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Ant Lion optimization algorithm for optimal sizing of renewable resources for loss reduction in distribution systems

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Abstract

This paper mainly focused on the impact of distributed generation (DG) placement on distribution system. The integration of DG is transforming the traditional radial distribution system into a multi-source system. Distributed generation is a term that refers to the production of electricity near the consumption place. The effects of distributed generation are short circuit levels are increased, load losses change, reliability change and voltage profiles change along the network. The above advantages can be accomplished by ideal position and sizing of DG units. The ideal positions are obtained from index vector method. Ant Lion Optimization (ALO), a novel meta heuristic algorithm is used to determine the optimal DG size. ALO modeled based on the unique hunting behavior of ant lions. The ALO algorithm is evaluated on IEEE 15, 33, 69 and 85-bus test systems. ALO algorithm was compared with different types of DG units and other evolutionary algorithms. When compared with other algorithms the ALO algorithm gives better results. From the analysis best results have been achieved from type III DG operating at 0.9 pf.

Keywords: Ant Lion Optimization Algorithm, Index vector method, Distributed Generation placement, Radial distribution system, Loss reduction, optimization, DG locations

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