

CHAPTER (1)

INTRODUCTION

High voltage direct current (HVDC) electric power transmission systems are preferred, in some situations, to the common alternating current AC transmission systems as a means for bulk transmission of electrical power. Modern form of HVDC transmission uses, extensively, modern technology. Some AC electric power systems, which are required to be connected together, may not be synchronized. Therefore, they can't be connected even if the distance between them is short. Also, in some circumstances, it is physically impossible, or highly impracticable, to connect them, even if they are synchronized. In such conditions, HVDC systems are considered to be the most effective method for connecting these systems [1].

Therefore, in this thesis investigation of the performance of HVDC systems under different operating conditions are conducted. Models representing some actual HVDC systems, and giving voltage profiles produced under different working conditions, and simulated using Matlab/Simulink. Corresponding computed results are obtained.

The Main Objectives of the Thesis

This work of study is aimed to develop and simulate different types of HVDC to explain the effects of different parameters in each system and subsystem used in HVDC transmission network. The study tackle's the following items:

- 1- Presenting a brief review study regarding the history of the HVDC systems
- 2- Developing simulated models for different systems used in HVDC.
- 3- Investigating the different parameters that control the output of the inverters/converters that feed the transmission systems.
- 4- Comparing the different configurations that are used in HVDC systems and their different applications such as Monopolar, Bipolar and MTDC (Multi Terminal Direct Current Transmission systems).
- 5- Studying the performance of the HVDC under different Load/Fault conditions.
- 6- Presenting the main conclusions for the HVDC systems study.

To achieve that, this thesis contains six chapters as follows:-

CHAPTER (1): INTRODUCTION

This chapter introduces the main objectives of the thesis and the chapters contained in this thesis

CHAPTER (2): LITERATURE REVIEW

This chapter is a literature review introduces the history of HVDC (high voltage direct current transmission systems, advantages/disadvantages of HVDC, comparison between AC and DC transmissions, types of HVDC systems, cost of HVDC transmission and HVDC different modern application and studies.

CHAPTER (3): SYSTEM MODELS

This chapter introduces the different considered models and studied cases, data for each model and scenario of the control/protection systems of each mode

CHAPTER (4): SIMULATED RESULTS

This chapter introduces the simulation results and discussions of the considered system models in chapter (3).

CHAPTER (5): MTDC (MULTI-TERMINAL DIRECT CURRENT TRANSMISSION SYSTEM

This chapter introduces the MTDC (multi-terminals direct current transmission systems), scenario of the control/protection systems of MTDC and the simulation results of the considered system model of MTDC.

CHAPTER (6): CONCLUSION

This chapter presents the main conclusions obtained for the different HVDC systems study.

REFERENCES