

特高压输电

特高压线路地线布置方式对地线电能损耗及潜供电流的影响

李振强,戴敏,娄颖,李志军

国网电力科学研究院, 湖北省 武汉市 430074

摘要:

由于导线的电磁耦合作用、线路的不完全平衡换位和三相负荷的不对称性, 2根架空地线之间或地线与大地之间会形成感应电流回路, 从而在地线上产生电能损耗。不同的地线布置方式感应电流不同, 电能损耗差别很大; 架空地线的布置方式对线路潜供电流会产生一定的影响, 这也决定了在模拟计算时建立仿真模型的难易。文中利用EMTP软件对特高压同塔双回输电线路不同布置方式下地线的感应电压、电流及线路潜供电流进行了仿真计算, 根据计算结果, 从减小电能损耗和潜供电流的角度考虑, 可选出较佳的地线布置方式; 在保证潜供电流计算精度的前提下, 可选择易于建模的地线布置方式。

关键词: 特高压 架空地线 感应电压 感应电流 电能损耗 潜供电流

Effect of UHV Ground Wire Disposition on Its Electric Energy Loss and Second Arc Current

LI Zhen-qiang ,DAI Min ,LOU Ying ,LI Zhi-jun

State Grid Electric Power Research Institution, Wuhan 430074, Hubei Province, China

Abstract:

Owing to electromagnetic coupling of conductors, as well as incomplete balanceable transposition of transmission lines and asymmetry of three phase load, it forms a circuit of inductive current between the two ground wires or ground wires and the earth, so it produces electric energy loss. The inductive currents are different because of different ground wire disposition, hence the electric energy loss has great disparity. Ground wire disposition has some impacts on second arc current of transmission lines, and it also can influence simulation model while analog computating. Combining the UHV same tower double circuit transmission, using electromagnetic transients program EMTP to calculate inductive current of ground wire and second arc current of transmission lines. In this paper, it gives the preferable ground wire disposition mode based on the calculation results, which gives attention to reducing ground wire electric energy loss and second arc current of transmission lines. In addition, it can select the ground wire disposition mode which is easy to modeling while guaranteeing calculation accuracy of second arc current.

Keywords: UHV ground wire induced voltage induced current electric energy loss second arc current

收稿日期 2009-02-06 修回日期 2009-07-29 网络版发布日期 2010-02-11

DOI:

基金项目:

通讯作者: 李振强

作者简介: 李振强(1982—), 男, 工程师, 主要从事电力系统过电压与绝缘配合的研究工作, E-mail: lizhenqiang@sgepri.com。

作者Email: lizhenqiang@sgepri.com

参考文献:

[1] 张纬钺, 何金良, 高玉明. 过电压防护及绝缘配合[M]. 北京: 清华大学出版社, 2002: 104-105. [2] 胡毅, 叶廷路, 王力农, 等. 光纤复合架空地线的雷击断股机理与防治措施[J]. 电网技术, 2006, 30(16): 70-76. Hu Yi, Ye Tinglu, Wang Linong, et al. Strands breaking mechanisms of optical fiber composite overhead ground wire caused by lightning stroke and corresponding preventive measures[J]. Power System Technology, 2006, 30(16): 70-76(in Chinese). [3] 孙业成, 赵大平, 陈希. 电力系统信息产业的发展方向[J]. 电网技术, 2000, 24(12): 37-40. Sun Yecheng, Zhao Daping, Chen Xi. Development

扩展功能

本文信息

- ▶ Supporting info
- ▶ PDF(314KB)
- ▶ [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

- ▶ 特高压
- ▶ 架空地线
- ▶ 感应电压
- ▶ 感应电流
- ▶ 电能损耗
- ▶ 潜供电流

本文作者相关文章

PubMed

direction of information technology in power industry[J]. Power System Technology, 2000, 24(12): 37-40 (in Chinese). [4] 李杰, 陈希, 林卫铭. 光纤复合架空地线(OPGW)热性能的研究[J]. 电网技术, 2006, 30(1): 89-93. Li Jie, Chen Xi, Lin Weiming. Study on heat properties of optical fiber composite overhead ground wires[J]. Power System Technology, 2006, 30(1): 89-93(in Chinese). [5] 邹军, 刘元庆, 袁建生, 等. 光缆复合地线系统故障电流分布的计算与讨论[J]. 电网技术, 2005, 29(10): 61-64. Zou Jun, Liu Yuanqing, Yuan Jiansheng, et al. Calculation and analysis of fault current distribution for compound optical ground wire system[J]. Power System Technology, 2005, 29(10): 61-64(in Chinese). [6] 吴康平. 500 kV线路绝缘地线设计[J]. 电力建设, 2001, 22(11): 11-13. Wu Kangping. 500 kV transmission line insulated ground wire design[J]. Electric Power Construction, 2001, 22(11): 11-13(in Chinese). [7] 东北电力设计院. 电力工程高压送电线路设计手册[M]. 北京: 中国电力出版社, 2002: 156-157. [8] 曹荣江, 顾霓鸿, 盛勇. 电力系统潜供电弧自灭特性的模拟研究[J]. 中国电机工程学报, 1996, 15(2): 73-78. Cao Rongjiang, Gu Nihong, Sheng Yong. Test study oil self-extinction behavior of secondary arc on power system[J]. Proceedings of the CSEE, 1996, 15(2): 73-78(in Chinese). [9] Laszlo Prikler, Mustafa Kizilcay, Gabor Ban, et al. Improved secondary arc model based on identification of arc parameters from staged fault test records[C]. 14th PSCC, Sevilla, Spain, 2002. [10] 蒋卫平, 朱艺颖, 吴雅妮, 等. 750 kV输变电示范工程单相人工接地故障试验现场实测和计算分析[J]. 电网技术, 2006, 30(19): 43-47. Jiang Weiping, Zhu Yiyong, Wu Yani, et al. Analysis on measured and calculated results of artificial single phase grounding test in 750 kV transmission pilot project[J]. Power System Technology, 2006, 30(19): 43-47(in Chinese). [11] 谷定燮, 周沛洪. 特高压输电系统过电压潜供电流和无功补偿[J]. 高电压技术, 2005, 31(11): 21-25. Gu Dingxie, Zhou Peihong. Overvoltage second arc current and reactive-load compensation of UHV transmission system [J]. High Voltage Engineering, 2005, 31(11): 21-25(in Chinese). [12] 和彦森, 宋杲, 曹荣江. 特高压同塔双回输电线路潜供电弧模拟试验等价性研究[J]. 电网技术, 2008, 32(22): 4-7. He Yanmiao, Song Gao, Cao Rongjiang. The Equivalence research for secondary arc simulation test of UHV with double circuit transmission lines[J]. Power System Technology, 2008, 32(22): 4-7(in Chinese). [13] 舒印彪. 1 000 kV交流特高压输电技术的研究与应用[J]. 电网技术, 2005, 29(19): T2-T6. [14] 商立群, 施围. 同杆双回输电线路的潜供电流和恢复电压[J]. 高电压技术, 2003, 29(10): 22-23. Shang Liqun, Shi Wei. Secondary arc current and recovery voltage on double-circuit lines on the same pole[J]. High Voltage Engineering, 2003, 29(10): 22-23(in Chinese). [15] 林莘, 何柏娜, 徐建源. 潜供电弧的仿真分析[J]. 高压电器, 2007, 43(1): 8-10. Lin Xin, He Baina, Xu Jianyuan. Simulation and analysis of secondary arc[J]. High Voltage Apparatus, 2007, 43(1): 8-10(in Chinese).

本刊中的类似文章

1. 杨杰 侯春青 .1 000 kV线路解列后山西电网变化情况与控制措施分析[J]. 电网技术, 2009,33(17): 19-23
2. 张冰 刘连光 肖湘宁.采用电网直流等效模型评估地磁感应电流水平的影响因素分析[J]. 电网技术, 2009,33(8): 13-17
3. 李显鑫 郭咏华 唐明贵.1 000 kV交流双回路单柱组合耐张塔型式规划[J]. 电网技术, 2009,33(7): 1-6
4. 郭小江 马世英 卜广全 汤涌.上海多馈入直流系统的无功控制策略[J]. 电网技术, 2009,33(7): 30-35
5. 刘连光 刘春明 张冰.磁暴对我国特高压电网的影响研究[J]. 电网技术, 2009,33(11): 1-5
6. 王羽 文习山 胡京 黄瑞平 陈虎 段玉祥 .特高压交流输电线路中相绕击模拟试验研究[J]. 电网技术, 2008,32(16): 1-4
7. 杨小兵|李兴源|金小明|郝巍 .云广特高压直流输电系统中换流变压器铁心饱和和不稳定分析[J]. 电网技术, 2008,32(19): 5-9
8. 石岩|张民|赵大平 .特高压直流工程二次系统成套设计方案及其特点[J]. 电网技术, 2008,32(21): 1-5
9. 张军|张斌|刘华|李黎|张新旺 .全封闭集中式特高压设备绝缘油处理系统[J]. 电网技术, 2008,32(21): 6-8
10. 谢惠藩 张尧 夏成军 林凌雪 .交直流互联电网直流功率调制相关问题[J]. 电网技术, 2009,33(4): 43-50
11. 孙景强|郭小江|张健|陈志刚|卜广全|陈家荣 .多馈入直流输电系统受端电网动态特性[J]. 电网技术, 2009,33(4): 57-60
12. 陈汉雄|胡劲松 .金沙江一期送端特高压直流输电系统协调控制[J]. 电网技术, 2008,32(8): 10-14
13. 吕 虎|朱艺颖|杨 铭 .多个特高压直流系统送端共用接地极的内过电压研究[J]. 电网技术, 2008,32(10): 5-10
14. 王俊永 周敏 周春霞 .快速失步解列装置在特高压电网的应用[J]. 电网技术, 2008,32(26): 1-3
15. 卫蜀作 蔡邠 .受端合理配置核电的重要性及其在改善电网运行状态和增强主网架结构中的作用[J]. 电网技术, 2008,32(10): 54-57