REACTIVE POWER CONTROL USING STATCOM IN POWER SYTEM

Project report presented in the partial fulfillment for the award of the Bachelor of Electrical Engineering (Hons)
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ACKNOWLEDGEMENT

Firstly, thank and grateful to Allah s.w.t that give me strength and passion to finish my thesis. I would like to thank to my helpful project supervisor, PM Pauziah Bt Mohd Arsad for her guidance, idea and suggestion in order to complete my final year project. All the knowledge and time that had been shared during this process of making my final year project is very precious. Honestly, all the contribution and cooperation. Special thank and credit for all effort during this process. Thank you very much and may Allah bless you always.

Besides, all praise to my lecturer for their support and encouragement directly or indirectly throughout my course in UITM. Especially for my lecturers who had taught me in majoring power system subjects. The knowledge that had been gained from the subject is very useful to complete my final year project. Also special thank to Cik Hanim for her guidance and knowledge in PSCAD simulation. With her cooperation I am able to understand and apply the PSCAD simulation program.
With my love and gratitude, I want to dedicate this thesis to my family who had support me throughout. They had given me a lot of motivation and support to complete this course. All praise for them especially Nordin Bin Sakif,
[illegible] and [illegible]
Lastly I would like to thank to all my friends for the constant and support throughout my studies and those who have contributed to the completion of this thesis.

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ABSTRACT

This project focuses in reactive power control in power system using Distribution Static Synchronous Compensator (D-STACOM). Reactive power compensation is very important in AC transmission. The project is to understand the reactive power compensation using D-STACOM 12-pulse configuration with Pulse Width Modulation (PWM) switching technique. This analysis includes reactive power condition under three phase balanced fault condition and application of three phase fault impedances. It can be shown that three phase balanced fault condition will decrease the reactive power in the system. D-STATCOM has an ability to absorb or injected the reactive power in the system. The designed was tested on IEEE 13 bus bar system using PSCAD/EMTDC software.

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CHAPTER 1

INTRODUCTION

1.1 PROJECT OVERVIEW

Reactive power (Q) control or Var control is important in power system. Reactive power directly affects the voltage and system stability is known as reactive power compensation. Generally reactive power compensation based on two concepts, generated or injected and absorb. Several techniques were discovering to archive the concept.

Reactive power was required for the voltage control of long transmission lines. An expression for determining the Q at the receiving end may be derived in terms of the receiving end power Pr, complex A, B parameters of the line such that the receiving end voltage, V_r is equal to or a specified ratio of the sending end voltage, V_s.

Synchronous generator can be used to generate or absorb Q. The ability of the generator to supply Q is determined by the short circuit ratio (S.C.R=$1/X_s$). In modern machines SCR is made low for economic reasons and hence the inherent ability of the machine to operate at leading power factors is not large. The Var capacity of the generator can be increased by the use of continuously acting voltage regulators. An over excited machine generates reactive power. An under-excited machine absorbs (or generates negative or leading) Vars. The generator is the main source of supply to the system of both positive and negative Vars.

Overhead lines and transformer is another method to control the reactive power. When fully loaded an overhead line absorbs Q =I^2X per phase. On light loads, the shunt capacitance of long lines may become predominant and the lines become Var generators. Transformers always absorb Q. Vars absorbed by a transformer is given as:

$$Q_{absorb} = (VA_{load})^2 \times \frac{X_{pu}}{VA_{rated}}$$