Optimal Distributed Generation Sources Design in Distribution Systems using Cuckoo Optimization Algorithm

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Abstract:

Regarding the growing use of distributed generation resources, optimal design of these units is necessary in the power system especially in the distribution network. In this paper, Cuckoo Optimization Algorithm with multiple purposes was used to determine optimal location and size of distributed generation resources. The investigated purposes include reducing line losses, reducing medium voltage deviation and voltage stability. Cuckoo Algorithm is an algorithm based on population which is derived from the life of cuckoos in nature. Using this algorithm leads to increased accuracy and speed of convergence. In order for the implementation of the proposed algorithm, distributed generation resources are considered in two modes. In the first mode, distributed generation resources only produce active power; but in the second mode, they produce reactive power too. Simulation is done in 33 bus bar radial system. The results of simulation show optimal convergence of the suggested algorithm. In addition, the obtained results were compared with the results of optimization algorithm of the aggregation of particles and genetics algorithm in order to show the efficiency of the suggested algorithm. The comparison indicated tangible superiority of Cuckoo Algorithm in comparison with the mentioned methods.

Keywords: Cuckoo Optimization Algorithm, Multi Object Optimization, Optimal Location and Size of Distributed Generation Resources.