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A NEW ISLANDING DETECTION TECHNIQUE BASED ON PASSIVE PARAMETER USING ARTIFICIAL NEURAL NETWORK EVOLUTIONARY PROGRAMING

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ABSTRACT

One of the main requirements of distribution utility companies related to interconnection of distributed generation (DG) is islanding detection technique. Islanding occurs when part of the distribution system becomes electrically isolated from the main supply, and it remains energized by DG in an isolated subsystem. Failure to detect islanding may lead to power quality issues, equipment damage and safety issues concerning the electrical company workers. Therefore, DG connection codes worldwide require that all islanded DGs to be disconnected as fast as possible after the formation of islanding. Among islanding detection technique, computational intelligence technique is the most recent approach that can produce almost zero non-detection zone. The objective of this thesis is to design a new islanding detection technique for synchronous type of DG based on the most sensitive passive parameters by using Artificial Neural Network (ANN) Evolutionary Programming (EP). The most sensitive parameter is selected from the sixteen parameters designated for this study considering the sensitivity analysis. The analysis is produced based on the response of each parameter when the test system is subjected with different types of islanding and non-islanding event. The selected parameter is applied as an input for ANNEP. EP is used to optimally tune the ANN parameter in order to classify accurately the islanding phenomenon. Large numbers of training and testing data set are recorded from simulation studies carried out on 11kV distribution test system. The simulation considers islanding and non- islanding events with different steps of power mismatch. Comparison performance of ANN and ANNEP in classifying islanding and non-islanding event is performed. In addition, the analysis of k-fold cross-validation performance is done to ensure results obtained from ANN-EP are accurate. Results show that the ANNEP outperform ANN in terms of accuracy of classification. This proves that the proposed islanding detection technique capable to distinguish islanding and non-islanding event correctly.

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