

电力系统

基于非支配排序差分进化算法的多目标电网规划

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摘要:

在多目标电网规划问题中, 综合考虑经济性、安全可靠性和环境影响等因素后, 提出了非支配排序差分进化算法。以电网投资、运行维护费用、网损费用、线路走廊面积最小为目标建立了多目标电网规划模型。非支配排序差分进化算法将Pareto非支配排序法与差分进化算法相结合, 采用动态调整策略调整差分进化算法控制参数, 改进了个体拥挤比较机制, 提高了算法的全局搜索能力和种群多样性, 并基于模糊集理论选取最优折衷解。

Garver-6节点和Garver-18节点系统算例结果表明, 该算法可以有效生成分布均匀的Pareto最优解集, 在求解多目标电网规划问题中具有可行性和优越性。

关键词:

Multi-Objective Transmission Network Planning Based on Non-Dominated Sorting Differential Evolution

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Abstract:

Considering the factors in multi-objective power network planning such as economy, security and reliability as well as environment influences, a non-dominated sorting differential evolution algorithm is proposed. Taking minimized investment for power network, operation and maintenance costs, network loss cost and line corridor as objectives, a multi-objective power network planning model is built. The non-dominated sorting differential evolution algorithm integrates Pareto non-dominated sorting algorithm with differential evolution algorithm and the control parameters of differential evolution are regulated by dynamic adjustment strategy; the crowding comparison mechanism of individuals is modified to improve the global search ability and population diversity, and the optimal compromise solution is chosen according to fuzzy set theory. Numerical results of Garver 6-bus system and Garver 18-bus system show that the proposed algorithm is better than non-dominated sorting genetic algorithm-II (NSGA-II) and can effectively generate optimal Pareto solution set, so it is of feasibility and superiority in solving multi-objective power network planning.

Keywords:

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