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Optimal Planning of Photovoltaic-based DG Units in Uncertain Distribution Network

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Abstract **–** This paper introduces a novel bio-inspired metaheuristic algorithm called the Zebra Optimization Algorithm (ZOA) for optimizing the allocation of distributed generation (DG) units based on photovoltaic (PV) technology in distribution networks (DN). The algorithm is inspired by the foraging behavior and defense strategies of zebras in nature. ZOA aims to minimize total energy losses and improve the daily voltage profile in the distribution network. The proposed approach was applied to the typical IEEE 33 node distribution network, and the simulation results were compared with those obtained by other optimization algorithms developed in recent literature. The effectiveness of the Zebra Optimization Algorithm method was confirmed by the comparison report, demonstrating its ability to outperform existing optimization algorithms.

Keywords – Uncertainties, (PV) Photovoltaic, Zebra Optimization Algorithm, Distribution System.