

电力电子与电力传动

三相四线制三电平三桥臂有源滤波器中点平衡控制策略

唐健, 邹旭东, 余煦, 邹云屏

电力安全与高效湖北省重点实验室(华中科技大学)

摘要: 中点平衡问题是三相四线制三电平三桥臂有源电力滤波器(active power filter, APF)的一个固有问题, 目前在矢量调制中尚无完善的控制理论完全解决此问题。该文通过对各种电流电压状态下每个三维空间矢量对直流中点电位的影响进行分析, 提出了“中点控制度”(neutral-point control grades, NPCG)的概念, 并给出了NPCG的计算公式; 基于NPCG, 在a-b-0坐标系下提出一种基于坐标平移原理的新型“三维矢量优化选择调制策略”(optimized 3D space vector modulation, O3DSVM), 该调制策略能优化选择NPCG值较高的矢量以合成目标矢量, 从而达到最大程度控制直流中点电位偏移的目的。仿真分析验证了中点控制度理论及O3DSVM调制策略的正确性和可行性, 采用该策略的APF不但中点电位得到了有效控制, 且补偿效果良好。

关键词: 三相四线制有源电力滤波器 三电平三桥臂 中点不平衡 中点控制度 三维矢量优化选择调制策略

A Research on Neutral-point Potential Balancing Control Strategy for Three-phase Four-wire Tri-level Three-leg APFs

TANG Jian, ZOU Xu-dong, SHE Xu, ZOU Yun-ping

Hubei Electric Power Security and High Efficiency Key Lab (Huazhong University of Science and Technology)

Abstract: For tri-level 3-leg converter based 3-phase 4-wire active power filter (APF), the direct current (DC) bus neutral-point potential unbalance problem is an inherent problem. There has not been any perfect theory to solve this problem completely in 3-D space vector modulation scheme. Based on the analysis of the affected extent of the neutral-point potential by every space vector on all kinds of voltage and current conditions the concept named neutral point control grade (NPCG) was proposed for the first time in this paper. The calculation formulas of NPCG were presented as well. Based on NPCG, a novel modulation scheme called optimized 3D space vector modulation (O3DSVM) scheme was proposed in a-b-0 coordinates based on the translation principle of axes, by which the space vectors with higher NPCG values are selected to synthesize the object vector to suppress the unbalance of the neutral-point potential. The simulation analysis verifies the correctness and feasibility of the proposed NPCG theory and the O3DSVM scheme. The neutral point potential was effectively controlled and the harmonic current was perfectly compensated by the APF with this proposed scheme.

Keywords: 3-phase 4-wire active power filter tri-level 3-leg neutral potential unbalancing neutral point control grade optimized 3D space vector modulation

收稿日期 2008-09-18 修回日期 2009-01-19 网络版发布日期 2009-08-31

DOI:

基金项目:

国家自然科学基金项目(50777026)。

通讯作者: 唐健

作者简介:

作者Email:

参考文献:

本刊中的类似文章

扩展功能

本文信息

- ▶ Supporting info
- ▶ PDF(892KB)
- ▶ [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

- ▶ 三相四线制有源电力滤波器
- ▶ 三电平三桥臂
- ▶ 中点不平衡
- ▶ 中点控制度
- ▶ 三维矢量优化选择调制策略

本文作者相关文章

- ▶ 唐健
- ▶ 邹云屏
- ▶ 何英杰
- ▶ 王成智
- ▶ 张杰

PubMed

- ▶ Article by Tang,j
- ▶ Article by Zou,Y.B
- ▶ Article by He,Y.J
- ▶ Article by Yu,C.Z
- ▶ Article by Zhang,j

