

可再生能源发电

液流储能电池在电网运行中的效率分析

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摘要:

借助实验手段及理论分析, 结合电网运行对储能电池的不同需求, 开展了全钒液流电池的运行特性研究。明确了影响液流电池储能系统效率的因素, 定性、定量地分析了影响电池储能系统效率的内因和外因, 包括过电势、支路电流、充放电应用模式、自放电等, 指出规模化应用液流电池储能系统时, 高电流密度充放电条件下的过电势对系统能量效率的影响极大; 在热备用工况下, 支路电流与自放电损耗是系统库仑效率的主要影响因素; 充放电模式的恰当选择有利于提高储能系统的整体工作效率。该研究为电池储能技术的理论研究及工程示范提供了数据基础及参考依据。

关键词: 液流电池 系统效率 过电势 支路电流 自放电

Efficiency Analysis of Redox Flow Battery Applied in Power System

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Abstract:

According to the different requirements from the power system operation, this study focused on the operation characteristics of vanadium redox flow battery by experimental means and theoretical analysis. The factors which influence the efficiency of battery energy storage system were identified and analyzed based on qualitative and quantitative analysis. The paper points out that under the circumstance of scaled application of redox flow battery, over-potential has great influence on energy efficiency especially at high charge/discharge current density. The loss of shunt current and self-discharge is the main factor that influences the coulomb efficiency during the use of spinning reserve. And proper use of charge/discharge modes can improve the work efficiency of battery energy storage system. This study is helpful to further theoretical research on battery energy storage technology and supplies plenty of data and references to pilot projects.

Keywords: redox flow battery efficiency of system over-potential shunt current self-discharge

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