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Research Paper on Three-Phase Fault Analysis on Transmission line in Matlab Simulink

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Abstract - Now-a-days the demand of electricity or power are increases day by day this results to transmits more power by Increasing the transmission line capacity from one place to the other place. But during the transmission some faults are occurred in the system, such as L-L fault (line to line), 1L-G fault (single line to ground) and 2L-G fault (double line to ground). These faults affect the power system equipment's which are connected to it. The main aim of this paper is to study or analysis of faults and also identifies the effect of the fault in transmission line along with bus system which is connected to transmission line. Mainly the major faults in long transmission lines is 3 Phase fault which are harmful to the electrical equipment. A proposed model in transmission line is simulated in MATLAB software to analysis and identified the faults and limit the fault. Fault block was taken from the sim-power system block library.The whole modeling and simulation of different operating and different conditions of fault on transmission line on IEEE 14 Bus System, their faults three line short circuit of the proposed work is presented in this paper.

Keywords: TCSCDynamics, IEEE BusSystem, Result Analysis

1.INTRODUCTION

As When different types of fault occurs in power system then in the process of transmission line fault analysis, determination of bus voltage and the rms line current are possible. While consulting with the power system the terms bus voltage and rms current of line are very important. In case of three phase power system mainly two faults occurs, three phase balance fault and unbalance fault on transmission line of power system, such as line to ground fault, double line to ground fault and double line fault. The transmission line fault analysis helps to select and develop a better for protection purpose[1]. For the protection of transmission line we place the circuit breakers and its rating is depends on triple line fault. The 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,the analysis of transmission line fault can be easily carried out. The main purpose of this paper is to study the general fault type which is Unbalance faults of transmission line in the power system. Also to perform the analysis and obtain the Result of various parameters (voltage, current, power etc) from simulation on those types of fault Using MATLAB. A new modeling framework for analysis and simulation of unbalance fault in power system on IEEE 14 bus system is Procedure includes the frequency information in dynamical models and produces approximate nonlinear Models that are well adopted for analysis and simulation. The transformer model includes Saturation. The parameters have been obtained from practical or experimental measurement. Due to fault all phases voltage magnitude decreases this can be improved using proposed Facts Devices TCSC.

2. Proposed System

Project we were perform on IEEE 14 bus system without TCSC observe the voltage, active power and reactive power waveform.

•Connect the TCSC with IEEE 14 bus system and observe the voltage, active, and reactivewaveform.

•Create the Three phase fault on IEEE 14 bus system and observe the effect of fault on 14 bus voltagewaveform.

•IEEE 14 bus system with three phase fault and TCSC connected it is observed that simulation result output TCSC improve thevoltage stability and power flow control in power system network.

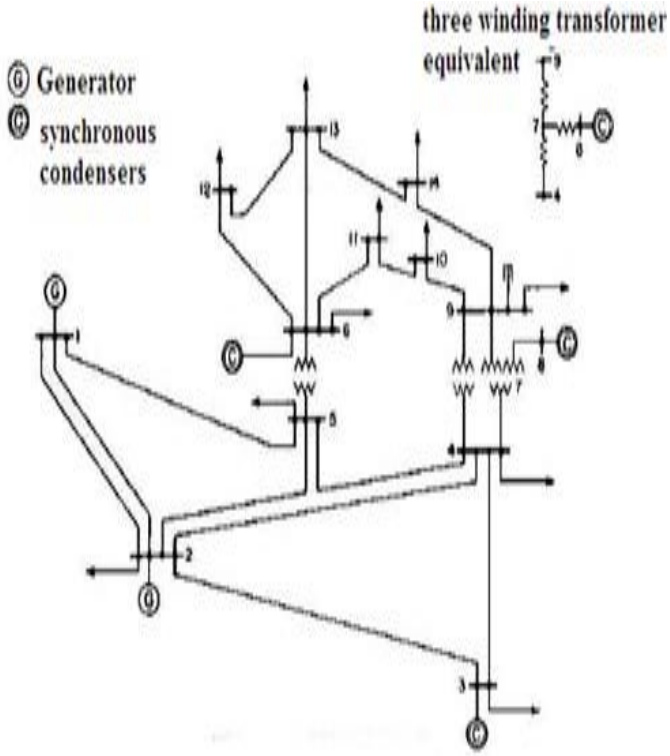

Figure 1. Single line diagram of IEEE 14 bus system

3. Simulink Model Description

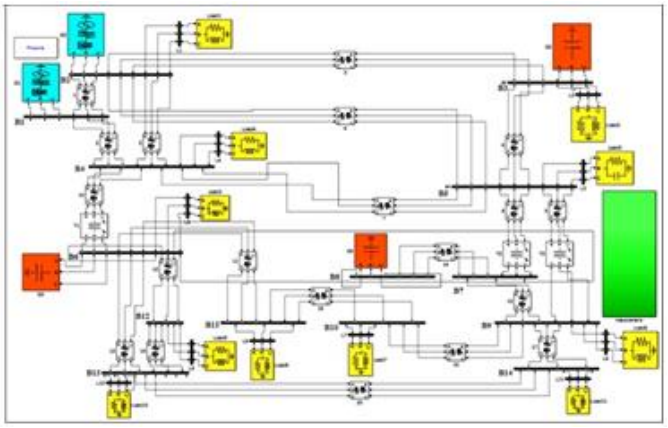

Figure2 IEEE 14 bus system without TCSC

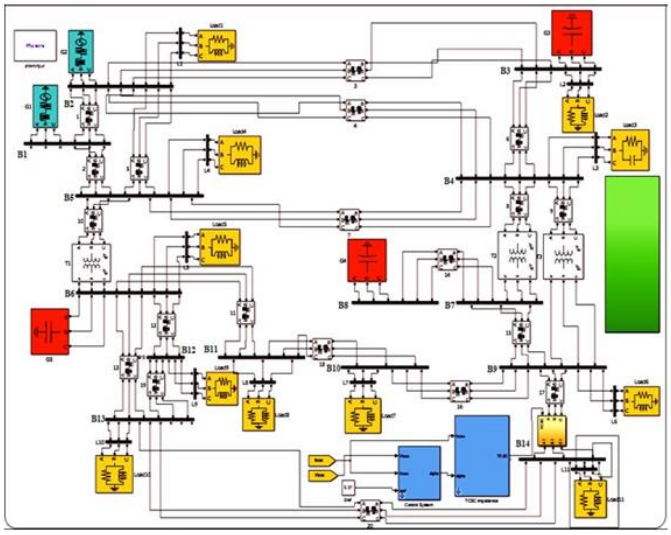

Figure2 IEEE 14 bus system with TCSC

TCSC. TCSC connected to bus 14. When TCSC operates in the constant impedance mode it uses voltage and current feedback for calculating the TCSC impedance. The reference impedance indirectly determines the power level, although an automatic power control mode could also be introduced

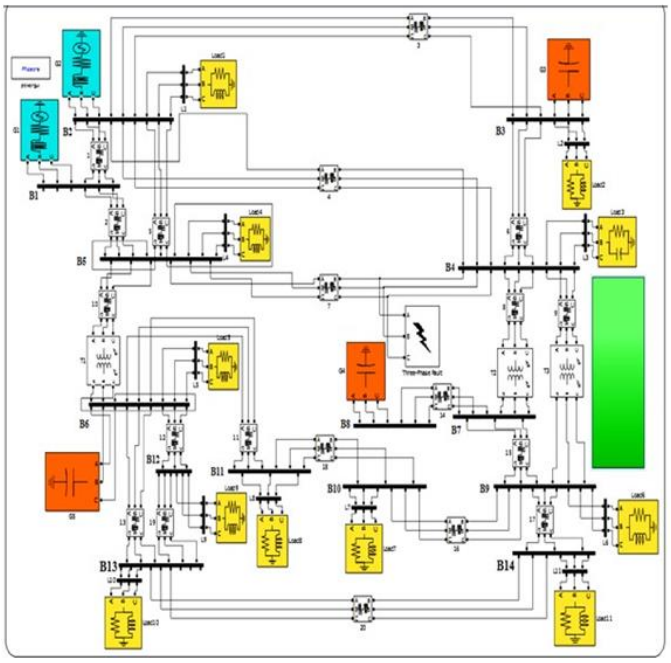

Figure 3 IEEE 14 bus system with Three phase fault.

Three phase fault created in between bus 4 and bus 5 for time duration of 10.00 to 10.05sec.

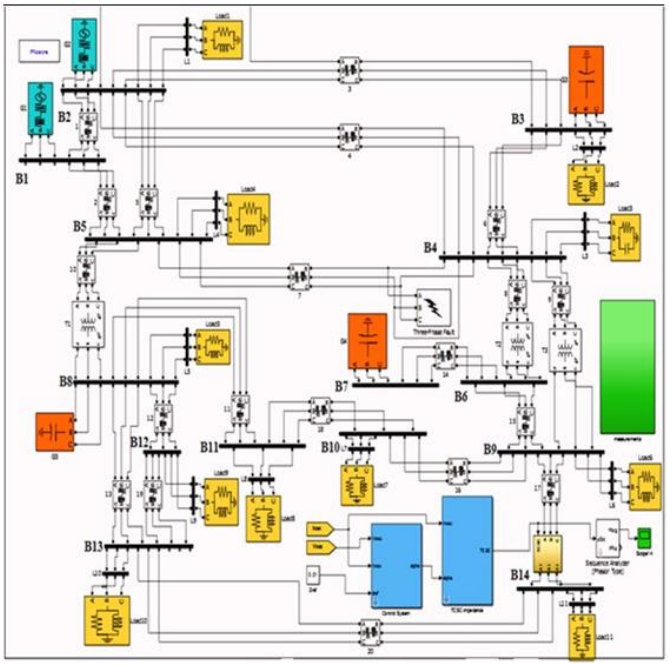

Figure 4: IEEE 14 bus system with Three phase fault with TCSC

Whenever fault occur in power system then TCSC improve the voltage stability and control the power flow in power system network.

Results and Analysis

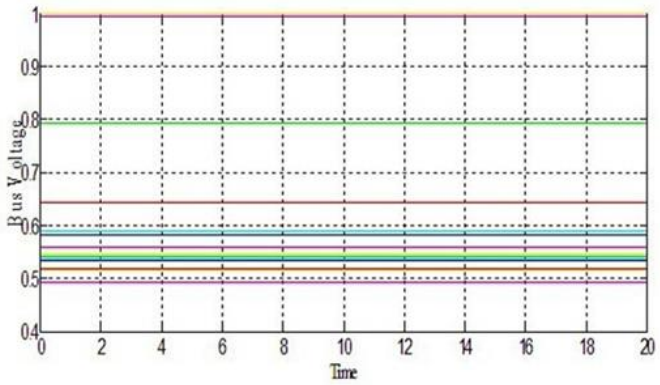

Fig.5 Simulation Result of IEEE 14 bus voltage

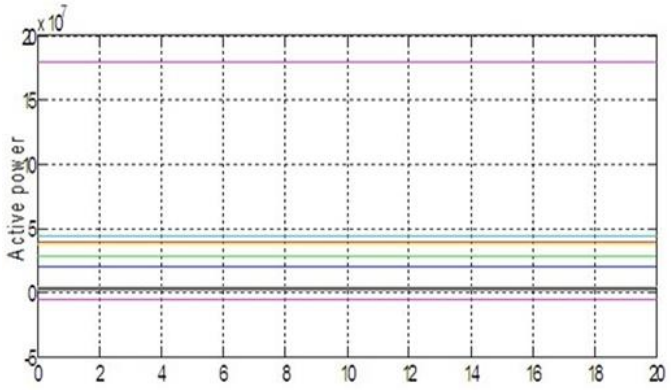

Figure 6: Simulation Result of Active power

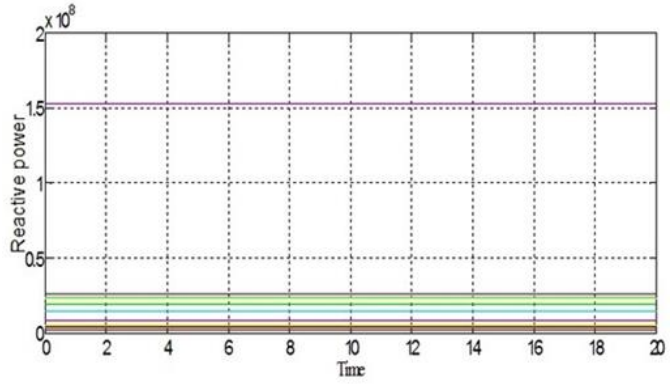

Figure 7 Simulation Result of Reactive power

Comparison Chart:

S.N.	Bus Voltage	Bus voltage without TCSCin P.U.	Bus voltage w TCSC in P.U
1	V1	0.9999	0.9989
2	V2	0.9937	0.9922
3	V3	0.5895	0.9809
4	V4	0.6437	0.9761
5	V5	0.7932	0.9795
6	V6	0.5833	0.9513
7	V7	0.5466	0.9865
8	V8	0.561	0.992
9	V9	0.5361	0.9468
10	V10	0.5183	0.9434
11	V11	0.5421	0.9458
12	V12	0.5354	0.9453
13	V13	0.5168	0.9434
14	V14	0.4933	0.9387

Conclusion

In this paper IEEE 14 bus system with 3 phase fault observe and TCSC FACTS controller is use to limit the fault and improve the voltage stability and power flow control in power system network. We reach at the conclusion that TCSC is one of the fast acting power electronic controller which can provide a smoothly variable series capacitive reactance. This is a new approach 14 bus system with TCSC to improve the voltage stability, limit fault and power flow control in power system network. IEEE 14 bus system with and without TCSC, comparative result and simulation result waveform show that, using TCSC we can improve the voltage stability and power flow control in power system network.and also limit the three phasefault

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