Three Phase Fault Analysis Using Simulink

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Abstract: Fault in a power network is any failure which interferes with the normal operation of the system. The normal operation of the power system at steady state is affected, sometimes dramatically, by the occurrence of such disturbances as overloads and short circuits. Electrical fault can also be defined as the deviation of voltages and currents from nominal values or states. Under normal operating conditions, power system equipment or lines carry normal voltages and currents which results in a safer operation of the system. The flow of current to the undesired path and the abnormal stoppage of the currents are termed as faults in the power system. Electrical networks, machines and equipments are often subjected to various types of faults while they are in operation. Here, we are trying to make a SIMULINK based model that is used to analyze the three-phase transient fault in the transmission line [1], [2], [3]. When a fault occurs, it causes excessively high currents to flow which can cause damage to the equipment such as; transformers, generators, bus bars, etc. and devices in the distribution or transmission section [4], [5].

1. Types of Power System Faults:

Fig. 1: Power System

2. Objectives and approach

This thesis compares and evaluation fault analysis. The purpose of this thesis is to examine the effect of fault on transmission grid overhead lines and its parameter like voltages, current. Different type of algorithm will be verified in Simulink and be implemented to the transmission line analyses of different known fault cases. The project will be divided into different work packages with main focus on implementation, verification, testing and benchmarking of algorithms for getting the effect of fault on voltages, current etc.

In this paper, it has been discussed how to analyze the three-phase transient fault in the transmission section and for this MATLAB simulation is used, which will show how the three-phase fault occurs in the transmission system and what will be the effect on the voltage, current during the fault and after the fault condition.

The principle reason for this paper is to study the general fault types which are balance and 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 is procedure includes the frequency information in dynamical models and produces approximate non linear models that are well adopted for analysis and simulation.
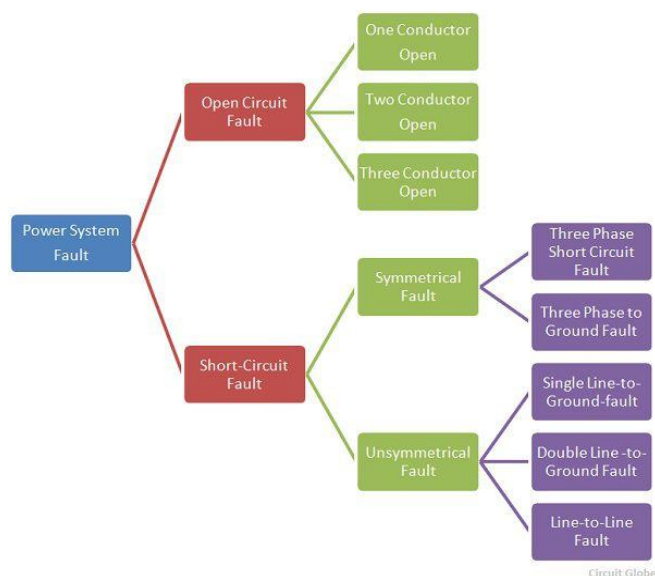
3. Methodology:

Lattice research facility is a multi-world view numerical registering environment and fourth era programming dialect created by Math-Works, MATLAB permits grid controls, plotting of capacities and information, execution of calculations, sure of UIs and interfacing with projects written in different dialects. In spite of the fact that MATLAB is proposed fundamentally for numerical registering a discretionary tool compartment utilizes the MuPAD typical processing capacities. An extra bundle, Simulink, includes graphical multi-space recreation and model based plan for dynamic and installed framework. MATLAB clients originate from different foundations of designing, science and financial aspects. MATLAB is broadly utilized as a part of scholarly and research organizations and also mechanical ventures. Additionally MATLAB gives an alluring domain with several dependable and precise inherent capacities.

MATLAB family cooperate with Simulink programming to display electrical, mechanical and control systems[32].A result of The Math-Works, Inc. MATLAB began life as a program intended to perform framework science, yet throughout the

years it has developed into an adaptable processing framework equipped for taking care of basically any specialized issue. MATLAB can control and transform huge frameworks and can be utilized as a part of numerous numerical applications. MATLAB's capacities can be reached out with expansion called SIMULINK, a program which is ordinarily utilized as a part of the investigation and combination of present day systems.

4. Elements of MATLAB Tool Box:

The components of the MATLAB tool stash utilized as a part of the analysis of power systems are, encouraging future amendment and extension of programming. This is imperative for looks into that are intriguing in creating and testing new for different power system applications. It gives a road to effectively get ready information records in ordinarily acknowledged organizations for systems that are made and the outcomes created by one application can be effortlessly utilized either completely or in part by some other application bolstered by the bundle. MATLAB/SIMULINK tool compartment comprises of:

1) Mat Power Tool compartment
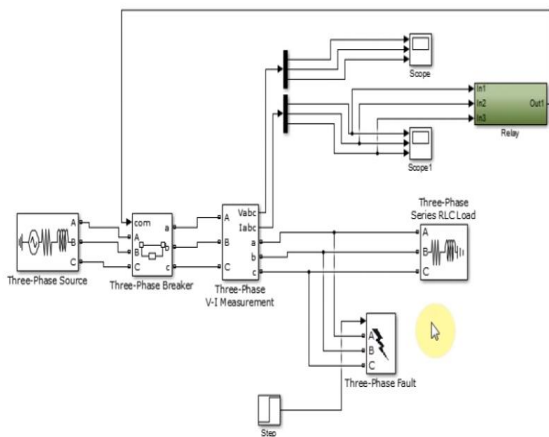2) Power System Analysis Tool kit and
.
3) Voltage Stability Tool kit.
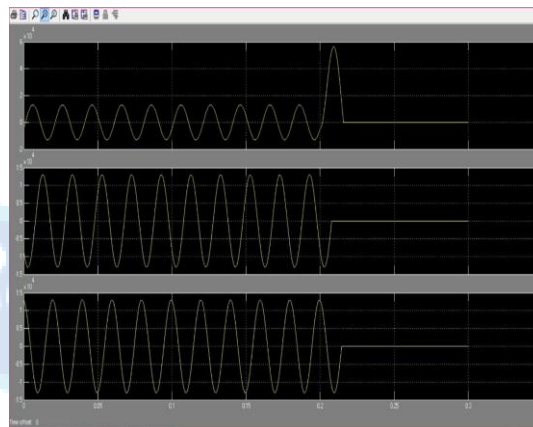

Fig. 2: Simulink Model for 3 Phase Fault Analysis
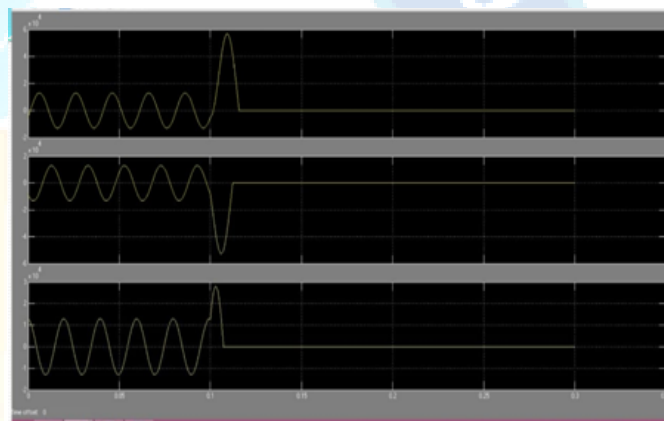

Fig. 3: Output Current Waveform for LL-G Fault

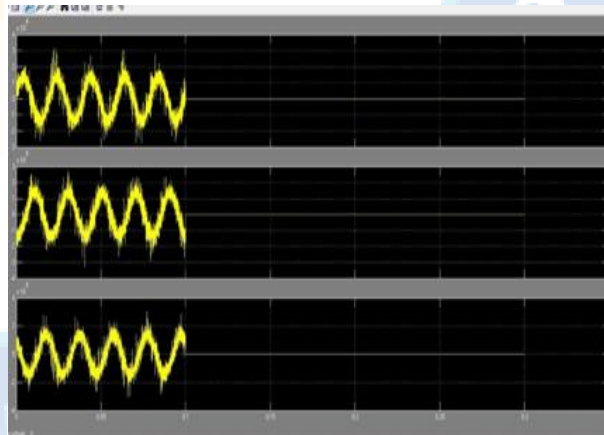**Fig. 4: Three Phase Fault Current Wave Form**

Fig. 5: Three Phase Fault Voltage Waveform

5. Conclusion

The simulation and analysis of three phase fault to achieve results of the transmission line parameter is convenient by using MATLAB software. In this paper simulation of three phase transmission line fault analysis system is proposed.

Single Line to Ground fault, Double Line fault etc in transmission line is also simulated. This system opens the way to redesign the bus system of the power system according to its results. The proposed work can able to implement for a larger power systems geographically apart.

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