

THE SIMULATION MODEL OF HVDC TRANSMISSION SYSTEM



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With The Salawat and Salam to Prophet Muhammad SAW

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ABSTRACT

This thesis reports the performance and control characteristic of an HVDC transmission using simulation software. A software simulation of HVDC using PSIM software was developed. In order to study the characteristic of the HVDC system two types of HVDC have been model using the PSIM software. The monopolar and bipolar types of high voltage were investigated. The converters at both end are function in rectifier and inverter which determine by the firing angle of the thyristor. The performances of both converters were demonstrated.

The main objective of HVDC converter is to provide point to point electrical power interconnection between asynchronous ac power networks. Advancements in power electronics are making High Voltage Direct Current (HVDC) Transmission System more attractive and reliable. More can be obtained from huge investment in complex HVDC system if operation and maintenance personnel have deeper understanding about the function of this system.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

Electrical plants generate power in the form of ac voltage and currents. This power is transmitted to the load centers on three phases, ac transmission lines. However, under certain circumstances, it becomes desirable to transmit this power over dc transmission lines. This alternative becomes economically attractive where a large amount of power is to be transmitted over a long distance from a remote generating plant to the load center.

This break-even distance for HVDC overhead transmission lines usually lies somewhere in a range of 300-400 miles and is much smaller for underwater cables. In addition, many other factors, such as the improved transient stability and the dynamic damping of the electrical system oscillations, may influence the selection of dc transmission in preference to the ac transmission. It is possible to interconnect two ac systems, which are at two different frequencies or which are not synchronized, by means of an HVDC transmission line [1].

HVDC transmission system has several types, such as monolink, bipolar link and homopolar link. Monopolar link it has one conductor and uses ground or sea as the other conductor. Modern monopolar systems for pure overhead lines carry typically 1500 MW. If underground or sea cables are used the typical value is 600 MW. Most monopolar systems are designed for future bipolar expansion. The other type is the bipolar link it has two conductors, has one positive and one negative. The neutral points on the two sides are grounded. However; there are a number of advantages to bipolar transmission which can make it the attractive option. Bipolar systems may carry as much as 3000 MW at voltages of +/-533 kV. Submarine cable installations initially commissioned as a monopole may be upgraded with additional cables and operated as a bipolar [2].