

Tools for Analysis and Optimization of Standalone Green Microgrids

Authors : William Anderson, Kyle Kobold, Oleg Yakimenko

Abstract : Green microgrids using mostly renewable energy (RE) for generation, are complex systems with inherent nonlinear dynamics. Among a variety of different optimization tools there are only a few ones that adequately consider this complexity. This paper evaluates applicability of two somewhat similar optimization tools tailored for standalone RE microgrids and also assesses a machine learning tool for performance prediction that can enhance the reliability of any chosen optimization tool. It shows that one of these microgrid optimization tools has certain advantages over another and presents a detailed routine of preparing input data to simulate RE microgrid behavior. The paper also shows how neural-network-based predictive modeling can be used to validate and forecast solar power generation based on weather time series data, which improves the overall quality of standalone RE microgrid analysis.

Keywords : microgrid, renewable energy, complex systems, optimization, predictive modeling, neural networks

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