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特高压输电

特高压直流碳化硅晶闸管阀损耗探讨

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摘要:

碳化硅是发展最为成熟的新型宽禁带半导体材料，且碳化硅功率器件近期已开始代替常规的硅基器件。以典型的±800 kV，额定电流为5 kA的高压直流输电工程为实例，建立了换流阀基本组件的电气模型，用PSCAD/EMTDC仿真软件搭建了换流器仿真电路，研究碳化硅晶闸管在高压直流换流阀中的应用。对基于碳化硅晶闸管和普通硅晶闸管的直流换流阀电气特性和损耗进行仿真结果比较。计算结果表明：用碳化硅晶闸管来代替传统的硅晶闸管，可以在不同的触发角和工况下大幅减少系统的功率损耗。最后估算了在直流工程中使用碳化硅晶闸管阀带来的经济效益。

关键词:

Discussion on Power Loss of HVDC Converter Valves Adopting Silicon Carbide Thyristors

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Abstract:

Among new kinds of most promising wide band gap semiconductor materials, the silicon carbide (SiC) is the most matured one, and recently the SiC power devices begin to displace conventional silicon thyristors power devices. Taking ±800 kV DC power transmission project with rated current of 5 000 A for example, an electrical model of basic components in converter valve is built and a simulation circuit for the converter is constructed by PSCAD/EMTDC software to research the application of SiC thyristors in HVDC converter valves. The electrical performances and power loss of DC converter valve consisted of SiC thyristor and that consisted of common silicon thyristors are respectively simulated and compared. Calculation results show that displacing conventional silicon thyristors by SiC thyristor can greatly decrease power loss of HVDC power transmission system under different trigger angles and operation conditions. Finally, the economic effect brought by utilizing SiC thyristors in HVDC power transmission project is estimated.

Keywords:

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