

自动化

不同电压等级同塔四回输电线路不同运行方式下零序互感对接地距离保护的影响

赵凯超,周泽昕,杜丁香

中国电力科学研究院,北京市 海淀区 100192

摘要: 分析了不同电压等级同塔四回线路在不同运行方式下,零序互感对接地距离保护零序电流补偿系数及测量阻抗的影响。理论分析表明:所有运行方式中,线路同塔双回运行时零序电流补偿系数最大,测量阻抗最小;1回运行,其他3回检修接地时,对应的零序电流补偿系数最小,测量阻抗最大。在此基础上,给出了接地距离保护零序电流补偿系数的整定建议。利用RTDS对1?000?kV/500?kV同塔四回线路进行了仿真验证,仿真结果与理论分析一致。

关键词:

Influence of Zero-Sequence Mutual Inductance on Earth-Fault Distance Protection for Four-Circuit Transmission Lines Belonging to Different Voltage Classes on Same Tower Under Different Operation Modes

ZHAO Kai-chao ,ZHOU Ze-xin ,DU Ding-xiang

China Electric Power Research Institute, Haidian District, Beijing 100192, China

Abstract: The influences of zero-sequence mutual inductance on zero-sequence current compensating factor and measured impedance of earth-fault distance protection for four-circuit transmission lines belonging to different voltage classes on same tower under different operation modes are analyzed. Theoretical analysis results show that in all operation modes the zero-sequence current compensating factor reaches its highest value and the measured impedance reaches its lowest value under the operation mode of two-circuit transmission lines on the same tower; the zero-sequence current compensating factor is the lowest and the measured impedance is the highest under the condition that one circuit is operated and the rest of the circuits are artificially grounded for the maintenance. On this basis, a suggestion on the setting of zero-sequence current compensating factor of earth-fault distance protection is given. Simulation verification of four-circuit transmission lines respectively belonging to 500?kV and 1?000?kV power grids on the same tower is performed by real-time digital simulator (RTDS), and simulation results conform to the results of theoretical analysis.

Keywords:

收稿日期 2010-06-18 修回日期 2010-07-27 网络版发布日期 2010-12-10

DOI:

基金项目:

通讯作者: 赵凯超

作者简介:

作者Email: kaichaozhao@163.com

参考文献:

- [1] 徐建国. 对国外超高压同塔多回送电线路技术的调研分析[J]. 电力建设, 2001, 22(7): 15-18. Xu Jianguo. Investigation and analysis on transmission line technique of EHV multiple - circuit on the same tower abroad[J]. Electric Power Construction, 2001, 22(7): 15-18(in Chinese).
- [2] 班连庚, 王晓刚, 白宏坤, 等. 同塔架设的220?kV/500?kV输电线路感应电流与感应电压仿真分析[J]. 电网技术, 2009, 33(6): 45-49. Ban Liangeng, Wang Xiaogang, Bai Hongkun, et al. Simulative analysis of induced voltages and currents among multi circuit 220?kV and 500?kV transmission lines on same tower[J]. Power System Technology, 2009, 33(6): 45-49(in Chinese).
- [3] 刘杰, 赵志斌, 崔翔. 基于混合法的不同电压等级同塔四回线路无线电干扰计算[J]. 电网技术, 2009, 33(20): 168-172. Liu Jie, Zhao Zhibin, Cui Xiang. Radio interference calculation of four circuits belonging to different voltage classes on same tower by hybrid method[J]. Power System Technology, 2009, 33(20): 168-172(in Chinese).
- [4] 张琦兵, 邵能灵, 袁成. 同塔四回输电线的相模变换[J]. 中国电机工程学报, 2009, 29(34): 57-62. Zhang Qibing, Tai Nengling, Yuan Cheng. Phase-mode transformation of four-parallel lines on the same

扩展功能

本文信息

- ▶ Supporting info
- ▶ PDF(352KB)
- ▶ [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

本文作者相关文章

PubMed

tower[J]. Proceedings of the CSEE, 2009, 29(34): 57-62(in Chinese). [5] 韦钢, 薛敏. 同杆并架4回输电线路的探讨[J]. 电力建设, 1999, 20(3): 4-7. Wei Gang, Xue Min. Investigating the four-circuit transmission lines erected on the same pole[J]. Electric Power Construction, 1999, 20(3): 4-7(in Chinese). [6] 王晓彤, 林集明, 班连庚. 广东500kV同塔四回线路相序排列的选择[J]. 电网技术, 2009, 33(19): 87-91. Wang Xiaotong, Lin Jiming, Ban Liangeng. Selection of phase sequence arrangement for Guangdong 500kV power transmission line adopting structure of four circuits on the same tower[J]. Power System Technology, 2009, 33(19): 87-91(in Chinese). [7] 冯桂宏, 张炳义, 王晓晖, 等. 500kV同塔四回路生态环境影响分析[J]. 电网技术, 2007, 31(23): 52-56. Feng Guihong, Zhang Bingyi, Wang Xiaohui, et al. Analysis on impact of 500kV transmission line adopting four circuit on the same tower on ecological environment[J]. Power System Technology, 2007, 31(23): 52-56(in Chinese). [8] 张晓, 贾振宏, 吴锁平. 500/220kV混压同塔四回线路电磁环境的仿真分析[J]. 电网技术, 2010, 34(5): 207-211. Zhang Xiao, Jia Zhenhong, Wu Suoping. Simulation analysis on electromagnetic environment of quadruple-circuit transmission lines belonging to different voltage classes on the same tower[J]. Power System Technology, 2010, 34(5): 207-211(in Chinese). [9] 郭润生, 何彩红, 鄧建杰. 相邻线路零序互感对线路零序纵联方向保护的影响[J]. 继电器, 2004, 32(9): 71-73. Guo Runsheng, He Caihong, Zhi Jianjie. Influence of zero-sequence mutual inductance to pilot protection in parallel lines[J]. Relay, 2004, 32(9): 71-73(in Chinese). [10] 孔伟彬, 朱晓彤, 张俊洪, 等. 同杆双回线上零序功率方向继电器的误判问题[J]. 电力系统自动化, 2002, 26(22): 45-48. Kong Weibin, Zhu Xiaotong, Zhang Junhong, et al. Wrong judgement of zero sequence directional relay on double-circuit line on the same pole[J]. Automation of Electric Power Systems, 2002, 26(22): 45-48(in Chinese). [11] 刘天斌, 张月品. 同塔并架线路接地距离保护零序电流补偿系数整定[J]. 电力系统自动化, 2008, 32(10): 101-103. Liu Tianbin, Zhang Yueping. Zero sequence current compensation factor setting of earth fault protection for double-circuit transmission line[J]. Automation of Electric Power Systems, 2008, 32(10): 101-103(in Chinese). [12] 康小宁, 梁振锋, 索南加乐. 相邻线路零序互感对平行双回线电流平衡保护的影响及改进措施[J]. 继电器, 2005, 33(20): 1-4. Kang Xiaoning, Liang Zhenfeng, Suonan Jiale. Influence of zero sequence mutual inductance to transverse differential current protection and approaches to the improved measures[J]. Relay, 2005, 33(20): 1-4(in Chinese). [13] 潘震东, 张嘉, 顾承昱. 500kV同塔四回线路工频过电压研究[J]. 华东电力, 2007, 35(3): 24-27. Pan Zhendong, Zhang Jia, Gu Chengyu. Power frequency over-voltage of 500kV four-circuit lines on the same tower[J]. East China Electric Power, 2007, 35(3): 24-27(in Chinese). [14] 余胜, 许钢, 余琼. 不同电压等级同杆并架多回线路的故障定位[J]. 电力系统保护与控制, 2009, 37(6): 44-47. Yu Sheng, Xu Gang, Yu Qiong. Fault location for multiple circuit overhead lines of different voltage grade on the same tower[J]. Power System Protection and Control, 2009, 37(6): 44-47(in Chinese). [15] 韦钢, 张一尘. 多回线同杆并架产生的循环电流及其补偿[J]. 继电器, 1997, 25(5): 6-10. Wei Gang, Zhang Yichen. Parallel multi-loop transmission lines produce circulating current and its compensation[J]. Relay, 1997, 25(5): 6-10(in Chinese). [16] 任明珠. 同塔四回线继电保护若干问题研究[D]. 上海: 上海交通大学, 2009.

本刊中的类似文章