1. Youssef, O.A.: ‘Fault classification based on wavelet transforms’. IEEE/PES Transmission and Distribution Conf. and Exposition, 2001, pp. 531–536

Youssef O.A.S proposed a method for classifying faults using wavelet transform. Her results shows that proposed algorithm is fast and secure technique for classifying the faults.

1. Lin, W.M., Yang, C.D., Lin, J.H., et al.: ‘A fault classification method by RBF neural network with OLS learning procedure’, IEEE Trans. Power Deliv., 2001, 16, pp. 473–477

W. M. Lin et al proposed radial basis function neural network with OLS learning procedure was used to identify various patterns in voltages and currents. This method used to classify faults on transmission lines.

1. Kashyap, K.H., Shenoy, U.J.: ‘Classification of power system faults using wavelet transforms and probabilistic neural networks’. Proc. 2003 Int. Symp. onCircuits and Systems, 2003, ISCAS’03, 2003, vol. 3, pp. III-423–III-426

Kashyap et al proposed fault classification method based on DWT and probabilistic neural network. Here DWT will decompose transients and then given to neural network to classify the faults.

1. Chanda, D., Kishore, N.K., Sinha, A.K.: ‘A wavelet multiresolution analysis for location of faults on transmission lines’, Int. J. Electr. Power Energy Syst., 2003, 25, pp. 59–69

Chandana et al proposed a method for the fault location identification based on DWT with multiresolution analysis. D-8 wavelet transform is used for the current signals decomposition.

1. Sanaye-Pasand, M., Khorashadi-Zadeh, H.: ‘Transmission line fault detection & phase selection using ANN’, Int. Conf. Power Systems Transients, New Orleans, USA, September 2003, pp. 33–53

Sanaye Prasad et al proposed a novel application of novel application of neural network approach to protection of transmission line is demonstrated. This method uses current signals to find the hidden relationship in input pattern. Fault detection and classification was done within quarter cycle.

1. Pradhan, A.K., Routray, A., Pati, S., et al.: ‘Wavelet fuzzy combined approach for fault classification of a series-compensated transmission line’, IEEE Trans. Power Deliv., 2004, 19, pp. 1612–1618

A K Pradhan et al proposed discrete wavelet transform integrated with a fuzzy logic system is designed for fault classification of a transmission line possessing a series capacitor at the midpoint. The approach uses information obtained from the wavelet decomposition of current signals for faulty phase selection and section identification. Two different FLSs are designed for the two classification objectives in this paper.

1. Khorashadi-Zadeh, H.: ‘Artificial neural network approach to fault classification for double circuit transmission lines’. 2004 IEEE/PES Transmission & Distribution Conf. & Exposition, Latin America, 2004, pp. 859–862

[H. Khorashadi-Zadeh](https://ieeexplore.ieee.org/author/38274590900) et al proposed a novel application of neural network approach to protection of double circuit transmission line is demonstrated. This method uses current signals to train the neural network.

1. Dash, P.K., Samantaray, S.R.: ‘An accurate fault classification algorithm using a minimal radial basis function neural network’, Eng. Intell. Syst. Electr. Eng. Commun., 2004, 12, pp. 205–210

P. K. Dash et al proposed a scheme for fault classification using minimal radial basis function network. In this approach the training time was drastically reduced and provides systematic approach for selecting number of neurons in the hidden layer

1. Mahanty, R.N., Dutta Gupta, P.B.: ‘Application of RBF neural network to fault classification and location in transmission lines’, IEE Proc., Gener. Transm. Distrib., 2004, 151, p. 201

R. N. Mahanty et al proposed a scheme based of radial basis function neural network for fault classification and location identification. In this method instantaneous voltage and current samples are used for training. For fault classification both pre fault and post fault samples are fed to the network. For fault location identification only post fault samples are used.

1. Thukaram, D., Khincha, H.P., Vijaynarasimha, H.P.: ‘Artificial neural network and support vector machine approach for locating faults in radial distribution systems’, IEEE Trans. Power Deliv., 2005, 20, pp. 710–721

D. Thukaram et al used ANN and SVM approach for locating faults in radial distribution systems. In this method firstly data was analysed using principle component analysis then faults are classified using support vector classifiers and feedforward neural networks.

1. Sedighi, A.-R., Haghifam, M.-R., Malik, O., et al.: ‘High impedance fault detection based on wavelet transform and statistical pattern recognition’, IEEE Trans. Power Deliv., 2005, 20, pp. 2414–2421

A R Sedighi et al proposed a method for high impedance fault (HIF) detection based on pattern recognition systems is presented in this paper. Using this method, HIFs can be discriminated from insulator leakage current (ILC) and transients such as capacitor switching, load switching (high/low voltage), ground fault, inrush current and no load line switching. Wavelet transform is used for the decomposition of signals and feature extraction, feature selection is done by principal component analysis and Bayes classifier is used for classification.

1. Silva, K.M., Souza, B.A., Brito, N.S.D.: ‘Fault detection and classification in transmission lines based on wavelet transform and ANN’, IEEE Trans. Power Deliv., 2006, 21, pp. 2058–2063

K M Silva et al  proposes a novel method for transmission-line fault detection and classification using oscillographic data. The fault detection and its clearing time are determined based on a set of rules obtained from the current waveform analysis in time and wavelet domains. The method is able to single out faults from other power-quality disturbances, such as voltage sags and oscillatory transients, which are common in power systems operation. An artificial neural network classifies the fault from the voltage and current waveforms pattern recognition in the time domain.

1. Jayabharata Reddy, M., Mohanta, D.K.: ‘A wavelet-fuzzy combined approach for classification and location of transmission line faults’, Int. J. Electr. Power Energy Syst., 2007, 29, pp. 669–678

M Jayabharata et al presents a real-time wavelet-Fuzzy combined approach for digital relaying. The algorithm for fault classification employs wavelet multi resolution analysis (MRA) to overcome the difficulties associated with conventional voltage and current based measurements due to effect of factors such as fault inception angle, fault impedance and fault distance. The proposed algorithm for fault location, different from conventional algorithms that are based on deterministic computations on a well-defined model to be protected, employs wavelet transform together with fuzzy logic.

1. Jung, C.K., Kim, K.H., Lee, J.B., et al.: ‘Wavelet and neuro-fuzzy based fault location for combined transmission systems’, Int. J. Electr. Power Energy Syst., 2007, 29, pp. 445–454

C K Jung paper describes the fault location algorithm using neuro-fuzzy systems in combined transmission lines with underground power cables. The neuro-fuzzy system consists of two parts to perform different tasks. One is to discriminate the fault section between overhead and underground using the detailed coefficients obtained by wavelet transform. The other system calculates fault location.

1. Parikh, U.B., Das, B., Maheshwari, R.P.: ‘Combined wavelet-SVM technique for fault zone detection in a series compensated transmission line’, IEEE Trans. Power Deliv., 2008, 23, pp. 1789–1794

U B Parikh et al presents a combined wavelet-support vector machine (SVM) technique for fault zone identification in a series compensated transmission line. The proposed method uses the samples of three line currents for one cycle duration to accomplish this task. Initially, the features of the line currents are extracted by first level decomposition of the current samples using discrete wavelet transform (DWT). Subsequently, the extracted features are applied as inputs to a SVM for determining the fault zone.

1. Upendar, J., Gupta, C.P., Singh, G.K.: ‘Discrete wavelet transform and probabilistic neural network based algorithm for classification of fault on transmission systems’. Proc. of the Indicon 2008 IEEE Conf. & Exhibition on Control, Communications and Automation, 2008, vol I, pp. 206–211

J Upender et al presents the development of an algorithm based on discrete wavelet transform (DWT) and probabilistic neural network (PNN) for classifying the power system faults. The proposed technique consists of a preprocessing unit based on discrete wavelet transform in combination with PNN. The DWT acts as extractor of distinctive features in the input current signal, which are collected at source end. The information is then fed into PNN for classifying the faults.

1. Samantaray, S.R.: ‘Decision tree-based fault zone identification and fault classification in flexible AC transmissions-based transmission line’, *IET Gener. Transm. Distrib.*, 2009, 3, pp. 425–436.

S R Samantaray et al presented a new approach for fault zone identification and fault classification for TCSC and UPFC line using decision trees.

1. Jamehbozorg, A., Shahrtash, S.M.: ‘A decision-tree-based method for fault classification in single-circuit transmission lines’, *IEEE Trans. Power Deliv.*, 2010, 25, pp. 2190–2196.

A Jamehbozorg et al proposed a novel method for fault classification in single-circuit transmission lines is presented. The proposed method needs voltages and currents of only one side of the protected line. After detecting the exact time of fault inception, the fault type is recognized by means of a decision-tree algorithm (DT) which is formerly trained by applying the odd harmonics of the measured signals.

1. Korkali, M., Lev-Ari, H., Abur, A.: ‘Traveling-wave-based fault-location technique for transmission grids via wide-area synchronized voltage measurements’, *IEEE Trans. Power Syst.*, 2012, 27, pp. 1003–1011.

M Korkali et al proposed a novel analytical and computational approach to fault location for power transmission grids. The proposed methodology involves an online and an offline stage. The online stage is based solely on the utilization of the time-of-arrival (ToA) measurements of traveling waves propagating from the fault-occurrence point to synchronized wide-area monitoring devices installed at strategically selected substations. The captured waveforms are processed together at the time of fault in order to identify the location of the fault under study.

1. Jiang, Q., Li, X., Wang, B., et al.: ‘PMU-based fault location using voltage measurements in large transmission networks’, *IEEE Trans. Power Deliv.*, 2012, 27, pp. 1644–1652.

Q Jiang et al  presents a general fault-location method for large transmission networks which uses phasor measurement unit (PMU) voltage measurements where the injected current at a fault point can be calculated by using the voltage change and its relevant transfer impedance on any bus.

1. Capar, A., Arsoy Basa, A.: ‘A performance oriented impedance based fault location algorithm for series compensated transmission lines’, *Int. J. Electr. Power Energy Syst.*, 2015, 71, pp. 209–214.

A Capar et al proposes a performance oriented fault location algorithm for series compensated transmission lines. The algorithm estimates the fault location based on the calculated fault voltage and current using two end measurements and line parameters. Fault location computations are carried out considering faults existed before or after the compensator location on the line.

1. Florian Rudin, Guo-Jie Li , Keyou Wang: ‘An Algorithm for Power System Fault Analysis based on Convolutional Deep Learning Neural Networks’, IJARESM, Volume 5, Issue 9, September- 2017.

Florian Rudin et al discusses the possibility of using deep learning architecture using convolutional neural networks (CNN) for real-time power system fault classification. This work is about fault classification only and not about localization. It aims to classify power system voltage signal samples in real time and determine whether they belong to a faulted or non-faulted state. The data is produced by simulating a simple two-bus power system with a three -phase balanced load.

1. A. Jain, T. C. Archana and M. B. K. Sahoo, "A Methodology for Fault Detection and Classification Using PMU Measurements," 2018 20th National Power Systems Conference (NPSC), Tiruchirappalli, India, 2018, pp. 1-6.

Amit Jain et al proposed a methodology for detection and classification of faults using PMU measurements.

1. K. Chen, J. Hu and J. He, "Detection and Classification of Transmission Line Faults Based on Unsupervised Feature Learning and Convolutional Sparse Autoencoder," *IEEE Trans. on Smart Grid*., vol. 9, no. 3, pp. 1748-1758, May 2018.

[Kunjin Chen](https://ieeexplore.ieee.org/author/37086148743) et al present in this paper a novel method for fault detection and classification in power transmission lines based on convolutional sparse autoencoder. Contrary to conventional methods, the proposed method automatically learns features from a dataset of voltage and current signals, on the basis of which a framework for fault detection and classification is created.