电源学报
JOURNAL OF POWER SUPPLY
北大中文核心期刊
ISSN 2095-2805 CN 12-1420/TM

电源学报 ›› 2022, Vol. 20 ›› Issue (5) : 92-100. DOI: 10.13234/j.issn.2095-2805.2022.5.92

多电平、新颖PWM控制

三相四桥臂混合五电平逆变器及其3D-SVPWM算法

魏金成，杨鑫，邱晓初，李琴

作者信息 +

Three-phase Four-leg Hybrid Five-level Inverter and Its 3D-SVPWM Algorithm

WEI Jincheng, YANG Xin, QIU Xiaochu, LI Qin

Author information +

History +

摘要

混合型多电平逆变器可以用较少的开关器件输出更多的电平，常被应用于中频逆变器领域，与传统逆变器相比，具有体积小、成本低和效率高等优点。一种新型的三相四桥臂混合式五电平逆变器拓扑及其abc坐标下的空间矢量脉宽调制（SVPWM）优化算法被提出，通过将直流端3个电容器的电压按1∶2∶1的比例调整，可实现输出线电压的9个电压等级，精简了电路结构，降低开关管应力。最后，所提结构和3D-SVPWM算法的仿真和实验结果验证了该方法的性能。

Abstract

Hybrid multilevel inverters can output more voltage levels with fewer switching devices and are often applied in the field of medium-frequency inverters, which have advantages of small size, low cost and high efficiency compared with the conventional inverters. A novel three-phase four-leg hybrid five-level inverter topology and its SVPWM algorithm under the abc coordinate are proposed, which can achieve nine voltage levels of output line voltage by adjusting the voltage of three capacitors at the DC terminal to a ratio of 1 : 2 : 1. As a result, the circuit structure is streamlined, and the voltage stress in switching devices is reduced. Finally, the proposed structure and the corresponding 3D-SVPWM algorithm were verified by simulation and experimental results.

关键词

多电平逆变器;混合五电平;中点电位;3D-SVPWM

Key words

multilevel inverter;hybrid five-level;midpoint potential;3D-SVPWM

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基金

西华大学自然科学重点基金资助项目(z1620906);四川省电力电子与电力传动重点实验室项目(SZD0503-09-0, SZJJ2016-049)