

国家重点基础研究项目

多落点直流输电系统换相失败影响因素的仿真分析

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摘要:

在多落点高压直流输电系统中, 影响换相失败的因素非常复杂。在引出送端多落点概念并建立送端和受端多落点经典模型的基础上, 针对耦合导纳、交流系统强度、故障位置这3个方面对系统逆变侧发生换相失败的影响进行了仿真分析。结果表明: 交直流并联的受端多落点系统存在强、弱临界耦合导纳2个指标, 送端多落点存在弱临界耦合导纳, 但故障后2系统难以实现同调恢复; 非耦合侧系统强度也会影响系统的换相失败, 系统强度越大, 抵抗换相失败的能力越强, 耦合侧系统强度对换相失败的影响更大; 不同故障位置和不同耦合侧对换相失败的影响不同。

关键词:

Simulative Analysis on Factors Impacting Commutation Failure in Multi-Terminal HVDC Transmission System

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Abstract:

In multi-terminal HVDC transmission system the factors impacting commutation failure are complicated. On the basis of drawing the concept of multi-terminals at sending end and building classical models for sending end with multi-infeed terminals and receiving end with multi-receiving terminals, the influences of coupling admittance, strength of AC system and fault-position on commutation failure occurred at inverter side are analyzed by simulation. Simulation results show that as for AC/DC parallel system there are two indices of strong and weak critical coupling admittance in receiving end with multi-terminals and there is the index of weak critical coupling admittance in sending end with multi-terminals, and after the fault it is difficult to recovery the two system coherently; the system strength at non-coupled side influences commutation failure too, the stronger the system, the stronger the ability to resist commutation failure, thus the influence of system strength at coupled side on commutation failure is greater; different fault-positions and different coupled side differently impact on commutation failure.

Keywords:

收稿日期 2010-05-17 修回日期 2010-05-27 网络版发布日期 2010-11-13

DOI:

基金项目:

“十一五”国家科技支撑计划重大项目(2008BAA13B01)。

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参考文献:

- [1] 徐政, 蔡晔, 刘国平. 大规模交直流电力系统仿真计算的相关问题[J]. 电力系统自动化, 2002, 26(15): 4-8. Xu Zheng, Cai Ye, Liu Guoping. Some problems in the simulation of large-scale AC/DC power systems[J]. Automation of Electric Power Systems, 2002, 26(15): 4-8(in English).
- [2] 林凌雪, 张尧, 钟庆, 等. 多馈入直流输电系统中换相失败研究综述[J]. 电网技术, 2006, 30(17): 40-46. Lin Lingxue, Zhang Yao, Zhong Qing, et al. A survey on commutation failures in multi-infeed HVDC transmission systems[J]. Power System Technology, 2006, 30(17): 40-46(in English).
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徐政, 韩祯祥. NETOMAC在直流输电系统仿真研究中的应用[J]. 电力自动化设备, 2001, 21(4): 10-14. Yang Weidong, Xu Zheng, Han Zhenxiang, Application of NETOMAC on HVDC system simulation[J]. Electric Power Automation Equipment, 2001, 21(4): 10-14(in English). [4] 赵良, 郭强, 覃琴, 等. 660 kV同塔双回直流线路与其送/受端交流系统的相互影响[J]. 电网技术, 2009, 33(19): 83-86. Zhao Liang, Guo Qiang, Qin Qin, et al. Research on interaction of  $\pm 660$  kV power transmission project adopting layout of double circuit on the same tower with AC power systems at its sending and receiving ends [J]. Power System Technology, 2009, 33(19): 83-86(in English). [5] 项玲, 郑建勇, 胡明强. 多端和多馈入直流输电系统中换相失败的研究[J]. 电力系统自动化, 2005, 29(11): 29-33. Xiang Ling, Zheng Jianyong, Hu Minqiang. Study on commutation failure in MTDC and MIDC systems[J]. Automation of Electric Power Systems, 2005, 29(11): 29-33(in English). [6] 吴冲, 李兴源, 何朝荣. 多馈入直流交互作用因子在换相失败中的应用[J]. 继电器, 2007, 35(9): 26-31. Wu Chong, Li Xingyuan, He Chaorong. Application of multi-infeed interaction factor in South Grid commutation failure research [J]. Relay, 2007, 35(9): 26-31(in English). [7] Lee H A D, Andersson G. Voltage stability analysis of multi-infeed HVDC systems [J]. IEEE Trans on Power Delivery, 1997, 12(3): 1309-1316. [8] Lee H A D, Andersson G. Power stability analysis of multi-infeed HVDC systems [J]. IEEE Trans on Power Delivery, 1997, 12(3): 923-931. [9] Lips H P. Aspects of multiple infeed of HVDC inverter station into a common AC system [J]. IEEE Trans on Power Apparatus and Systems, 1973, 92(2): 135-141. [10] 杨卫东, 徐政, 韩祯祥. 多馈入交直流电力系统研究中的相关问题[J]. 电网技术, 2000, 24(8): 13-17. Yang Weidong, Xu Zheng, Han Zhenxiang. Special issues and suggestions on multi-infeed AC/DC power systems[J]. Power System Technology, 2000, 24(8): 13-17(in English). [11] 胡林献, 陈学允. 崩溃点法交直流联合系统电压稳定分析[J]. 中国电机工程学报, 1997, 17(6): 395-398. Hu Linxian, Chen Xueyun. Point of collapse method applied to voltage stability analysis of AC/DC power system[J]. Proceedings of the CSEE, 1997, 17(6): 395-398(in English). [12] 陈树勇, 李新年, 余军, 等. 基于正余弦分量检测的高压直流换相失败预防方法[J]. 中国电机工程学报, 2005, 25(14): 1-6. Chen Shuyong, Li Xinnian, Yu Jun, et al. A method based on the sin-cos components detection mitigates commutation failure in HVDC [J]. Proceedings of the CSEE, 2005, 25(14): 1-6(in English). [13] 何朝荣, 李兴源, 金小明, 等. 高压直流输电系统换相失败的判断标准[J]. 电网技术, 2006, 30(22): 19-23. He Chaorong, Li Xingyuan, Jin Xiaoming, et al. Simulation analysis on commutation failure criteria for HVDC transmission systems [J]. Power System Technology, 2006, 30(22): 19-23(in English). [14] 何朝荣, 李兴源. 影响多馈入高压直流换相失败的耦合导纳研究[J]. 中国电机工程学报, 2008, 28(7): 51-57. He Chaorong, Li Xingyuan. Study on mutual admittance and commutation failure for Multi-infeed HVDC transmission systems [J]. Proceedings of the CSEE, 2008, 28(7): 51-57(in English). [15] Kundur P. Power system stability and control[M]. 北京: 中国电力出版社, 2002: 323-326. [16] 刘建, 李兴源, 傅孝韬, 等. 多馈入短路比及多馈入交互作用因子与换相失败的关系[J]. 电网技术, 2009, 33(12): 20-25. Liu Jian, Li Xingyuan, Fu Xiaotao, et al. Relationship of multi-infeed short circuit ratio and multi-infeed interaction factor with commutation failure[J]. Power System Technology, 2009, 33(12): 20-25(in English). [17] 魏星. 交流系统强度对HVDC故障恢复特性影响的仿真分析[J]. 电力科学与工程, 2007, 23(3): 24-26. Wei Xing. Simulation analysis of AC system strength on HVDC fault restoration characteristics[J]. Electric Power Science and Engineering, 2007, 23(3): 24-26(in English). [18] 林伟芳, 汤涌, 卜广全. 多馈入交直流系统电压稳定性研究[J]. 电网技术, 2008, 32(11): 7-12. Lin Weifang, Tang Yong, Bu Guangquan. Study on voltage stability of multi-infeed HVDC power transmission system[J]. Power System Technology, 2008, 32(11): 7-12(in Chinese). [19] 林伟芳, 汤涌, 卜广全. 多馈入交直流系统短路比的定义和应用[J]. 中国电机工程学报, 2008, 28(12): 1-8. Lin Weifang, Tang Yong, Bu Guangquan. Definition and application of short circuit ratio for multi-infeed AC/DC power systems [J]. Proceedings of the CSEE, 2008, 28(12): 1-8(in English).

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