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SIMULINK FOR MONITORING A FAULT-STATE SYSTEM

Siddhant Yadav[1], Rupesh Kumar Sahu[2], Pratiksha Nirala[3], Mohini Moitra[4]

[123]UG Student, Department of Electrical & Electronics Engineering, CEC Bilaspur, Chhattisgarh, India
[4]Assistant Professor, Department of Electrical & Electronics Engineering, CEC Bilaspur, Chhattisgarh, India

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Abstract - *The main objective of the research project is to create a simulation model for three-phase symmetrical (Triple Line to Ground) and asymmetrical (Single Line Fault, Double Line Fault) analysis using MATLAB. These faults, which include single-line-to-ground, double-line-to-ground, triple-line-to-ground, and line-to-line faults, typically occur in long transmission line systems. Several fault types are analyzed and the results are shown in the simulation output, such as voltage and current. This study examines the MATLAB program used to simulate transmission line modalities.*

Key Words: *Line to line fault, Line to ground fault, Double line to ground fault, symmetrical and asymmetrical faults, MATLAB software*

1. INTRODUCTION

Fault analysis is helpful in determining the machine voltage and line current when colourful faults do in the system. The terms" line voltage" and" line current" are pivotal when dealing with an electrical system. There are substantially two types of faults in the electrical system. A symmetrical fault is the first type and an asymmetrical fault is the alternate, similar as a single line- to- ground fault, a line- to- ground fault, a double line- to- ground fault, or a two- line fault (1). assaying power line faults is important from the point of view of electrical system protection. We use a three- line circuit swell and relay system to cover the electrical system.

1.1 Asymmetrical Fault

These are veritably common and less serious than symmetrical faults. These faults are generally known as three types videlicet single-phase earth fault also known as LG fault, two phase short to each other and current fault also known as line to line (L- L), two phase earth fault also known as double line. to ground (L- L- G) blights. Line- to-earth fault is the most common fault and 64- 69 of faults are of this type. This causes the line to communicate earth or ground. 14- 20 percent of faults are double lines to base and beget two cables to communicate ground. Line- to-line faults do when two cables meet, substantially due to line swinging caused by winds, and 5- 10 percent of faults are of this type.

1.2 Symmetrical Fault

A symmetrical fault is one that affects every phase while keeping the system in balance. A symmetrical fault is one that occurs in three phases. These three fault types are appertained to as unsymmetrical or asymmetrical faults line to base, line to line, and two-line to ground. Symmetrical faults can be examined using per-phase analysis since they produce balanced conditions.

2. CAUSE OF ELECTRICAL FAULT

There Are Several Reason of Electrical Fault -

• Short Circuits Equipment damage and system dislocation can affect from the creation of a low- resistance route that allows inordinate current inflow.

• Voltage Unbalance Considerable variability in phase voltages may affect in outfit imbalance and possible malfunctions.

• Challenges with Grounding Wrong or shy grounding ways could contribute to crimes.

• Environmental Factors Lightning strikes and other rainfall- related events can beget faults in outfit and lines of electricity.

3. OUTCOME OF ELECTRICAL FAULT

Power outages, outfit damage, fires, and short circuits are just a many of the issues that can affect from electrical failures. They might be the consequence of effects like damaged sequestration, imperfect wiring, or broken outfit. These troubles can be reduced with routine examinations and proper conservation.

4. CIRCUIT AND DESCREPTION

Fig. 1 illustrates how the simulation of different faults is enforced using a simulation model created in the MATLAB software exercising the Sim Power System. It consists of one three- phase source along with one two- winding three- phase motor. One three- phase VI dimension and one R- L cargo is also connected to each other by a transmission line. Three- phase faults do between the three- phase VI dimension and the motor line for voltage and current fault measuring purposes. compass connected

for voltage and current waveform measuring purpose. One Step function is also use who's

One of MATLAB's most helpful functions for control design is the step function.

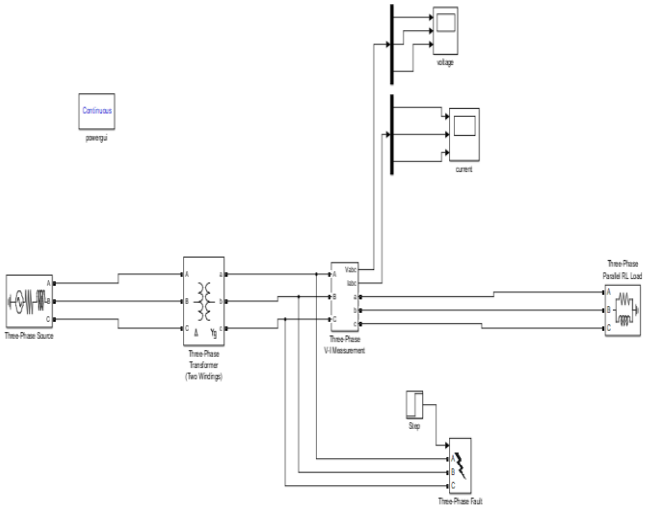

Fig -1: Representation of Transmission line modal for Fault monitoring

5. SIMULATION RESULT

5.1 Under Non-Faulty Condition

All three phases have sinusoidal voltage and sinusoidal current while the system is in a Non faulty state, meaning that no faults are present in any of the lines. The voltage and current waveforms of a Non faulty system are displayed in numbers 2 and 3, independently. Every one of the three stages is in balance.

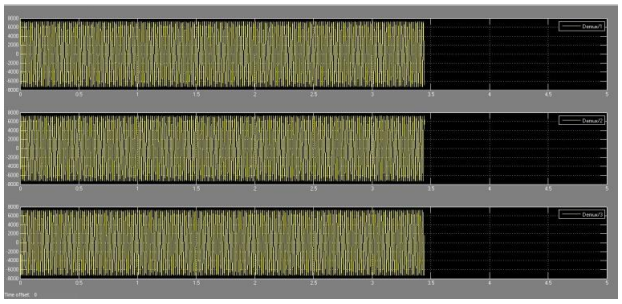

Fig -5.1(a): Voltage Waveform

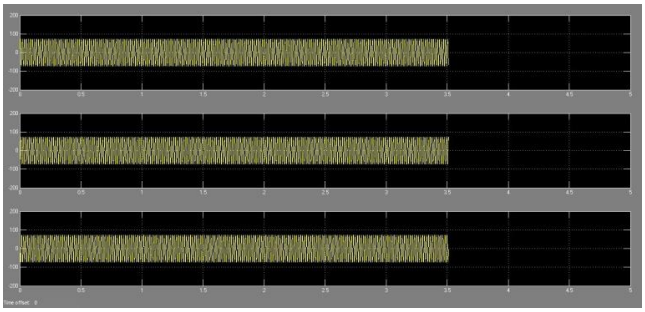

Fig –5.1(b): Current Waveform

5.2 Cause of Symmetrical Fault on voltage and current

5.2.1 L-L-L-G Fault

Figures 5.2.1(a) and 5.2.1(b) display the voltage and current waveforms during a triple-line fault in the system. At the fault occurrence at 0.1 seconds, all phase voltages swiftly plummet to zero, while the system's current experiences a substantial surge, peaking at 200A.

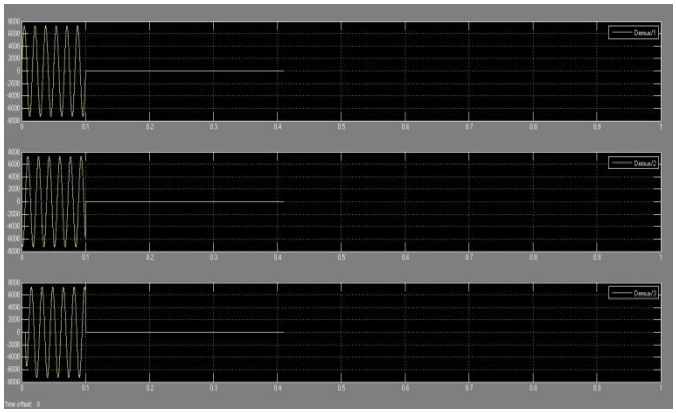

Fig -5.2.1(a): Voltage Waveform

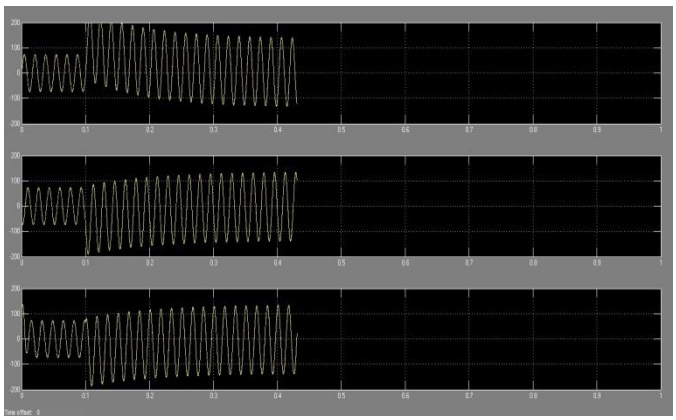

Fig -5.2.1(b): Current Waveform

5.3 Cause of Asymmetrical Fault on voltage and current

5.3.1 S-L-G Fault

In Figures 5.3.1(a) and 5.3.1(b), the voltage and current waveforms depict a single-line to ground fault in the system, specifically in phase A. At the fault instance at 0.1 seconds, the phase A voltage swiftly drops to zero, accompanied by a significant surge in the current of line A, reaching a peak of 200A.

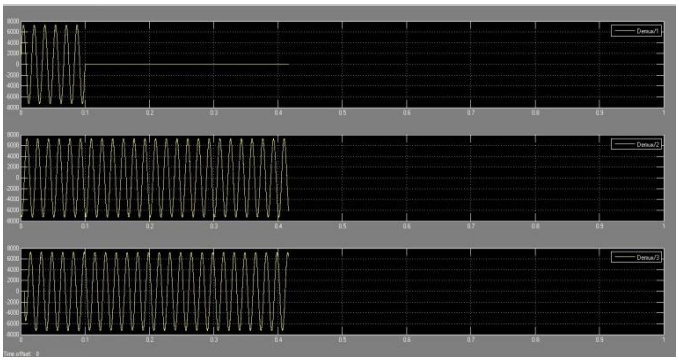

Fig -5.3.1(a): Voltage Waveform

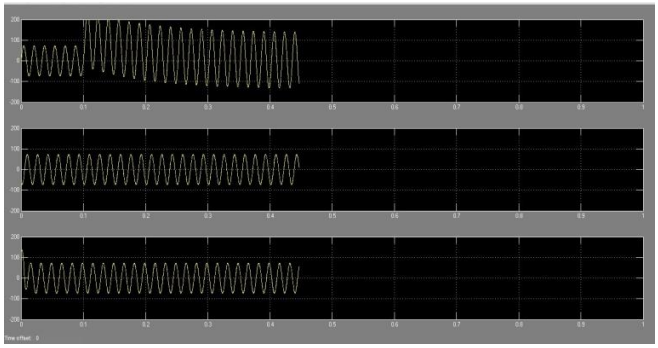

Fig -5.3.1(b): Current Waveform

5.3.2 L-L-G Fault

Figures 5.3.2(a) and Fig -5.3.2(b) illustrate voltage and current waveforms portraying a double-line to ground fault in the system, affecting phases A and B. At the fault occurrence at 0.1 seconds, both phase A and B voltages rapidly decrease to zero. Simultaneously, there is a notable increase in the current of lines A and B, peaking at 200A.

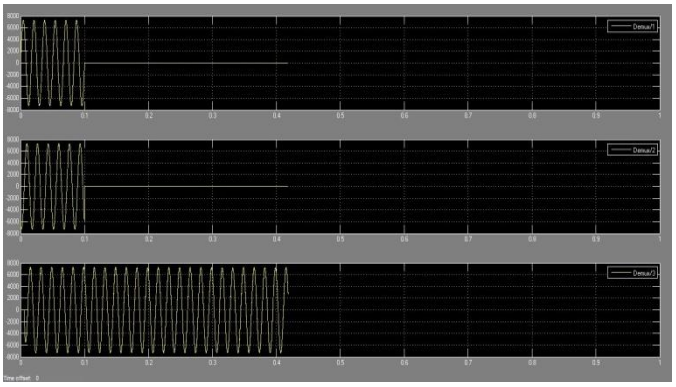

Fig -5.3.2(a): Voltage Waveform

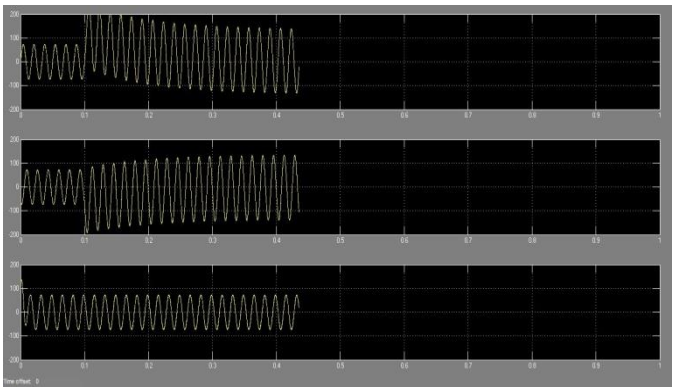

Fig -5.3.2(b): Current Waveform

6. CONCLUSIONS

A simulation study using MATLAB is conducted to examine the different kinds of symmetrical and asymmetrical faults that can arise in the transmission line. Using the circuit swell, you can in the healthy system, increase and drop the impact of a fault. It has been dissembled how different fault types, similar as single line to base, double line to base, three phase, and line to line, affect the voltage and current waveforms on the cargo side both during and after the fault. The theoretical aspects are vindicated by this simulation disquisition.

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