Construction of Extra High Voltage Transmission Line using MATLAB

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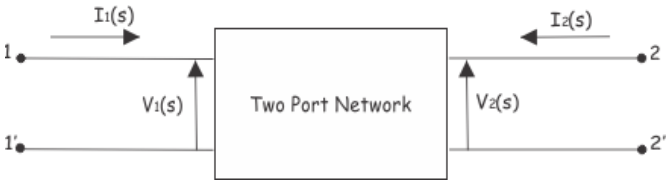
***Abstract*- The aim of this paper is simulation of extra high voltage in long transmission lines.The entire power system is divided into three parts supply, transmission amd distribution of which transmission lines are connecting the other two parts. So, it plays a very important role. Extra High Voltage (EHV) transmission lines are being used these days because more is the voltage of transmission line the better the performance and efficiency of the system. Moreover, at high voltages chances of power loss is reduced to minimal level. Super power stations are also a major reason for usage of EHV transmission line. By simulation we can analyze the parameters of transmission lines (T-parameters) in actual scenario. By the result so obtained designing of EHV lines for bulk power transmission with less losses and better efficiency can be done.**

***Keywords*- EHV Lines, Reduced Power Loss, Super power station, Bulk power transmission**

I. INTRODUCTION

The electrical power system has three principle divisions the generating stations, the transmission system and the distribution system. The transmission lines link between generating station and the distribution system that lead to other power system interconnections. Today, we are using of Extra High Voltage (EHV) transmission lines for transmission of power between the generating station and distribution system in India .The main reasons are the construction of super power stations of very large capacities needs the transmission at high voltage so use EHV lines and at high voltages power loss is also reduced since losses are directly proportional to the square of current[1] .With MATLAB, the simulation of transmission line analyzes the behaviors and parameters of transmission line under the actual conditions to simulate a long transmission line and analyze the waveforms at sending and receiving end[2]. The results after simulation help in designing Extra High Voltage Long Transmission Line Model. For the protection of long transmission line we place the circuit breakers and its rating is depends on L-L-L fault. Their reason behind is that the triple line fault current is very high as compare to other fault current. Hence by using MATLAB simulation in computer, we identified and analysis of EHV transmission line fault can be easily find out. It is necessary to calculate the voltage current and power at any point on the transmission line provided the values at one point are known. We are aware that in 3 phase circuit problem it is sufficient to compute results in one phase and subsequently predict results in the other 2 phases by exploiting the three phase symmetry[3].

II. TWO PORT NETWORK



When an electrical signal is applied to the input port of the network, there would be an electrical output signal. The relation between input and output signals of the network can be determined by transfer various network parameters, such as, impedance, admittance, voltage ratio and current ratio. A two-port network is represented by four external variables: voltage and current at the input port, and voltage and current at the output port, so that the two-port network can be treated as a black box modelled by the relationships between the four variables Vs, Is, Vr and Ir. There exist six different ways to describe the relationships between these variables, depending on which two of the four variables are given, while the other two can always be derived. The parameters used in order to describe a two-port network are the following: Z, Y, A ,B,C ,D, h and g.

III. TRANSMISSION LINE PARAMETERS

A major section of power system engineering deals in the transmission of electrical power from one particular place (eg. generating station) to another like substations or distribution units with maximum efficiency. So it's of substantial importance for power system engineers to be thorough with its mathematical modelling. The relation between the sending and receiving end specifications are given using ABCD parameters by the equations below.

Vs=AVr+BIr

Is=CVr+Dir

So,

A=Vs/Vr(at Ir=0) **B=Vs/Ir(at Vr=0)**

C=Is/Vr(at Ir=0) **D=Is/Ir(at Vr=0)**

IV. SIMULATION MODEL

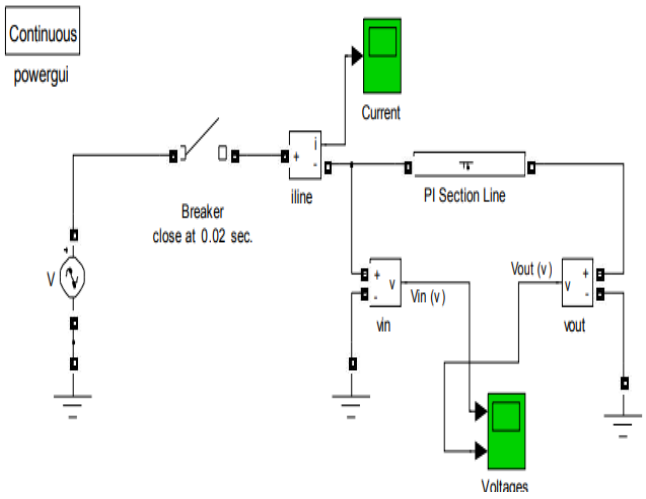


Fig.1 Simulation of EHV Transmission line

OUTPUT

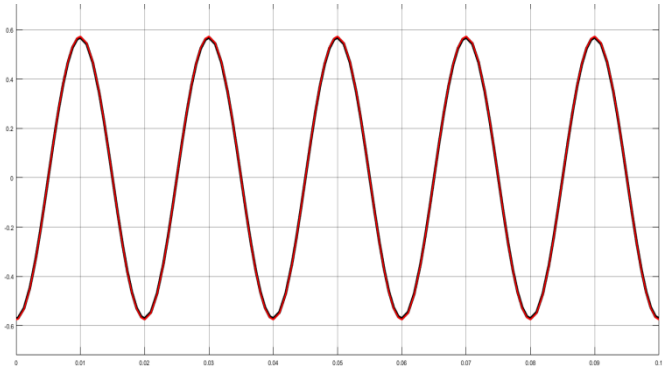


Fig.2 Waveform the current

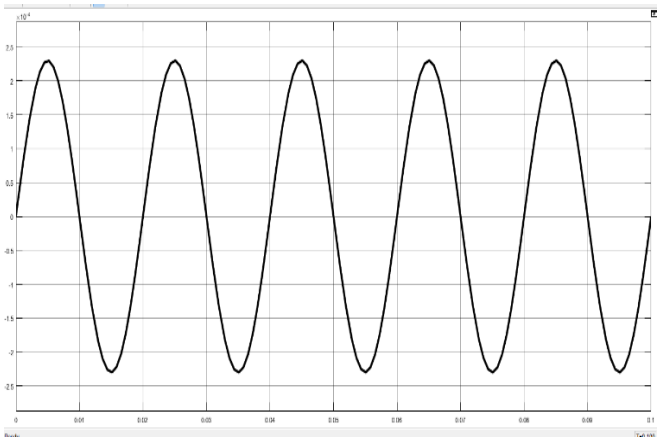


Fig.3 Waveform the Voltage

By the simulation result it is said that extra high voltage lines are best sited for transmission of bulk power.

IV. CONCLUSION

This paper present the complete simulation of extra high voltage transmission line with smooth characteristics of voltage and the current waveform with efficient manner in minimum losses.

V. FUTURE SCOPE

The above performance of the existing system can be improved by using the different intelligence system like ANN, Fuzzy etc to get the better performance characteristic with smooth and reliable operation.

REFERENCES

[1]. L.M. Youngs, The Technical Writer's Handbook. Mill Valley, CA: University Science, 2015
[2]. A. W. Huang, L. Ding, O. Sung-Kwun, "A Comparative Study of Space Search Algorithm and Particle Swarm Optimization in the Design of ANFIS-based Fuzzy Model,IET journal, no. 1, 2012
[3]. A Wang Xu, et al. Modeling and Simulation of PWM RectifierBasedon theSpace Vector Modulation[J].Electric Drive,2010 ,32(2):27-31.
[4]. Circuit Analysis by A.Chakraborthy
[5]. IEEE paper by "Karl E. Lonngren and Er-Wei Bai" on "Simulink Simulation of Transmission Line"
[6]. Power System Analysis And Design by B.R.Gupta