

Capacity-Based Optimization Using Whale Optimization Technique of a Power Distribution Network

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Abstract

In the power distribution network, real power loss and voltage profile management are critical issues. By providing active and reactive power support, both of these issues can be managed. This paper utilized the Meta heuristic-based method for the optimal size and placement of distributed generation (DG) and capacitor (QG) sources for loss reduction by incorporating network current carrying capacity constraint in the optimization problem. The overall problem is optimized using an upgraded method of the fitness assignment and solution chasing based on the aggregate approach called Multi-objective Whale Optimization Algorithm (MWOA). Wind and solar photovoltaic sources are utilized as the distributed generation with their probabilistic outputs. The developed method is tested using two feeders of practical Bahir Dar Distribution Network, Ethiopia. The results of loss minimization and voltage profile management with MWOA are compared with multi-objective particle swarm optimization (MPSO) with an equal number of iteration to show the superiority of the developed method.

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