# Abstract

The present thesis demonstrates a signal-analysis based technique of fault identification, classification and determination of fault location on overhead transmission lines. The conventional methods of fault classification involve complex mathematical operations. The complexity of the calculations increases with the increase in size of the power system network. The soft computing techniques have shown relatively better performance in the method of fault classification with respect to speed and accuracy. The methods mainly involve the simulations of network and faults in reliable softwares like EMTP, PSCAD and MATLAB, involving the application of signal processing tools i,e, Wavelet transform and S-Transform. The proposed method is based on the multi-resolution S-transform, which is used for extracting features from the voltage/current signals of power system network. These features are used as input vectors of a Probabilistic Neural Network (PNN) for fault detection and classification. Another set of features have been extracted for training a Back Propagation Neural Network (BPNN) in determining the fault location. The suggested technique in this research has been tested on a single circuit a.c. transmission system under balanced and unbalanced loading conditions. The method has been further implemented on a multi-terminal a.c. system and a six-pulse HVDC transmission system. The effect of noise on both the current and voltage signals has been investigated in all the studies. The results have been obtained with satisfactory accuracy and speed. All the simulations have been done in MATLAB (The MathWorks, Natick, Massachusetts, USA) environment for different values of fault locations, fault resistances, and fault inception angles.

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