

电力电子与电力传动

输入串联输出并联DC/AC逆变器系统的控制策略

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摘要:

输入串联输出并联逆变器系统适用于输入电压高、输出电流大的直流/交流变换场合, 要保证该逆变器系统正常工作, 就必须保证输入电压均压与输出电流均流。提出一种采用负载电流反馈的输入均压输出均流控制策略, 该控制策略根据各模块间的输入电压偏差直接调节各模块的输出电流幅值, 使输入电压高的模块输出电流增大, 输入电压低的模块输出电流减小, 从而实现输入均压。与采用输出滤波电感电流反馈的方法相比, 采用负载电流反馈时, 即使输出滤波电容不匹配, 也不影响输出均流效果。同时, 还分析输入均压环与系统输出电压环的关系, 给出输入均压环和系统输出电压环的设计准则。最后以一台由2个模块组成的输入串联输出并联逆变器原理样机验证该控制策略的有效性以及环路设计的正确性。

关键词: 输入串联输出并联 负载电流反馈 均压/均流

Control Strategy for Input-series and Output-parallel Connected Inverter System

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Abstract:

Input-series and output-parallel (ISOP) inverter system is very suitable for high input-voltage and high output-current power conversion applications. Input voltage sharing (IVS) and output current sharing (OCS) among the constitutional modules of the ISOP inverter system are required for its proper work. A control strategy with load current controlled was proposed for ISOP inverter system to achieve IVS and OCS. The output current magnitudes were regulated based on the error of the input voltages of the modules, i.e., increasing the output current of the module with higher input voltage and decreasing the output current of the module with lower input voltage. Compared with the control strategy with output filter inductor current controlled, the unmatched filter capacitors have no influence on the OCS with the proposed control strategy. Meanwhile, the relationship between the IVS loop and output voltage loop was analyzed and their design guidelines were also given. A 2 kVA two-module ISOP inverter system prototype was fabricated and tested in the lab and the experimental results verify the proposed control strategy.

Keywords: input-series and output-parallel (ISOP) load current controlled voltage/current sharing

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