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微型电网、智能电网中的电力电子技术

能量产消者的分层控制策略研究

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Research on Hierarchical Control Strategy for Energy Prosumers

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History

摘要

随着屋顶光伏、风机等可再生能源的大量普及，未来配电网中将会出现越来越多的能量产消者。为提高对可再生能源的利用率和实现对能量产消者的电能管理，提出一种基于模糊控制理论的能量产消者分层控制策略。具体是将分布式电源出力和负荷功率、储能荷电状态值SOC（state of charge）及实时电价等作为模糊控制的输入量，经模糊推理、解模糊，确定能量产消者的运行模式。通过在Matlab/Simulink中搭建模型进行仿真，验证了该分层控制策略能够实现电能的合理分配以及提高可再生能源的利用率。

Abstract

With the wide spread of rooftop photovoltaic(PV), wind turbines and other renewable power sources, more and more energy prosumers will appear in distribution network in the future. To improve the utilization rate of renewable energy and realize the power management of energy prosumers, a hierarchical control strategy for energy prosumers is proposed, which is based on the fuzzy control theory. Specifically, the output and load power of distributed generations, state of charge of the energy storage system, and real-time electricity price are taken as input variables of the fuzzy controller, and the operation mode of the energy prosumer is determined through the output from the fuzzy controller. A simulation model is built in Matlab/Simulink, and simulation results show that the proposed hierarchical control strategy can realize a reasonable distribution of power and improve the utilization rate of renewable power.

关键词

能量产消者;分层控制;模糊控制;分布式电源

Key words

energy prosumer;hierarchical control;fuzzy control;distributed generation

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