

电力电子与电力传动

电压源换流器型直流输电换流器损耗分析

潘武略 徐政 张静 王超

浙江大学电气工程学院 浙江大学电气工程学院 浙江大学电气工程学院 浙江大学电气工程学院

摘要: 电压源换流器型直流输电(voltage source converter based HVDC, VSC-HVDC)应用于大容量功率传输的主要障碍之一是其相对较高的换流器损耗。因而, 换流器损耗的准确计算对系统设计、器件参数及冷却装置的选择非常重要。通过分析换流器IGBT器件的开关特性, 同时考虑结温、死区效应的影响, 提出一种基于曲线拟合理论的通用换流器损耗计算方法。该方法能够有效利用厂家提供的器件特性参数, 适合于实际工程应用。在此基础上, 分析了正弦脉宽和最小开关PWM两种调制方式下的换流器损耗特性, 建立了基于PSCAD/EMTDC的通用的损耗计算模块。

关键词: 电压源换流器型直流输电 换流器损耗 脉宽调制 空间矢量 开关损耗 IGBT

Dissipation Analysis of VSC-HVDC Converter

PAN Wu-lue XU Zheng ZHANG Jing WANG Chao

Abstract: The relative higher converter dissipation is one of the main barriers for the application of VSC-HVDC in bulk power transmission system. The accurate calculation of the converter dissipation plays an important role in system design, device parameters optimization and heat sinks selection. By investigating the IGBT switching characteristics, a novel generalized dissipation calculation method based on the curve fitting theory is proposed. The impacts of junction temperature and dead time on dissipation are also taken into considered. This method is suitable for practical engineering, for it is based on IGBT datasheet provided by the manufacturers. Utilizing this method, the converter dissipations under SPWM and minimum switching loss PWM modulation techniques are analyzed and compared. A universal dissipation calculation module is established in PSCAD/EMTDC.

Keywords: VSC-HVDC converter dissipation pulse width modulation vector space switching loss IGBT

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通讯作者: 潘武略

作者简介:

作者Email: panwulue@163.com

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