

DNR optimization for loss reduction and voltage stability considering EV charging load

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ABSTRACT

In recent years, electric vehicles (EVs) have been a countermeasure to the serious carbon emission problem in the transportation sector. However, despite being one of the essential infrastructures in the EV ecosystem, the EV charging load causes voltage instability and increases power losses in the distribution network. Thus, this paper proposed optimizing distribution network reconfiguration (DNR) to solve the problem. The best two metaheuristic methods, Cuckoo Search Algorithm (CSA) and Particle Swarm Optimization (PSO) were compared to get the optimum solution. It was tested on the IEEE 33-bus system in the MATLAB environment with various cases of charging activity. As a result, the CSA showed better consistency with better power loss reduction and voltage stability compared to PSO.

KEYWORDS

Charging load; Cuckoo search algorithm; Distribution network reconfiguration; Electric vehicle; Particle swarm optimization; Power losses; Voltage stability

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