

新能源与分布式发电

分布式电源选址定容的多目标优化算法

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摘要:

在综合考虑网损、电压质量和电流质量3个指标的基础上, 建立了分布式电源选址定容的多目标决策模型, 并提出了一种改进多目标微分进化算法(improved differential evolution for multiobjective optimization, IDEMO)。该算法引入混沌搜索策略以提高初始种群利用率, 采用控制参数调整策略以克服算法对控制参数依赖性强的缺点, 利用动态拥挤距离排序策略使得帕累托解集分布更加均匀, 从而为最终决策提供了优良的候选方案。以上述算法求得的帕累托最优解集为决策矩阵, 使用基于熵的序数偏好方法对最优解集进行排序, 得到最终决策方案。在IEEE-33节点系统上对所提方法进行了测试, 并从外部解、C指标和S指标3方面与其他3种多目标优化算法进行了比较, 验证了所提算法具有良好的搜索性能。最后评价了所选方案的有效性。

关键词: 分布式电源 选址定容 多目标微分进化算法 帕累托解集 多目标决策方法

Multi-objective Optimization Algorithm for Distributed Generation Locating and Sizing

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Abstract:

The paper proposes a multi-objective decision making approach for distributed generation locating and sizing, comprehensively considering three indices of network power losses, voltage deviation and current deviation, and presents an improved differential evolution algorithm for multiobjective optimization (IDEMO). The chaotic searching strategy is introduced to improve the availability rate of initial population; the adjustment strategies for control parameters are used to strengthen global optimal searching capability, and dynamic crowding distance is employed to keep the diversity of population. The Pareto solution set given by the IDEMO is then sorted and the optimal solution is obtained by the TOPSIS (technique for order performance by similarity to ideal solution) based on the entropy. The proposed method is testified on the the IEEE-33 bus system, and compared with other multiobjective optimization evolutionary algorithms from the aspects of outer solutions, C metric and S metric. The results show that the proposed approach has merits in search performance. The effectiveness of the selected scheme is finally evaluated.

Keywords: distributed generation locating and sizing differential evolution for multiobjective optimization Pareto solution set multi-objective decision making

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