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Abstract With the random and intermittent renewables such as wind and photovoltaic (PV) generation connected to the grid on a large scale, and due to the imprecision of load forecasting, these factors together make the uncertainty of power systems increasingly exhibit the characteristics of Knightian uncertainty, which makes the planning and operation of the microgrid become a very challenging job. Therefore, based on info-gap decision theory, this paper establishes multi-objective microgrid planning and operation models under opportuneness and robustness strategies. Finally, the case studies on the Banshee microgrid system and Monte Carlo simulation demonstrate the effectiveness and superiority of the proposed multi-objective microgrid planning and operation models.

Keywords Renewable energy sources; Uncertainty; Costs; Computational modeling; Microgrids; Robustness; Mathematical models; Planning; Power systems; Load modeling; Info-gap decision theory; microgrid; multi-objective; planning and operation; renewable energy; uncertainty