

## 基于自耦补偿与谐波屏蔽换流变压器的直流输电系统仿真研究

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### 摘要

为揭示自耦补偿与谐波屏蔽(新型)换流变压器电磁暂态瞬变过程, 模拟直流输电系统中新型换流变压器网侧与阀侧端口电压、电流的输入、输出特性以及交直流之间的相互

作用, 利用仿真软件Matlab分别建立了用于6脉动与12脉动直流输电系统的新型换流变压器仿真模型, 并将其应用到直流输电系统动态仿真中。仿真结果表明: 新型换流变压器取代传统换流变压器在一定程度上优化了直流输电系统的结构, 通过对变压器第三绕组的零阻抗设计及绕组抽头处滤波器参数的合理配置, 既能降低换流变压器网侧谐波含量、有效减少谐波与无功对换流变压器的损耗, 又改善了换流变压器阀侧的线电压与相电流, 有利于换流器可靠换相与正常运行。

关键词 [自耦补偿与谐波屏蔽; 换流变压器; 直流输电; 仿真模型](#)

分类号

## Simulation Study of DC Transmission System Based on Auto-Compensating and Harmonics Shading Converting Transformer

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### Abstract

To reveal the electromagnetic transient process in new type of converting transformer, i.e., the auto-compensating and harmonics shading converting transformer, and simulate the input and output characteristics of terminal voltages and currents at both AC and DC sides of the new type of converting transformer as well as the interaction of AC and DC system, by use of Matlab software the simulation models of new type of converting transformer for 6-pulsation and 12-pulsation DC transmission system respectively are established and applied in the dynamic simulation of DC power transmission systems. Simulation results show that substituting traditional converting transformer with new type of converting transformer the structure of DC power transmission system can be improved to a certain extent; by means of the zero-impedance design for the third winding of the transformer and rational parameter configuration of filters at the winding taps, not only the harmonics at the AC side of converting transformer can be decreased and the losses in converting transformer caused by harmonics and reactive power can be effectively reduced, but also the waveforms of line voltage and phase current of converting transformer at DC side can be improved and it is favorable to the reliable commutation and normal operation of converters.

Key words [auto-compensating and harmonics shading; converting transformer; HVDC power transmission; simulation model](#)

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