSC)
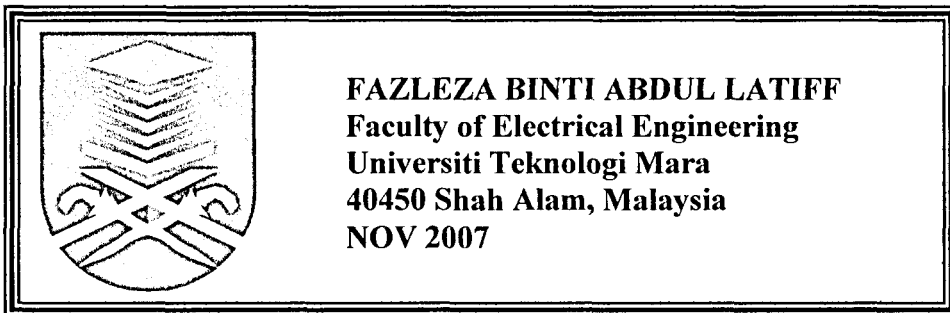
Project Report is presented in partial fulfillment for the award of the

Bachelor of Electrical Engineering (Honors) of

UNIVERSITI TEKNOLOGI MARA

FAZLEZA BINTI ABDUL LATIFF
Faculty of Electrical Engineering
Universiti Teknologi Mara
40450 Shah Alam, Malaysia
NOV 2007

ACKNOWLEDGEMENT

In the name of Allah the most Beneficent and Merciful. A deep sense of thankfulness to Allah who has given me the strength, ability and patience to complete this project and thesis as it is today. Firstly, I would like to take this opportunity to put into words my deepest gratitude and appreciation to my project supervisor, Dr. Ismail Musirin for his support, guidance, patience, encouragement and abundance of ideas during the completion of this project.

I would also like to express my extraordinary appreciation to my family for their invaluable support along the duration of my studies until the completion of this thesis.

Finally yet importantly, thanks to all the persons who have directly or indirectly contributed in some other ways which have driven and boosted up my synergy and motivation until this thesis has reached its destination.

Fazleza binti Abdul Latiff
Bachelor in Electrical Engineering (Hons.)
Faculty of Electrical Engeneering
Universiti Teknologi MARA (UiTM)
Shah Alam,Selangor

ABSTRACT

This thesis presents an approach to minimize the power loss in distribution system. Power loss can be reduced by inserting Flexible Alternating Current Transmission Systems (FACTS) device which in the system. Thyristor Controlled Series Compensators (TCSC) is one type of FACTS device can be inserted directly in series with transmission line. TCSC is also more economical than other competing FACTS technology. TCSC provide fast speed of response and executes any switching patterns without restrictions. The main benefits of TCSC are increased energy transfer, dampening of power oscillations, dampening of sub synchronous resonances, and control of line power flow. This approach is done by using Evolutionary Programming (EP) technique. EP search for the optimal solution by evolving a population of candidate solutions, over a number of generations or iterations. The evolution of solution is carried out through mutation and competitive selection. The best generation of power loss can be obtained after running EP program. The technique was tested on the 12-Bus Radial Distribution System. Result from the study has revealed that TCSC is able to minimize loss in power distribution system.

Keywords – power loss minimization, MATLAB Programming, Evolutionary Programming, TCSC optimization

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CHAPTER 1

INTRODUCTION

1.1   Introduction

In power System Engineering as well as in many other areas of Electrical Engineering, optimizing the usage of resources and subject to several constraints are tremendously important and usually complicated due to specific technical, economical or other scrupulous aspects of the problems. To increase the complexity of electrical power system and the demands imposed by economic have emphasized the need from improving power system. Electrical power losses in distribution systems correspond to about 70% of total losses in electric power systems [2]. These electrical losses can be considerably reduced through the installation and control of capacitors [1]. Computational techniques for capacitors placement in distribution systems, have been extensively researched since the 60's with several available technical publications in this research area [3].

In this study, Matlab is the suitable program that is used to calculate the power losses in distribution system through optimization process. FACTS devices are environmentally friendly. They contain no hazardous materials and produce no waste or pollutions. FACTS help distribute the electrical energy more economically through better utilization of existing installations thereby reducing the need for additional transmission lines.

This thesis presents minimization of Power Loss by Evolutionary Programming using Thyristor Controlled Series Compensators (TCSC).The proposed technique on the 12-Bus Radial Distribution System.