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太阳能、风力、燃料电池发电

低输入电流纹波大升压比差动Boost型逆变器研究

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Research on Differential Boost Mode Inverter with Low Input Ripple and High Boost Ratio

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History

摘要

为减少功率变换级数以及低频纹波对输入直流电源的影响, 具有大升压能力和低输入纹波的单相逆变器具有重要的研究意义。深入研究了大升压比差动Boost逆变器电路拓扑、纹波抑制策略、电流纹波回路、输入电流反馈和输出电压复合控制策略。在传统波形控制基础上, 通过输入电流反馈在输出滤波电容上叠加低频偶次电压, 进一步减小输入电流中相应偶次谐波分量, 使逆变器输出侧低频脉动功率在输出滤波电容与负载之间传递, 阻断其向输入源传递; 采用前馈与比例积分控制策略提高输出电压质量和输入电流质量。不同负载下的实验结果验证了此变换器的可行性。

Abstract

To reduce the effects of power transformation stages and low-frequency ripple on input DC supply, the research on single-phase inverters with a high Boost ratio and low input ripple is of significance. In this paper, the circuit topology, ripple suppression strategy, current ripple loop, input current feedback and output voltage compound control strategy of a differential Boost mode inverter with a high Boost ratio are studied. On the basis of the traditional waveform control, low-frequency even-order voltage is added to the output filter capacitor by input current feedback control, thus further reducing the corresponding even-order harmonic component of input current. The low-frequency pulsating power on the output side of the inverter is transmitted between the output filter capacitor and load, thus blocking the transmission to the input source. The feedforward and PI control strategies are applied to improve the quality of output voltage and input current. Experimental results under different load conditions verified the effectiveness of the converter.

关键词

大升压比; 低频纹波抑制; 输入电流反馈; 单相逆变器

Key words

high Boost ratio; low-frequency ripple suppression; input current feedback; single-phase inverter

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