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Recent Development of Intelligent Shunt Fault Classifier for Nigeria 33-kV Power Lines

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Abstract

This paper presents a new approach to using artificial neural networks (ANNs) in improving the protection of transmission lines. The proposed method uses instantaneous values of voltages and currents during normal and fault conditions on a transmission line as inputs to four different neural network structures. The structures are then aptly combined to yield a system that can detect and classify shunt faults with improved efficiency. The details of the design procedure as well as various simulations carried out are provided in the paper. The performance of the developed system is evaluated using two performance indices, viz., accuracy and mean square error (MSE), and the results show that this approach is capable of detecting and classifying all possible shunt faults on the 33-kV Nigeria power lines in less than 1ms with high level of accuracy. The performance of the system, when tested under various shunt fault types with varying resistances and distances, shows that the system can be used to improve distance line protection in 33-kV Nigeria power line.