

**A STUDY ON THE TRANSIENT STABILITY IMPROVEMENT USING HVDC-
LIGHT**

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ABSTRACT

The understanding of the transient stability on power systems is very important to power engineer. Theoretically, there were two types of stability in power systems which are steady-state stability and transient stability. Since transient stability gives a big impact to power systems operation, so, the study on the transient stability is conducted. There were many FACTS devices that can be used to improve the transient stability on the power system network, such as UPFC, SVC, DVR, HVDC-Light and so on. HVDC-Light was an idea to connect the power network from Bakun to peninsular Malaysia through the submarine cable. HVDC-Light has been chosen to be analyzed since this technology has not been completed. So, the simulation for this system has been designed in PSCAD software. HVDC-Light comprises two Voltage Source Converters (VSCs), one operating as rectifier and the other operating as inverter. The simulation of this project involves the two buses system, synchronous machine and generator. So, the circuit without the HVDC-Light and the circuit with HVDC-Light are designed in the PSCAD software. Then, the comparison of the output which is consists of active power, reactive power, voltage and internal phase angle for the synchronous machine between those two circuits will be made. The result shows that HVDC-Light improved the transient stability and power generation on the power systems network.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Professional electrical engineers in the future must be able to determine and fully understand the power system operation. As an electrical engineering student majoring in power, the understanding of the whole operation of the new technology that will be used in power system is very important indeed. This project is a study of the transient stability improvement by using HVDC-Light which is one of the FACTS devices. Besides that, this project will also discuss the power flow study to determine the steady state operating condition of the electrical power network.

The steady state may be determined by finding out the flow of active and reactive power throughout the network and the voltage magnitudes and phase angles at all nodes of the network. Transient stability is very important in the power system network. Transient stability will be discussed with respect to active power and reactive power of the sending part and receiving part. As we know, electromagnetic transient studies provide priceless information relating to the behavior of the system in the event of different forms of transient phenomena, which can hardly be achieved by other means. This thesis addresses the transient and power flow studies of electrical networks with embedded, power electronics-based, FACTS and Custom Power (CP) controllers. The transient analysis and modeling is performed with the state-of-the-art digital simulator PSCAD/EMTDC v4.0.