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Master Thesis Defense

Entitled

A MULTI-OBJECTIVE OPTIMAL CAPACITY AND PLACEMENT OF DISTRIBUTED GENERATORS IN THE POWER SYSTEM NETWORKS USING ATOM SEARCH OPTIMIZATION METHOD

by

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Abstract

Nowadays, renewable energy sources become a more significant source of energy in the new millennium where the continuous penetration of dispersed resources of the reactive power into power systems is predictable to establish new issues in the power systems. Recently, Power loss mitigation and voltage profile development are major investigation challenges that attracted the researchers in the power systems area. Distributed generation (DG) is widely preferred as it is considered a highly effective solution that strengths the performance of the power system networks. The objectives of this multi-objective function study are to minimize the power losses in the feeders, sustain the voltage levels and reduce the application cost of the DGs by adapting the Atom Search Optimization (ASO) simulated on the Matlab software. Two different IEEE power test systems are demonstrating in this research, which are radial distribution system with 33 buses, and a 14 bus power system hosting 1DG, 2DGs and 3DGs in both systems. Backward forward sweep power flow and Newten Raphson power flow methods are used for each of them correspondingly. The proposed technique is compared with GA-PSO method. The results depict the effectiveness of the projected method in minimizing the system power losses and regulating the voltage profile where the reduction of power loss is 25.38% in the 33 Radial distribution system using 2 DGs while the power loss reduction percentage in 14 bus system are 0.316% and 0.169% in systems with 1DGs and 2DGs correspondingly. The voltage profile has been enhanced comparing with the original case and the results gained from GA-PSO method.

Keywords: Distributed Generation, Voltage Profile, Power Losses, Atom Search Optimization, multi-objective function.