Abstract

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Optimal Coordination of DOC Relays Incorporated into a Distributed Generation-Based Micro-grid Using a Meta-Heuristic MVO Algorithm

Distributed, generation-based micro-grids are increasingly being used in the build-up of the modern power system. However, the protection of these micro-grids has many challenges. One of the important challenges is the coordination of directional overcurrent (DOC) relays. The optimization of the coordination of DOC relays is considered a nonlinear programming problem with pre-defined constrains. In this paper, the problem of the optimal coordination of DOC relays is solved using a multi-verse optimization (MVO) algorithm which is inspired from cosmology science. The proposed algorithm is tested by applying it to Institute of Electrical and Electronics Engineers (IEEE) 3 bus and IEEE 9 bus networks. The performance of the proposed algorithm is compared with the particle swarm optimization (PSO) algorithm when applied to both networks. All results show that the performance of the MVO algorithm is better than PSO in terms of its reduction of both the overall operating time (OT) of DOC relays and the computational burden of the computer solving the optimization problem.