THREE PHASE TRANSMISSION LINE FAULT ANALYSIS
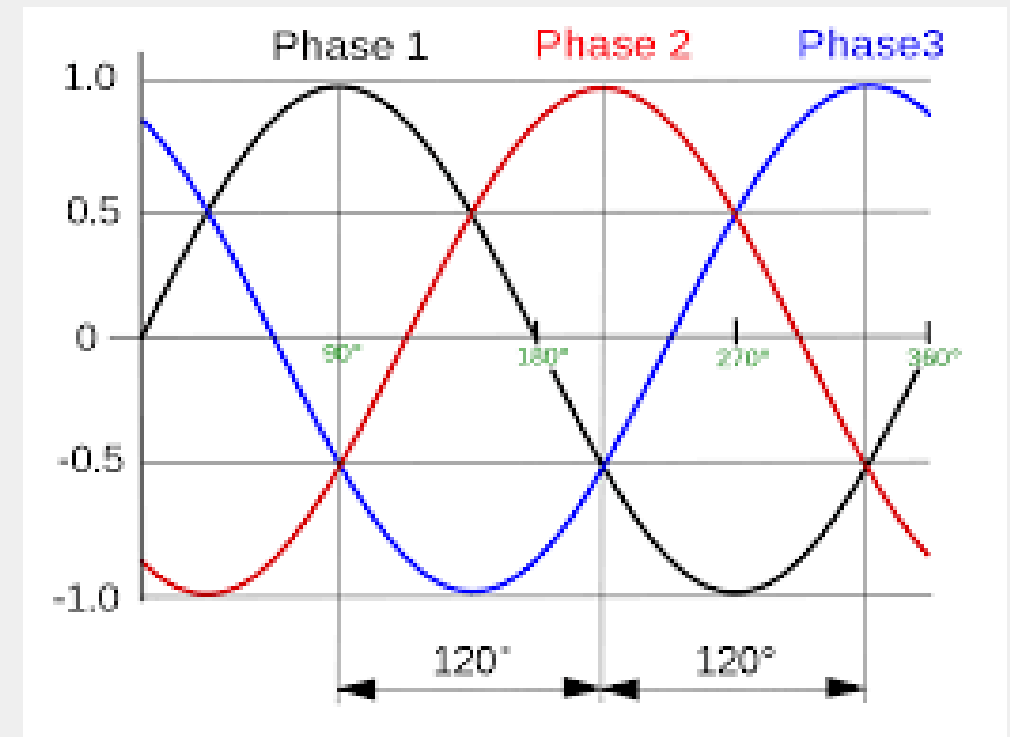
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ABSTRACT

- The main aim of this project is to build up a ***MATLAB based Simulation model*** for 3 phase symmetrical and unsymmetrical faults. This project ways to deal with the MATLAB programming in which transmission line model is composed and different issues has been reenacted utilizing tool compartment. Fault Analysis for different sorts of faults has been done and it's impacts are appeared in simulation output such as *voltage ,current* and *fault current* output in terms of waveforms. By analyzing waveforms we can calculate which fault occurring is maximum and what are the safety measurement that we can include in the power system to overcome this fault.

INTRODUCTION

➢ Now-a-days the demand of electricity or power is increasing day by day this results to transmit 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).** The faults occurring in power systems can be broadly classified into *symmetrical faults* and *unsymmetrical faults*, there is yet another classification of fault types namely, *shunt type* of faults and *series type* of fault ,in this project we are analyzing only shunt type of faults, this shunt type of fault involve short circuit between the conductors and or between conductor and ground . They are characterized by increases in current and fall in voltage and frequency in faulted phase. The different kinds of shunt faults are single line to ground fault ,double line to ground fault and three line to ground fault . The study of these faults are necessary to ensure that reliability and stability of the power system.
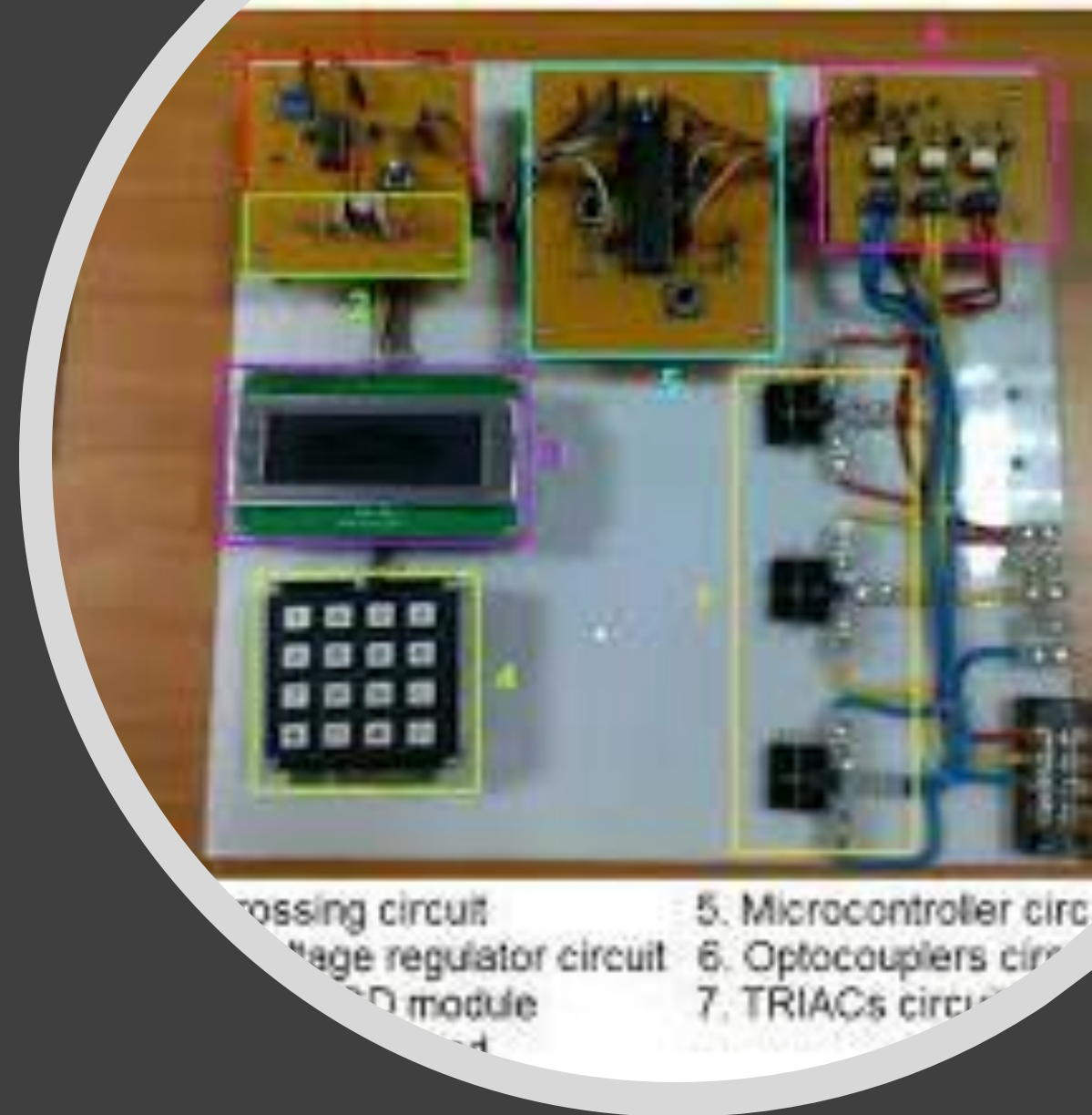
TRANSMISSION LINE FAULTS

- In three-phase transmission line of power system mainly there are two types of faults hich occurs

- **Balance** fault- also called *symmetrical fault*

- **Unbalanced** fault – also called *unsymmetrical fault*

- In our project we are talking about unsymmetrical fault – it mainly occur in between two or three conductors of three phase system or some time between the conductor and groud.

- Contingent on this the unsymmetrical faults can be characterized into fundamental three sorts:-

- *Single Line to Ground fault.*

- *Double Line fault.*

- *Double Line to Ground fault.*

- *Three Line to Ground fault.*

- The *frequency of occurrence* of the single line to ground fault is more in the three phase system followed by the L-L fault, 2L-G fault and three phase fault.
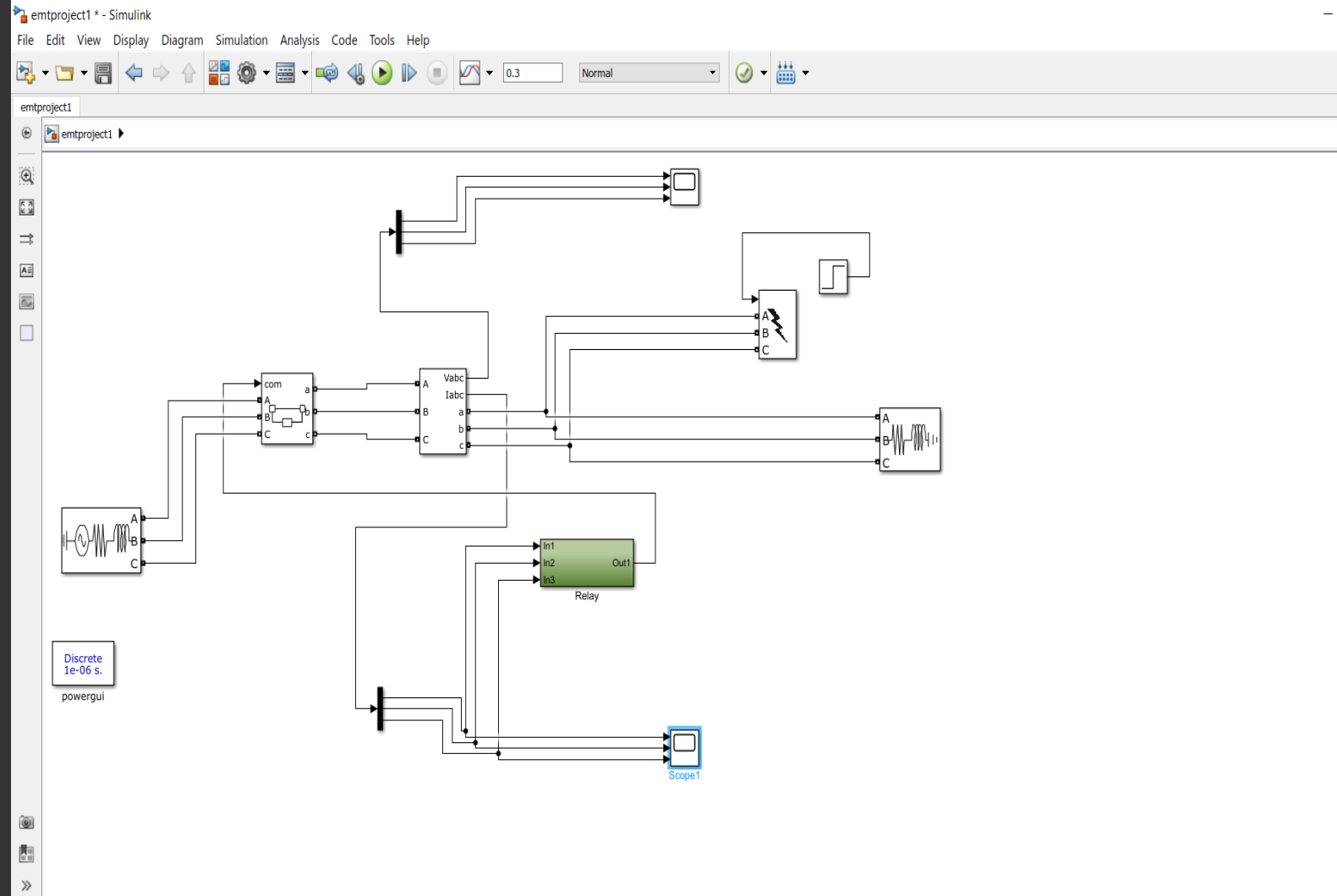
Components

- Three phase source
- Three phase breaker
- Three phase v-i measurement
- Three phase fault
- Three phase series RLC load
- Step
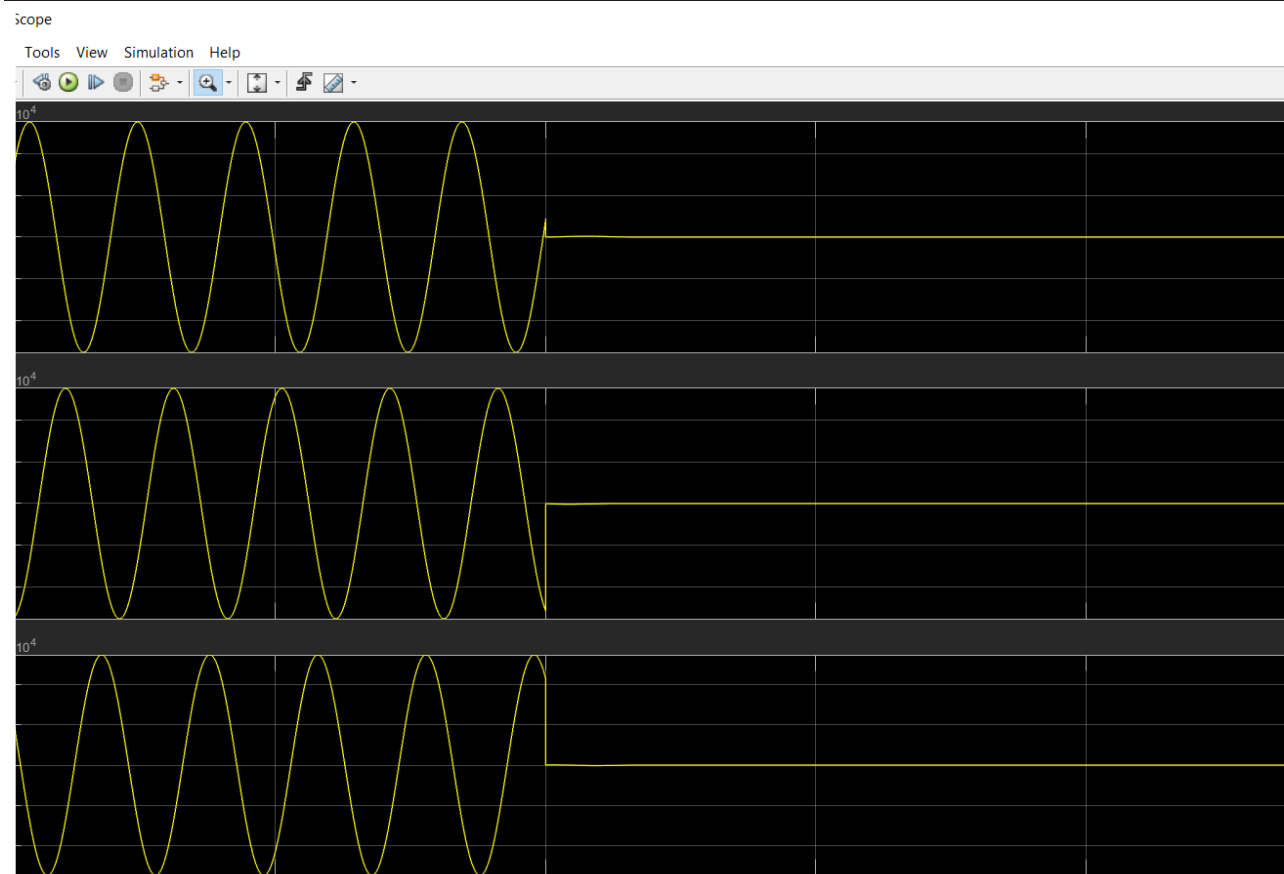- Scope
- Demux
- Powergui

Simulation Model

Relay

- A standout amongst the most vital segments of a power protection system is the relay which is a gadget that treks the circuit breakers when the information voltage and current signs relate to the fault conditions intended for the relay operation.

- Over the years the relay technology has developed and the classification based on generations is as follows:

- 1. Electromechanical Relays: They are the first generation of relays. They use the principle of electromechanical conversion. They are rugged & immune to electromagnetic interference. But with recent advancements, they have been turned obsolete in most areas.

- 2. Solid State Relay: They make use of transistors, op-amps, etc. They are more flexible with a self-check facility, consuming less power and having improved dynamic performance than the electromechanical relays. They also were smaller in size requiring less panel space.

- 3. Numerical Relays: Operation involves Analog to Digital conversion of currents and voltages, which are acquired from the CTs and VT which is fed to the DSP or microprocessor. These signals are then processed using the protection algorithms and the necessary decisions are taken.

- The advantages of a Numerical Relay are:

- High flexibility. ⦿ Multiple functionalities.

- Self-checking and communication facility.

- Can be adaptive

Relay Simulation Model
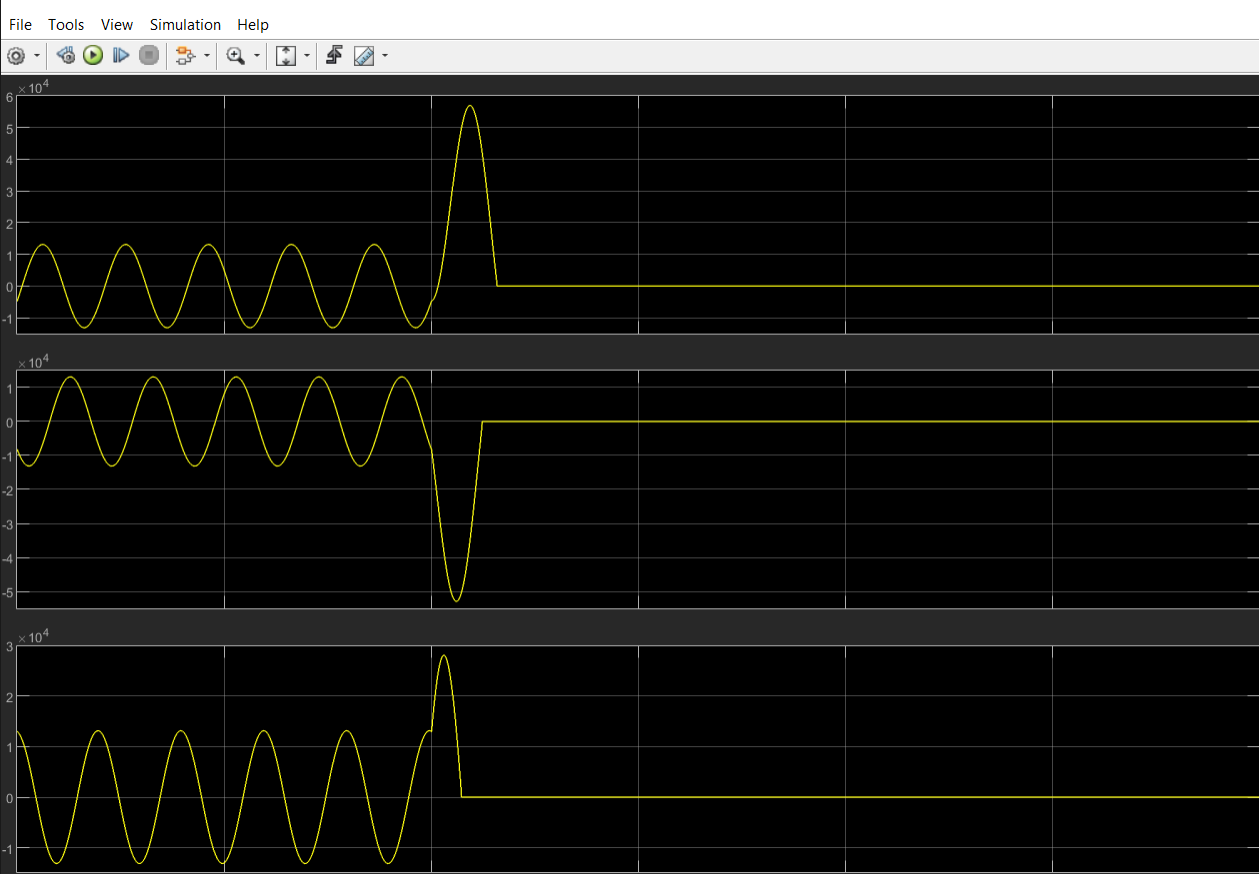
Scope Outputs

References
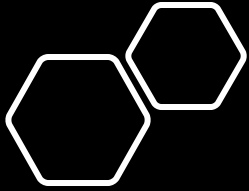
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Contribution

Anshul (2K19/EC/022)

- MATLAB Simulink

- Basics of three phase system and transmission line faults

- Designed the basic diagram of simulation model

- Verified the output plots

- Preparation of Project Report

Abhay Lakhotra (2K19/EC/006)

- MATLAB Simulink

- Basics of three phase system and transmission line faults

- Performed the simulation model and resolved the errors

- Verified the output plots

- Preparation of PPT