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Optimum Location and Size of DG Using GA with Sensitivity Analysis for a Real Time Radial Distribution System

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Abstract

Distributed Generation (DG) must be of appropriate size and location for getting the benefits in the distribution system. Most of the renewable generation is directly grid to a distribution substation to fulfill the load demand; this may not give techno-economic benefit to the utility. A radial distribution system is identified where the wind generation DGs is connected at substation bus to fulfill the load requirements. From the study, it is observed that the system does not have any effect or loss as well as voltage profile with the inclusion of DGs. This paper discusses a technique to reduce active and reactive power losses in an existing radial distribution system with wind generation connected to the grid. For obtaining minimum loss the evolutionary technique Genetic Algorithm (GA) is implemented. GA includes some parameters which have to be adjusted for getting reliable results. This work is part of the answer to this approach addressing this connective problem. The proposed methodologies being tested on practical radial system representing load with constant impedance models. The optimal size and location of DGs in a radial distribution feeder obtained through the techniques with variation in options for GA operators for different values of population size, crossover fraction, and generation. After having a set of optimal location and size of DGs by this methodology, with the available generation, the only location of DGs changed as per optimal location, and afterward, both optimal location and size are implemented to observe the effect on active and reactive power loss. **Test results prove that utilizing available generation at an optimal location reduction in a power loss of 47.81% and 83.66% with an optimum size of DG at an optimal location obtained by the proposed methodology can be obtained. Also, exceptional improvement in voltage at the bus is observed.**

Keywords: Distributed Generation, Location and size, Radial distribution system, sensitivity analysis

JEL Classification: C02, L11

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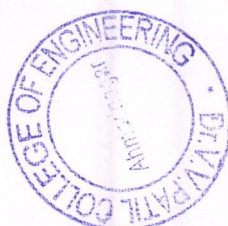
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