

电力电子与电力传动

多电平通用空间矢量调制集成电路及其FPGA实现

宋强 刘文华

清华大学电机工程与应用电子技术系 清华大学电机工程与应用电子技术系

摘要: 提出一种多电平变流器空间矢量控制(space vector modulation, SVM)集成电路(integrated circuit, IC)的设计方法。所提出的多电平SVM IC是建立在参考电压分解的通用多电平SVM算法的基础上, 适用于任何电平数目的多电平变流器。采用可编程逻辑门阵列(field-programmable gate array, FPGA)实现所提出的多电平SVM IC。基于FPGA的多电平SVM IC具有高速的处理能力, 在数字控制器中专门用于脉冲信号的发生, 可解决多电平SVM算法占用数字信号处理器(digital signal processor, DSP)计算资源过多的问题, 并可实现较高的开关频率。并且采用所提出的多电平SVM IC可大大加速产品的开发周期。通过在1台9电平级联式变流器上的试验结果对所提出的多电平SVM IC进行验证。

关键词: 现场可编程逻辑门阵列 空间矢量调制 脉冲宽度调制集成电路 数字控制器

A SVM IC for Multilevel Converters and Its FPGA-based Implementation

SONG Qiang LIU Wen-hua

Abstract: A new approach in realization of multilevel space vector modulation (SVM) control integrated circuit (IC) using field-programmable gate array (FPGA) was presented. The proposed SVM IC, which builds on an universal multilevel SVM algorithm based on decomposing reference voltage vector, is generally applicable to converters with any number of levels. The proposed SVM IC has been realized using the state-of-the-art FGPA technique and can serve as a part of the digital controller to generate SVM gating signals for multilevel converters. Owing to the high-speed processing capability of FPGA, the proposed multilevel SVM IC can release the computation load of the microprocessor. Fast prototyping and higher switching frequency are other advantages. The developed multilevel SVM IC has been verified using the experimental results on a nine-level cascaded H-bridges converter.

Keywords: field-programmable gate array space vector modulation PWM control integrated circuit digital control

收稿日期 2006-11-09 修回日期 1900-01-01 网络版发布日期

DOI:

基金项目:

通讯作者: 宋强

作者简介:

作者Email: songqiang songqiang@tsinghua.edu.cn

参考文献:

本刊中的类似文章

Copyright by 中国电机工程学报

扩展功能

本文信息

- ▶ Supporting info
- ▶ PDF(226KB)
- ▶ [HTML全文]
- ▶ 参考文献[PDF]
- ▶ 参考文献

服务与反馈

- ▶ 把本文推荐给朋友
- ▶ 加入我的书架
- ▶ 加入引用管理器
- ▶ 引用本文
- ▶ Email Alert
- ▶ 文章反馈
- ▶ 浏览反馈信息

本文关键词相关文章

- ▶ 现场可编程逻辑门阵列
- ▶ 空间矢量调制
- ▶ 脉冲宽度调制集成电路
- ▶ 数字控制器

本文作者相关文章

- ▶ 宋强

PubMed

- ▶ Article by