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Abstract As renewable energy rapidly develops, microgrids have gradually become an essential part of modern power systems. Microgrids integrate distributed generation, energy storage systems, and loads, improving energy utilization efficiency and offering strong resilience against disturbances. Electric vehicles (EVs), as a form of energy storage for renewable energy, have a significant impact on the operation of microgrids through their charging behavior. Proper scheduling of EV charging can not only reduce the operating costs of the microgrid but also balance loads and enhance renewable energy absorption. However, the uncertainty in DG output poses challenges to microgrid scheduling. The Information-Gap Decision Theory (IGDT) is an approach used to solve optimization problems involving uncertainty. Compared to traditional methods for handling uncertainty, such as stochastic programming, fuzzy programming, and interval robust optimization, IGDT has the advantage of not requiring precise probability distributions or uncertainty intervals for uncertain parameters. This paper proposes an optimization scheduling strategy for microgrids with orderly charging of EVs based on IGDT, analyzing the uncertainty of DG output. First, a model of EV travel characteristics and an orderly charging scheduling model are established. Then, a robust optimization model based on IGDT is constructed. The objective is to minimize the total operating cost of the microgrid.

Keywords microgrid, electric vehicles, orderly charging, information-gap decision theory, optimization scheduling