

新能源与分布式发电

混合储能系统在独立光伏发电系统功率平衡中的应用

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摘要:

提出了将能量密度大、环境友好的磷酸铁锂电池和功率密度高、循环使用寿命长的超级电容组合, 构成混合储能系统应用于独立光伏发电系统。以优化系统可靠性及运行状态为目标, 设计了控制结构和控制方式。对系统进行仿真分析, 结果表明, 在光伏电池输出功率存在波动且负载发生脉动的情况下, 储能系统能迅速平衡系统瞬时功率, 维持系统可靠运行。

关键词: 独立光伏发电系统 混合储能 功率平衡 运行状态优化

Application of Hybrid Energy Storage System in Power Balance of Stand-Alone Photovoltaic Power System

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Abstract:

In this paper it is proposed to apply a hybrid energy storage system consisting of lithium iron phosphate (LiFePO₄) battery that is environment-friendly and possesses high energy density and super capacitance combination that possesses high power density and long service lifecycle in standalone photovoltaic (PV) power system. Taking the optimization of system reliability and operation states as the object, the control structure of the proposed hybrid energy storage system and its control modes are designed to optimize both system reliability and operation status of the energy storage devices. Simulation analysis of the proposed system is performed and analysis results show that under the fluctuation of PV cell output and pulsating load the instantaneous power can be rapidly balanced by the proposed hybrid energy storage system, thus reliable operation of the proposed system can be sustained.

Keywords: standalone photovoltaic power system hybrid energy storage power balance operation status optimization

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