

基于改进HPSO算法的电动汽车并网联合优化调度策略与仿真 【上架时间： 2023-03-30】



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详细信息

【标题】 基于改进HPSO算法的电动汽车并网联合优化调度策略与仿真

【Title】 Joint optimal scheduling strategy and Simulation of electric vehicle grid connection based on improved hybrid particle swarm optimization algorithm

【摘要】 为了解决电动汽车无序并入多源微电网时引起的电网损耗增加、电压和频率波动，从而降低电能质量的问题，可以通过优化控制，变电动汽车的无序入网为有序接入电网充电，通过削峰填谷改善系统网损和电压偏差。传统的优化控制算法，包括迭代法、梯度法、牛顿法及拉格朗日法等，虽然求解问题高效可靠，但对数学模型的高度依赖，比如要求目标函数连续可导，往往在实际问题中无法满足。本文以电动汽车并入多源微电网运行优化为目标，微电网考虑电动汽车、光伏、风电、燃料电池、汽轮机及储能系统，建立微电网与电动汽车协同调度的优化模型，考虑发电运行成本和环境治理成本两大约束进行优化求解。本文对现有的粒子群算法进行改进，提出改进混合粒子群（HPSO）算法求解多约束条件。通过算例仿真电动汽车在不同场景下对并网微电网的影响。

【Abstract】 In order to solve the problems of increased power grid loss, voltage and frequency fluctuation caused by disorderly integration of electric vehicles into multi-source microgrid, so as to reduce power quality, the disorderly access of electric vehicles can be changed into orderly access to the power grid for charging through optimal control, and the system network loss and voltage deviation can be improved by peak shaving and valley filling. The traditional optimal control algorithms, including iterative method, gradient method, Newton method and Lagrange method, are efficient and reliable, but they are highly dependent on the mathematical model. For example, they require the continuous derivation of the objective function, which can not be met in practical problems. This paper aims at the operation optimization of electric vehicles incorporated into multi-source microgrid. Microgrid considers electric vehicles, photovoltaic, wind power, fuel cells, steam turbines and energy storage systems, establishes the optimization model of collaborative scheduling between microgrid and electric vehicles, and optimizes the solution considering the two constraints of power generation operation cost and environmental governance cost. This paper improves the existing particle swarm optimization algorithm and proposes an improved hybrid particle swarm optimization algorithm to solve multiple constraints. Finally, an example is given to simulate the impact of electric vehicles on grid connected microgrid in different scenarios.

【关键词】 电动汽车；微电网；联合优化调度；改进混合粒子群算法；仿真

【Keywords】 electric vehicle; microgrid; joint optimal scheduling; improved hybrid particle swarm optimization algorithm; simulation

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