

Hualong Liu and Wenyuan Tang, 2025, Optimal Scheduling for Microgrids with Large-Scale Integration of Electric Vehicle Charging Using Info-Gap Decision Theory, 2025 IEEE/ AIAA Transportation Electrification Conference and Electric Aircraft Technologies Symposium (ITEC+EATS), June 2025.

DOI: 10.1109/ITEC63604.2025.11098053

Abstract With large-scale electric vehicles (EVs) connected to the microgrid (MG), the charging of these EVs, especially the disordered charging, has brought unprecedented challenges to the reliable and economical operation of the MG. Consequently, we propose the optimal scheduling for the MG with large-scale integration of ordered and unordered charging EVs using infogap decision theory. First, we propose a method of calculating the total charging power of both ordered and unordered EV charging. Second, we propose multi-objective MG scheduling models considering the uncertainties of wind, photovoltaic (PV) generation, and loads. Third, we propose single objective MG scheduling models. Finally, we verify the effectiveness of the proposed approaches by performing case studies. The results show that the proposed approaches can allow decision-makers to choose the optimal scheduling plan based on the actual situation.

Keywords Electric vehicles, microgrid, ordered and unordered charging, info-gap decision theory, renewable generation, uncertainties.