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# 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, Voltage Instability,Problem Statement***

## 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 . Literature Survey

1.Optimal placement of custom power devices in power systemto mitigate voltage sag underfault.
D. K. Tanti , M. K. Varma, Brijesh singh , O. N. Mehrotra, attempts
to summarize the placement of custom power devices may prove an effective remedy for solving power system problem. In this paper,an Artificial Neural Network (ANN) based approach for optimal placement of Distribution Static Synchronous Compensator (DSTATCOM),Dynamic Voltage Restorer (DVR) and Unified Power Quality Conditioner (UPQC) ina power system network has been considered to mitigate voltage sag under faults. A comparative performance of DSTATCOM, DVR and UPQC in voltage sagmitigation has been studied to select most effective controller out of three controllers for the system[2].

2. Voltage stability improvement using Thyristor controlled series capacitor (TCSC) based on Lmn and VCPI stability indices.
Venu Yarlagadda ,Dr. B.V. Sankar Ram, Dr K.R.M. Rao show the
effect of TCSC on voltage stability improvement. The voltage Lmn and VCPI Indices with and without TCSC have been recorded[3].

3. Comparison of thyristor controlled series capacitor and discrete PWM generator e reduction of voltagesag.
Manisha chadar A method to reduce voltage sag andincrease
the voltage quality using series compensation is considered. Discrete PWM generator six pulse base TCSC series compensator and firing angle through TCSC controller system is used to reduce the voltages ag produce by non linear load.

Result in simulink output waveform show that firing angle TCSC control system is more effective compare to PWM generator six pulse controlled system[4].

4. Power flow control using TCSC Facts controller.

According to shrawan Ram and G. K. Joshi thyristor controlled series capacitor is one of the fast acting power electronics controller which can provide current and power flow control in transmission line by varying its firing angle [5].

5. Analytical Modeling of TCSCDynamics

D. Jovcic member IEEE and G. N.Pillai they are simplified fundamental frequency model of TCSC is proposed and the model result are verified. Using frequency response of the non linear load TCSC segment a simplified non linear state space model is derived, where the frequency of the dominant TCSC complex poles show linear dependent on the firing angle [6].

## 3. Problem Statement

In recent years, along with the rapid increasing electric power requirement, the reconstruction of India's urban and rural power network is more and more urgent. There will be huge demand for reactive power compensation to improve the efficiency and stability of AC transmission systems during transmission upgrade process. Given a profit-driven, deregulated electric power industry coupled with increased load growth, the power transmission infrastructure is being stressed to its upper operating limits to achieve maximum economic returns to both generator and transmission system owners. In such an environment, system stability problems such as inadequate voltage Control and fast regulation must be resolved in the cost-effective manner to improve overall grid security and reliability.

## 3. Voltage Instability

From Voltage instability is basically caused by an unavailability of reactive power support in an area of the network, where the voltage drops uncontrollable. Lack of reactive power may essentially have two origins : firstly, a gradual increase of power demands without the reactive part being met in some buses or secondly, a sudden change in the network topology redirecting the power flows in such a way that the required reactive power cannot be delivered to some buses. Introducing FACTS devices is the most effective way for utilities to improve the voltage profile and voltage stability margin of the system.

## 4. Power FlowProblem

In Modern electric power utilities are facing many challenges due to ever-increasing complexity in their operation and structure. In the recent past, one of the problems that got wide attention is the power system instabilities. With the lack of new generation and transmission facilities and over exploitation of the existing facilities geared by increase in load demand make these types of problems more imminent in modern power systems. Demand of electrical power is continuously rising at a very high rate due to rapid industrial development. To meet this demand, it is essential to raise the transmitted power along with the existing transmission facilities The need for the power flow control in electrical power systems is thus evident with the increased loading transmission lines; The problem of transient stability after a major fault can become a transmission power limiting factor. The power system should adapt to momentary system conditions, in other words, power system should be flexible

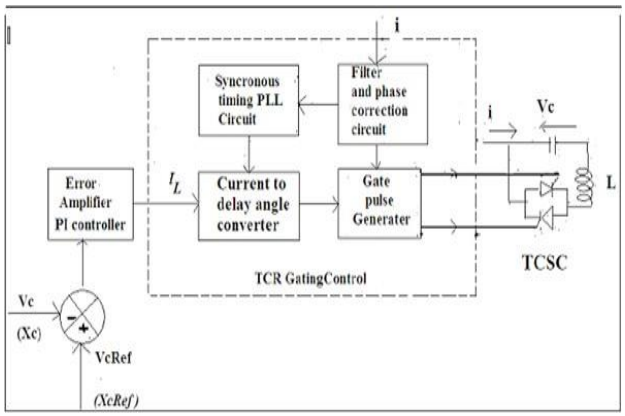


*Fig: A functional internal control scheme for the TCSC based on the synchronization to the fundamental component of the line current*

### *Conclusion*

The aforementioned benefits are typically seen to increase transmission lines capacity. Benefits of TCSC are not subject only to newly built TCSC installation but they can also be achieved by upgrading existing series compensation on the thyristors controlled series compensation or only its part, thus considerably extended its influence and usefulness.

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