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Pareto System of Optimal Placement and Sizing of Distributed Generation in Radial Distribution Networks Using Particle Swarm Optimization

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Abstract : The Pareto approach of optimal solutions in a search space that evolved in multi-objective optimization problems is adopted in this paper, which stands for a set of solutions in the search space. This paper aims at presenting an optimal placement of Distributed Generation (DG) in radial distribution networks with an optimal size for minimization of power loss and voltage deviation as well as maximizing voltage profile of the networks. And these problems are formulated using particle swarm optimization (PSO) as a constraint nonlinear optimization problem with both locations and sizes of DG being continuous. The objective functions adopted are the total active power loss function and voltage deviation function. The multiple nature of the problem, made it necessary to form a multi-objective function in search of the solution that consists of both the DG location and size. The proposed PSO algorithm is used to determine optimal placement and size of DG in a distribution network. The output indicates that PSO algorithm technique shows an edge over other types of search methods due to its effectiveness and computational efficiency. The proposed method is tested on the standard IEEE 34-bus and validated with 33-bus test systems distribution networks. Results indicate that the sizing and location of DG are system dependent and should be optimally selected before installing the distributed generators in the system and also an improvement in the voltage profile and power loss reduction have been achieved.

Keywords : distributed generation, pareto, particle swarm optimization, power loss, voltage deviation
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