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Analysis of Transmission Line Using Impedance Parameter under Fault Condition Using MATLAB

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Abstract: **Digital relays can more precisely and economically manage system protection, coordination and communication as compared to traditional analog electrical-mechanical relays. The digital relay is a multifunctional device using numerical algorithms. Digital relaying compared to static relays, digital relays introduce Analogue to digital convertor (A/D conversion) of all measured analogue quantities and use the discrete Fourier transform (DFT) to implement the algorithm. Involves digital processing of one or more analog signals in three steps conversion of analogue signal to digital form,Processing of digital form, Boolean decision to trip or not to trip.Advantage of digital relayHigh level of functionality integration, Additional monitoring functions, Functional flexibility, Capable of working under a wide range of temperatures, They can implement more complex function and are generally more accurateSelf-checking and self-adaptability. The more detailed factors for transmission line protection directlyaddress dependability and security for a specific application. The protection system selected should provide redundancy to limit the impact of device failure, and backup protection to ensure dependability. Reclosing may be applied to keep the line in service for temporary faults, such as lightning strikes. A digital relay also estimates the electrical distance to the fault and compares the result with a given threshold, which determines the protection zone. the faulty line of the parallel communication is estimated By comparing the magnitudes of currents in the Corresponding phases, the relay should be able to detect the faulted line correctly.[1][2]**

Key words: - **Fault condition, transmission lines, Impedance Parameter.**

I. INTRODUCTION

Transmission lines are a vital part of the electrical distribution system, as they provide the path to transfer power between generation and load. Transmission lines operate at voltage levels from 69kV to 765kV, and are ideally tightly interconnected for reliable operation. Factors like de-regulated market environment, economics, right of-way clearance and environmental requirements have pushed utilities to operate transmission lines close to their operating limits. Any fault, if not detected and isolated quickly will cascade into a system wide disturbance causing widespread outages for a tightly interconnected system operating close to its limits. Transmission protection systems are designed to identify the location of faults and isolate only the faulted section.The key challenge to the transmission line protection lies in reliably detecting and isolating faults compromising the security of the system Distance relaying principle, due to their high speed fault clearance compared with the over current relays is a widely used protective scheme for the protection of high and extra high voltage (EHV) transmission and sub-transmission lines. A distance Relay estimates the electrical distance to the fault and compares the result with a given threshold, which determines the protection zone. In terms of hardware, distance relays have evolved from electromechanical relays to static relays and to digital relays. When a fault occurs in an electrical transmission line, the distance relays detect the faulty line and type of fault but they may under reach/over reach depending upon pre-fault loading, fault resistance and remote end in-feeds. The impedance estimated by a digital distance relay reduces with the increase in the speed at which the estimate is obtained. A survey of transmission line protection is done through this article. Since the implementation of digital relaying, a lot of work has been done to improve the performance of digital protective relays, but in the context of reformation in the power industry and operation of transmission lines close to the stability limits, new tools and algorithms are needed to maintain system reliability and security within an acceptable level.[2][7]

FAULTS OF TRANSMISSION LINE:

There are two main types of faults:

- Symmetric faults: system remains balanced; these faults are relatively rare, but are the easiest to analyze so we'll consider them first.
- Unsymmetrical faults: system is no longer balanced; Very common, but more difficult to analyze

II. OBJECTIVES AND METHODOLOGY EXISTING SYSTEM

The distance protection is one of the most commonly used techniques in the protection of transmission lines. The basic principle of distance protection involves thedivision of the voltage at the relaying point by the measured current. The apparent impedance socalculated is compared with the reach point impedance. If the measured impedance is less than the reach point impedance, it is assumed that a fault exists on the line between the relay and the reach point the reach point of a relay is the point along the line impedance locus that is intersected by the boundary characteristic of the relay.[5]

III. PROPOSED SYSTEM:

The proposed method is a digital relaying technique, it's not using any complex mathematical, it only operate the relay in the different operating condition [8].Using this proposed method the presence of a fault on one of the parallel lines, a larger part of the current from the source passes along the faulty line, while the healthy line carries a smaller current. By comparing the magnitudes of currents in the Corresponding phases, the relay should be able to detect the faulted line correctly.[3]

IV. OPERATIONAL DIAGRAM:

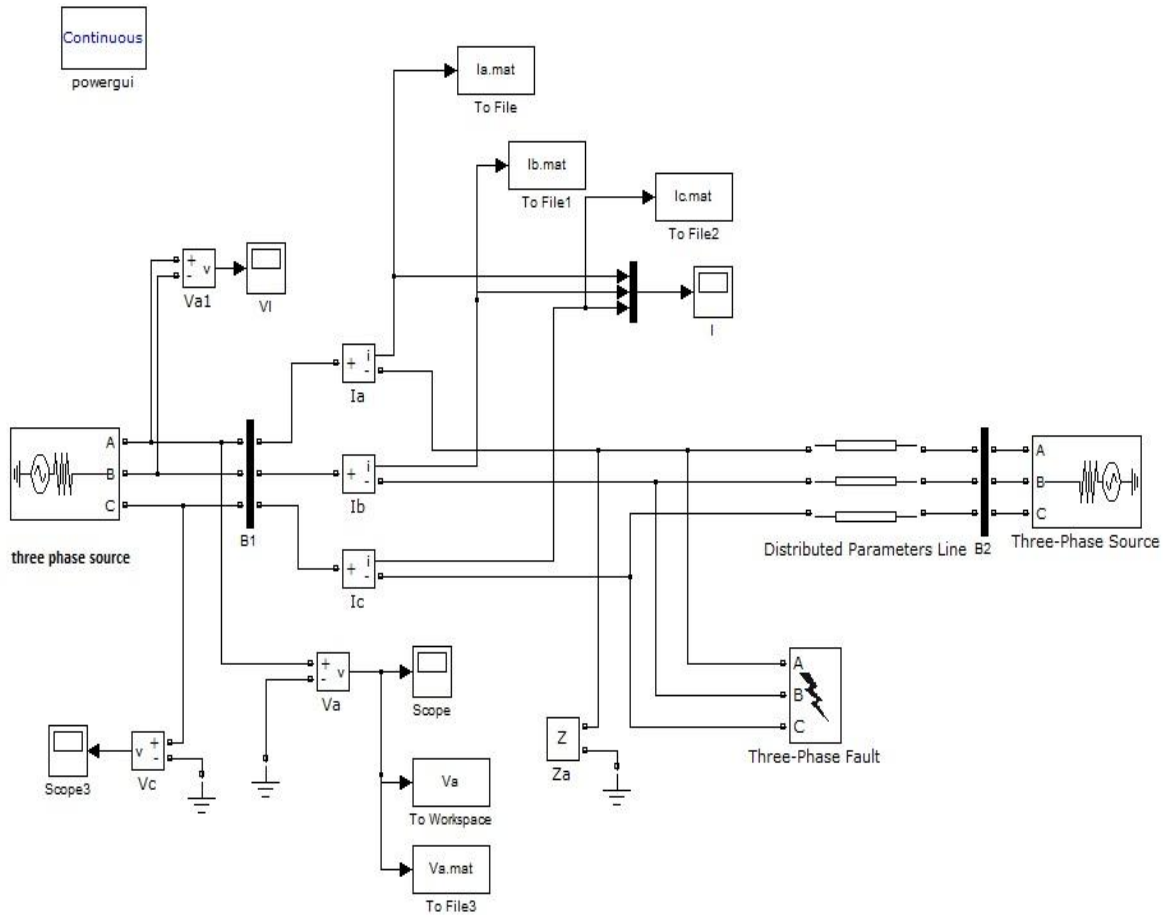

Figure 1

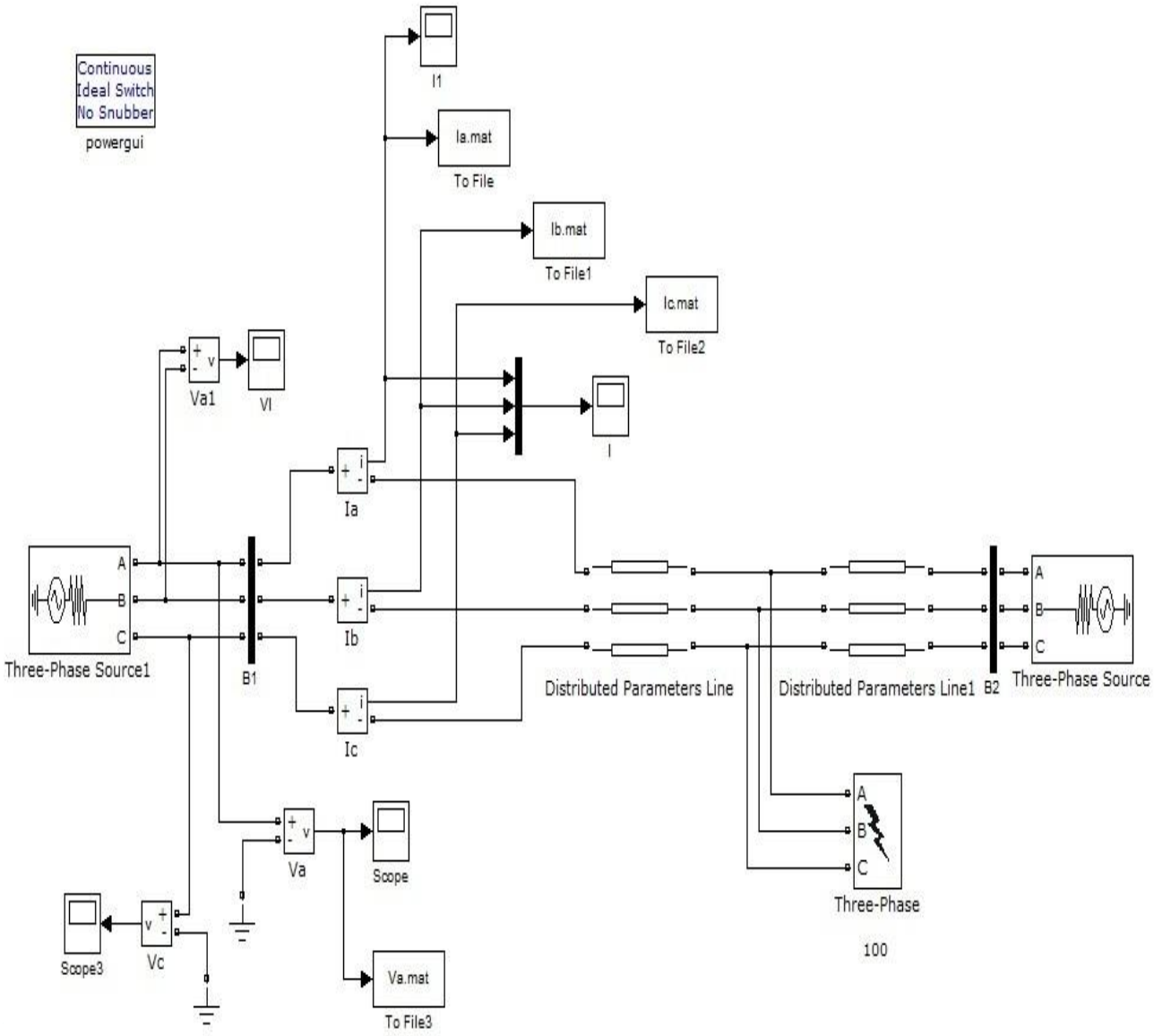

Figure 2

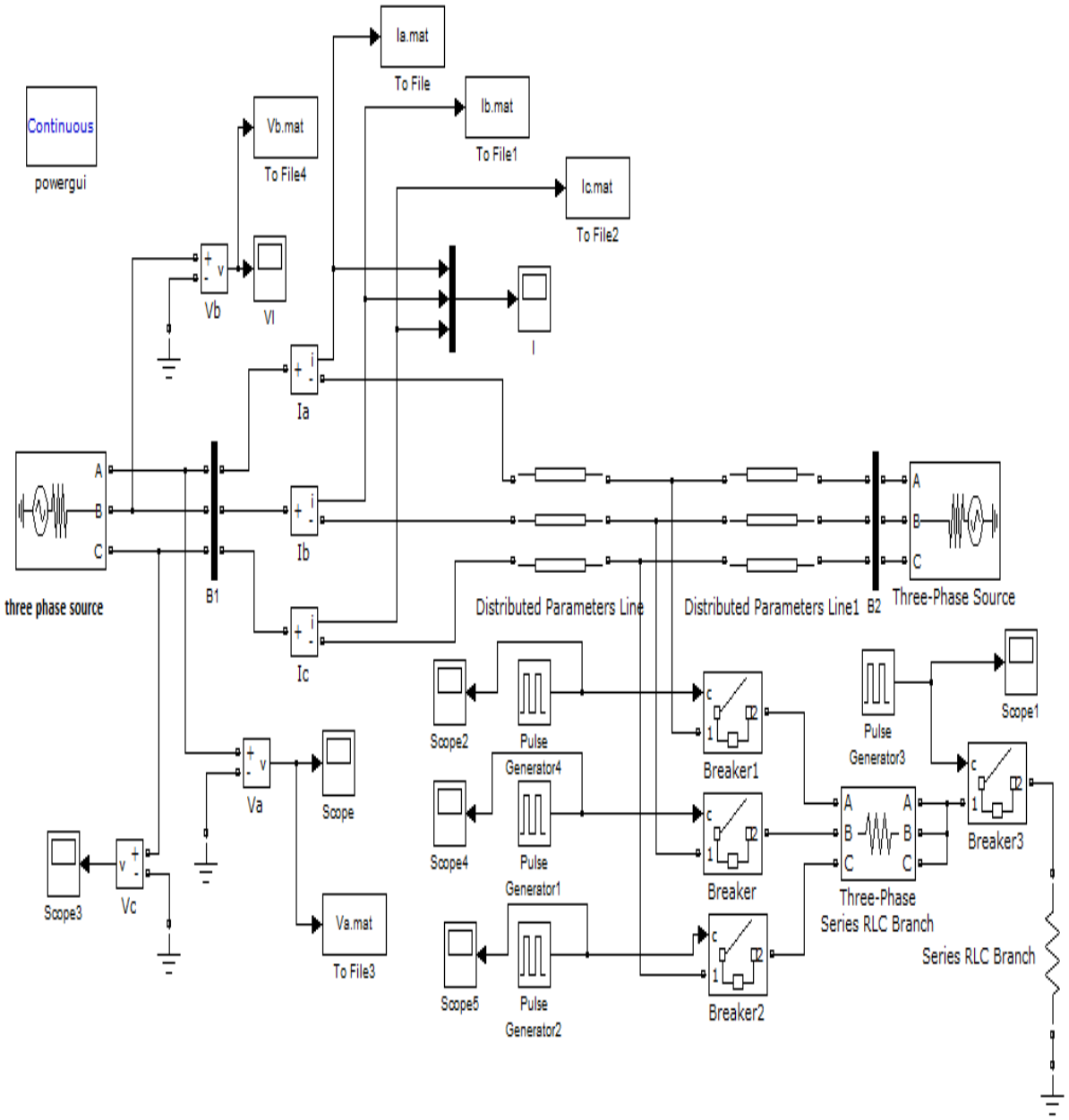

Figure 3

Simulation Environment Settings

	Setting Value
Network area	35×35
Number of mobile nodes	15 to 35
Node transmission range	5-7

V. CONCLUSION:

Using a digital relay at the both end of the parallel transmission line for improving the stability in the transmission line and reducing the power loss. During this protection algorithm fault location of the parallel transmission line can be easily identified, and relays are switched depends up on the range of the frequency level from the receiver side, due to this fault at the receiver side is also reduced, the output of the efficiency in the implementation of the process is simulated by an mat lab

software, comparatively it's got a high performance at the output end.

REFERENCES

[1]. R.O. Berglund, W.A. Mitlelstadt, M.L. Shelton, P. Barkan, G. Dewey, and K.M. Skreiner, "One cycle fault interruption of 500 kV system-benefits and breaker design", IEEE Trans. on Power Apparatus and Systems, Vol. PAS-93(5), 1978, pp. 2104-16.

[2]. Westinghouse Electric Corporation, Applied Protective Relaying, Newark, N.J., 1976.

[3]. M.M. Elkateb and WJ.Cheetham, "Problems in series compensated lines", Proceedings, Second International Conference in Power System Protection, IEE Conference

[4]. W.D. Stanley, "Digital signal processing", Reston Publishing Co. Inc., Reston, Virginia, 1975.

[5]. E.W. Davison, and A. Wright, "Some factors affecting the accuracy of distance-type protection equipment under earth fault conditions", IEE Roc.Vol. 110, no. 9.

[6]. H.W. Dommel, and 1.1. Dommel, " Transient program user manual", Dept. of Electrical Engineering, University of Britch Columbia, Vancouver, B.C., 1987.

[7]. O.P. Malik, *G.S.* Hope, and M.E. Rasmy, "Digital technique for impedance protection of transmission lines", Can. Elec. Eng. J, Vol. 1(4), 1976, pp. 8-12.

[8]. Demetrio's A. Tziouvaras, William D. Hawbaker, "Novel Applications of a Digital Relay with Multiple Setting Groups," 17th Annual Western Protective Relay Conference, Spokane, Washington, October 23-25, 1990.

[9]. Kenneth C. Behrendt, Michael J. Dood, "Substation Relay Data and Communication," 22nd Annual Western Protective Relay Conference, Spokane, Washington, October 24-26, 1995.

[10]. Titarenko and I. Noskelsky, " Protective relaying in electric power systems", Peace publishers, Moscow, second eddition.

[11]. B. R. Andersen and X. Lie "Hybrid HVDC system for power transmission to island networks", IEEE Trans. Power Del., vol. 19, no. 4, pp.1884 -1890 2004.

[12]. Xiaoyao Zhou, Haifeng Wang, R. K. Aggarwal, and Phil Beaumont, " Performance Evaluation of a Distance Relay as Applied to a Transmission System With UPFC," IEEE Trans. Power Del., vol. 21, no. 3, pp. 1137-1147, Jan. 2006.

[13]. D.M. Horan and R. Guinee, "A Novel Pulse Echo Correlation Tool for Transmission Path Testing and Fault Finding using Pseudorandom Binary Sequences", IEEE International Symposium on Defect and Fault Tolerance in VLSI Systems, pp. 229-237, 03-05 Oct. 2005.

[14]. M. Travassosvaldez, c. Machado ferreira, and f. P. M. Barbosa, "electrical engineering teaching and distance learning using a desktop virtual reality system," in power engineering conference (upec), 2013 48th international universities', 2013, pp. 1-4.

[15]. J. Izykowski,, E. Rosolowski, P.Balcerek, M.Fulczyk,, and M.M. Saha, "Accurate noniterative fault location algorithm utilizing two-end unsynchronized measurements," IEEE Trans. on Power Delivery, vol. 25, no. 1, pp. 72-80, Jan. 2010.

[16]. S. Kouro, M. Malinowski, K. Gopakumar, J. Pou, L. Franquelo, B. Wu, J. Rodriguez, M. Perez, and J. Leon, "Recent advances and industrial applications of multilevel converters," Industrial Electronics, IEEE Transactions on, vol. 57, no. 8, pp. 2553-2580, aug. 2010.

[17]. P. K. Dash, A. K. Pradhan, and G. Panda, "A Novel Fuzzy Neural Network Based Distance Relaying Scheme", IEEE Transactions on Power Delivery, Vol. 15, No. 3, July 2000.

[18]. K. R. Padiyar, "FACTS Controller in Power Transmission and Distribution,", New Age International (P) Limited, Publishers, 2007.

