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Impact of Distributed Generations on RDS using Short Circuit and Harmonics Analysis

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Abstract: *This paper presents a new method using Particle Swarm Optimization (PSO) to optimally place Distributed Generators (DG) in distribution networks (DN). The main goals are to reduce harmonics, perform short circuit analysis, assess how DG improves the voltage profile and system reliability, and minimize both active and reactive power losses. The optimization process uses an objective function (OF) for load flow calculations within the distribution network. MATLAB-DIgSILENT simulations were conducted on an IEEE 33 bus DN to evaluate the impact of DG. The study investigates harmonics and short circuits under conditions both with and without DG, showing significant improvements in system performance, such as voltage profile and harmonics, thus confirming the effectiveness of the proposed PSO-based approach.*

This study utilizes PSO techniques to tackle network issues associated with the installation of various types of multiple Distributed Generators (DGs). The comparative analysis of PSO methods, with and without DG, highlights the superior results achieved by the proposed approach. When applied to the IEEE 33 bus system, the suggested method leads to significant reductions in harmonics, improvements in the voltage profile, and notable decreases in both active and reactive power losses.

Keywords: Particle Swarm Optimizer (PSO),Radial Distribution System (RDS), Optimal Power Flow (OPS), Distribution Network (DN), Distributed Generator (DG)