Robust Fault Detection of Multilevel Inverter using Optimized Radial Basis Function based Artificial Neural Network in Renewable Energy Power Generation Application

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Authors:
T. G. Manjunath, Ashok Kusagur

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Abstract

The Optimized Artificial Neural Network based fault detection of the multilevel inverters are of research interest since the HVDC system and Electrical Drives system has started using the multilevel inverters as the power processing units. While the power supply to the multilevel inverters is constant the results of the THD obtained would be stable. But the multilevel inverters that are used with Renewable Energy Resources as the power supply, the variation in the supply would largely affect the THD values thus a robust model for the fault detection of multilevel inverters which not only considers the THD but the positive sequence voltage, negative sequence voltage, zero sequence voltage and angle of the inverter output is considered. This paper is an attempt to develop a robust fault detection method using the optimized Artificial Neural Network (ANN) using the Radial Basis function. The objective function of this optimization algorithm is the minimization of the Mean Square Error while the ANN is getting trained. The optimization is carried out by the use of the weight and the bias value search in the search space, which would enhance the training of the ANN. Particle Swarm Optimization (PSO) and the Cuckoo Search Algorithm (CSA) are considered for the optimization
algorithms. Matlab based implementation is carried out and the results are measured and tabulated. It is observed that the CSA algorithm is performing better while training the ANN for the fault detection.

References

1. T.G.Manjunath, Dr.Ashok Kusagur “Fault Diagnosis and Reconfiguration of Multi level Inverter switch failure- A performance perspective ”, International Journal of Electrical and computer Engineering.,vol.6,no.6, Dec 2016,pp.2610-2620
14. Tianzhen Wang et al, "Cascaded H-Bridge Multilevel Inverter System Fault Diagnosis


Index Terms

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Keywords

Parameter Estimation, Artificial Neural Network, Particle Swarm Optimization, Cuckoo Search Algorithm and Radial Basis Function.