International Journal of Technical Research and Applications e-ISSN: 2320-8163,
www.ijtra.com Volume 4, Issue 3 (May-June, 2016), PP. 232-234

A REVIEW ON ANALYSIS DETECTION AND CLASSIFICATION OF TRANSMISSION LINE FAULTS

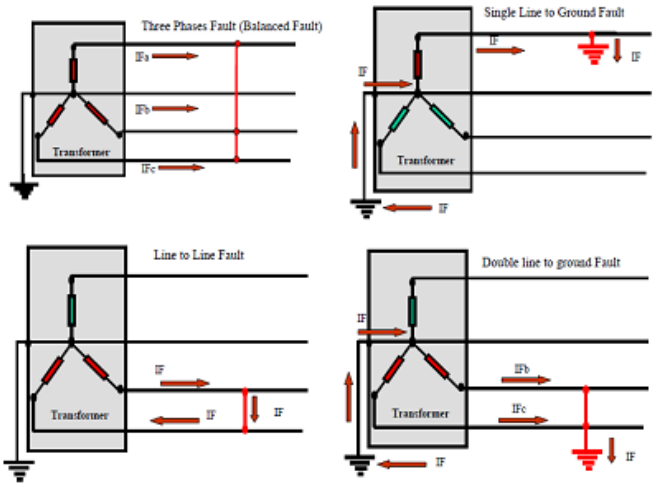
Dhanashri D. Taywade , Professor A.A Ghute

Abstract— **Transmission lines is a vital component that acts as a bridge between the generating stations . Transmission lines are designed to transfer electric power from source locations to distribution networks. However, their lengths are exposed to various faults. Protective relay and fault recorder systems, based on fundamental power frequency signals, are installed to isolate and the faulty line and provide the fault position. However, the error is high especially in transmission lines. The transmission system id to deliver bulk power from power stations to load centers and large industrial consumers beyond the economical service range of the regular primary distribution lines. The transmission lines are very prone and sensitive to all the parameters. So various types of faults occur on the transmission lines whether it is transmission lines or distribution lines.**

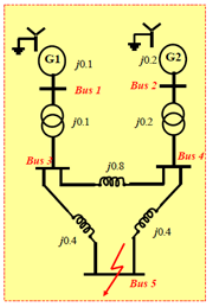
I. INTRODUCTION

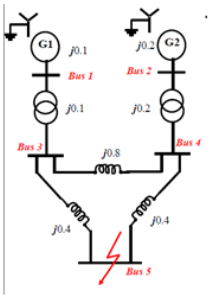
As the demand for power and the generation increases day by day so as the population is expanding in a linear curve, so it is necessary to supply the maximum power with the minimum losses and high stability for securing the stability of the power system. Its is necessary to maintain the constant transmission lines parameters. The most important drawback which decreases the efficiency of transmission lines is the faults. All has to clear as early as possible within short period of time. There are various faults occurring in transmission lines such as L-G, LL-G, LLL, and LLL-G. So it is also important to detect, classify and clear these faults as early as possible. So various techniques along with the switchgears are incorporated in this view. Large amount of advanced techniques for faults analysis, detection, classification, locations has been done and found great accuracy and efficiency.

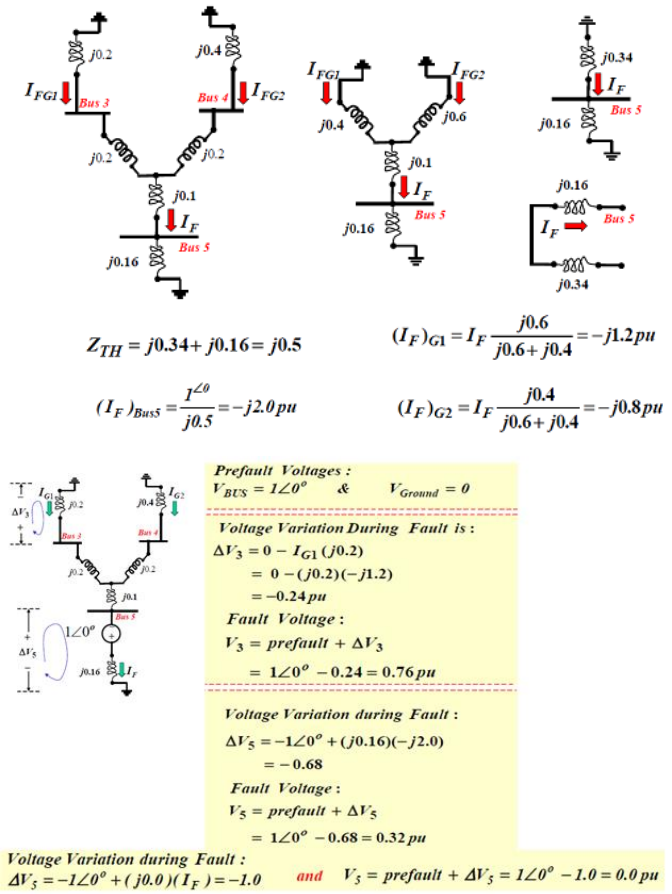
Various Types of faults occurring on transmission lines.



There are various conventional methods for calculation of these faults such as Z-bus matrix method. No doubt there are circuit breakers and relays which comes in the category of switchgears but the major and transient faults cannot be clear. The most important parameter which vary and to be controlled when fault occurs is the fault current .The various mathematical manual methods for calculation of fault current such as Bus impedance matrix and fault current calculation using Z bus.







These techniques found to be complicated for solving large networks of transmission lines and maintaining the parameters of transmission lines which are not constant and calculations becomes difficult as the length of network increases calculation becomes more complex.

Also fault classification and detection is carried out by using various techniques which are advanced and very accurate by means of various software such as Mat lab, PSCAD EMTDC. In this paper we have discussed various techniques for fault classification, location and detection.

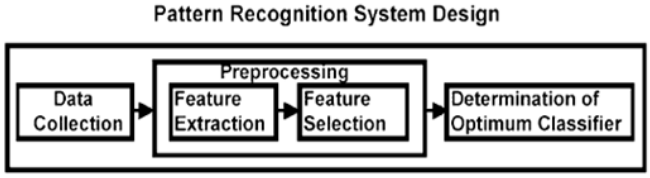
Synchronized Phasor Measurement for fault detection and classification.

This method includes adaptive fault protection scheme for transmission lines using synchronized phasor measurements. The fault detection, direction discrimination, classification, and location. Both fault-detection and fault-location indices are derived by using two-terminal synchronized measurements ,incorporated with distributed line model and modal transformation theory. The fault-detection index is composed of two complex phasors and the angle difference between the two phasors determines whether the fault is internal or external to the protected zone. The fault types can be classified by the modal fault detection index. This scheme also combines online parameter estimation to ensure protection scheme performance and achieve adaptive protection. Extensive simulation studies show that the proposed scheme provides a fast relay response and high accuracy in fault location , classification under various system and fault conditions. The proposed method responds very well with regards to dependability, security, and sensitivity (high-resistance fault coverage).

Wavelet and statistical pattern based high impedance fault detection .

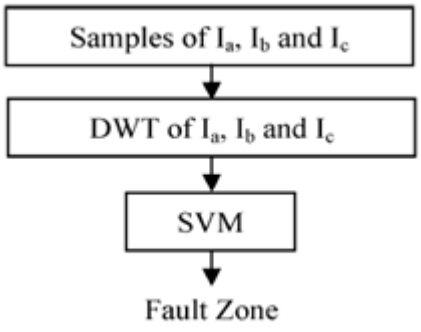
The another method for fault detection and classification based on Wavelet and statistical Pattern Recognition. It's a novel method for high impedance fault (HIF) based on pattern Recognition. The insulator leakage current (ILC) and transients such as capacitor switching load , ground fault , inrush current and no load line switching. Wavelet transform is used for the decomposition of signals and feature extraction , selection component is done by principle component analysis and Baye's classifier but this technique is not so accurate and found problems in result analysis.

Block diagram



Combined SVM – wavelet technique for detection of fault zone.

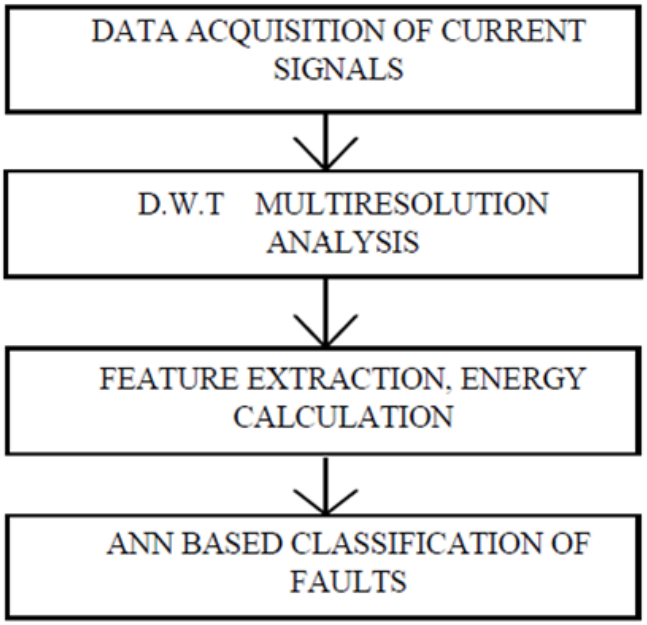
After that a method called SVM technique for a fault zone detection in a series compensated transmission lines is undertaken. This method has a combined wavelet support vector machine (SVM) technique for fault zone identification in high voltage transmission lines we can consider it as series compensated transmission lines. The features of the line currents are extracted using decomposition levels of DWT that is discrete wavelet transform. These features are given as input to SVM for testing and determining the fault zone. This method can detect upto 1000 fault cases with varying fault resistances, inception angles and source impedances. But however this technique is limited upto series compensated lines but not on all categories of transmission lines. So this technique has not found an approach for further research and advancement.



Classification and detection of transmission line Faults using Discrete wavelet transform with combination of ANN.

The most promising and universal method for fault detection , classification and location is the wavelet transform

using ANN. The DWT is a powerful tool for extracting the features of waves using the multiresolution analysis. The wavelet can also identify the very minute disturbances occurring in a normal wave and decompose it to get samples. There is much information in the transient components. So it can be used to identify the abnormality of the equipment or the power system.There are various power wavelets which works in power system and there accuracy and computation time is very less. Also ANN is artificial neural network is the best classifier which works as human brain neurons. It first trains itself with the extracted results by setting the iterations and working on it again and again, and by the hidden layer synthesis get the results at the most accurate level. So the combined wavelet and ANN technique is found to be most world wide for all types power system disturbances whether they can be power quality issues or transmission line faults.



REFERENCES

[1] M. Tarafder Hagh, K. Razi, and H Taghizadeh, "Fault Classification and Location of Power Transmission Lines using Artificial Neural Network ", The 8th International Power Engineering Conference, 1109-1114, 2007

[2] 0. Dag, and C. Ucak, "Fault Classification for Power Distribution Systems via a Combined Wavelet-Neural Approach", IEEE, 1309-1304, 2004.

[3] M.Geethanjali, K.Sathiya priya, "Combined Wavelet Transforms and Neural Network (WNN) based Fault Detection and Classification in Transmission lines", pages 1-7.

[4] M. Kezunovic, L. Rikalo, "Detects and Classify Faults Using Neural Nets", *EEE Compuer Applications in Power*, 4347, Oct. 1996.

[5] K. M. Silva, B. A. Souza, and N. S. D. Brito, ''Fault detection and classification in transmission lines based on wavelet transform and ANN,''

IEEE Trans. Power Del., vol. 21, no. 4, pp. 2058--2063, Oct. 2006.

[6] T. B. Littler and D. J. Morrow, ''Wavelets for the analysis and compression of power system disturbances,'' *IEEE Trans. Power Del.*, vol.

14, no. 2, pp. 358--364, Apr. 1999.

[7] A. M. Gaouda, M. M. A. Salama, M. R. Sultan, and A. Y. Chikhani, ''Power quality detection and classification using wavelet-multiresolution signal decomposition,'' *IEEE Trans. Power Del.*, vol. 14, no. 4, pp. 1469--1476, Oct. 1999.

[8] X. Xu and M. Kezunovic, ''Automated feature extraction from power system transients using wavelet transform,'' in *Proc. Int. Conf. Power*

System Technology, 2002, vol. 4, pp. 1994--1998.

[9] C. L. Tu, W. L. Hwang, and J. Ho, ''Analysis of singularities from modulus maxima of complex wavelets,'' *IEEE Trans. Inf. Theory*, vol. 51, no. 3, pp. 1049--1062, Mar. 2005.

[10] T. Le-Tien, H. Talhami, and D. T. Nguyen, ''Simple algorithm for wavelet maxima modulus extraction in time-scale representations,''

IEEE Electron. Lett., vol. 33, no. 5, pp. 370--371, Feb. 1997.