

高压技术

750 kV高压电抗器笼式出线结构均压特性研究

包博¹, 谢天喜¹, 彭宗仁¹, 刘鹏¹, 莫娟²

1. 电力设备电气绝缘国家重点实验室(西安交通大学), 陕西省 西安市 710049; 2. 中国电力科学研究院, 北京市 海淀区 100192

摘要:

750kV变电站内高压电抗器多采用笼式分裂导线与管母连接, 该结构形式较为复杂, 容易发生严重的电晕放电, 不仅造成功率损耗, 而且给周围环境带来可听噪声和无线电干扰, 因此有必要对高压电抗器出线结构采取一定的防晕措施。本文采用三维有限元法, 对750kV变电站高压电抗器出线回路进行了仿真计算, 得出了其三维电位及电场分布规律, 研究了笼式出线各分裂导线表面的电场分布情况, 分析了不同屏蔽环配置对其分布的影响, 提出了高压电抗器笼式出线结构的屏蔽环配置建议。本文的研究成果有效的改善了750kV高压电抗器笼式出线结构的均压特性, 已在750kV电站的设计和建设中得到应用。

关键词: 高压电抗器 笼式出线 电场分布 电晕 屏蔽环 有限元

Voltage-Sharing Characteristics of Cage Outgoing Line Structure for HV Reactors in 750 kV Power Grid

BAO Bo¹, XIE Tianxi¹, PENG Zongren¹, LIU Peng¹, MO Juan²

1. State Key Laboratory of Electrical Insulation and Power Equipment (Xi'an Jiaotong University), Xi'an 710049, Shaanxi Province, China; 2. China Electric Power Research Institute, Haidian District, Beijing 100192, China

Abstract:

Cage outgoing line structure was widely used in 750kV high voltage reactor. Due to its complex structure, it usually caused serious corona in the power station. This phenomenon can not only cause power loss, but also bring audible noise and radio interference to the surrounding environment, so it is significant to carry out research in order to reduce the influence. With three-dimensional finite element method, this paper established model of high voltage reactor loop and calculated the potential and electric field distribution of cage outgoing line structure. The results showed the surface electric field distribution of each bundle conductor. Then the influence of different shielding ring configuration schemes was proposed. Finally, shielding ring configuration suggestions were given at the end of this paper. The results in this paper, which effectively improved the voltage-sharing characteristics of cage outgoing line structure, have been used in the 750kV power stations.

Keywords: high voltage reactor cage-outgoing line electric field distribution corona shielding ring finite element

收稿日期 2010-11-02 修回日期 2010-12-13 网络版发布日期 2011-05-18

DOI:

基金项目:

通讯作者: 包博

作者简介:

作者Email: hunter0104@126.com

参考文献:

- [1] 杜澍春. 交流750kV单回线路杆塔空气间隙的研究[J]. 电网技术, 2008, 32(19): 5-8. Du Shuchun. Research on air clearance of tower for AC 750kV single circuit transmission line[J]. Power System Technology, 2008, 32(19): 5-8(in Chinese).
- [2] 衣立东, 吕世荣. 750kV输变电示范工程施工关键技术的研究与应用[J]. 电网技术, 2006, 29(3): 61-66. Yi Lidong, Lu Shirong. Study and application of construction key technologies for 750kV transmission and transformation demonstration project[J]. Power System Technology, 2006, 29(3): 61-66(in Chinese).
- [3] 杨万开, 史可琴, 范越, 等. 750kV输

扩展功能

本文信息

- ▶ Supporting info
- ▶ PDF(948KB)
- ▶ [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

- ▶ 高压电抗器
- ▶ 笼式出线
- ▶ 电场分布
- ▶ 电晕
- ▶ 屏蔽环
- ▶ 有限元

本文作者相关文章

PubMed

变电示范工程1500MVA满负荷试验[J]. 电网技术, 2008, 32(7): 29-33. Yang Wankai, Shi Keqin, Fan Yue, et al. Research on 1 500 MVA full-load test of 750 kV power transmission pilot project[J]. Power System Technology, 2008, 32(7): 29-33(in Chinese). [4] 潘炜, 刘文颖, 杨以涵, 等. 电磁环网条件下西北750kV电网运行方式的研究[J]. 电网技术, 2007, 31(15): 37-42. Pan Wei, Liu Wenyong, Yang Yihan, et al. Research on operating modes of 750 kV Northwest China Power Grid electro-magnetically coupled with 330 kV power grid[J]. Power System Technology, 2007, 31(15): 37-42(in Chinese). [5] 严璋, 朱德恒. 高电压绝缘技术[M]. 北京: 中国电力出版社, 2007: 119-123. [6] 周克定. 工程电磁场数值计算理论方法及应用[M]. 北京: 高等教育出版社, 1994: 54-66. [7] 杨宪章. 工程电磁场[M]. 北京: 中国水利水电出版社, 2002: 33-38. [8] 王勛成. 有限单元法[M]. 北京: 清华大学出版社, 2003: 530-558. [9] 龚曙光. ANSYS基础应用及范例解析[M]. 北京: 机械工业出版社, 2003: 15-35. [10] 谢梁, 谷莉莉, 郑怀清, 等. 特高压交流刚性跳线金具电晕试验[J]. 高电压技术, 2009, 35(3): 470-474. Xie Liang, Gu Lili, Zheng Huaiqing, et al. Corona test for UHVAC rigid jumper[J]. High Voltage Engineering, 2009, 35(3): 470-474(in Chinese). [11] 王蕊. 750?kV耐张转角塔跳线型式研究[D]. 西安: 西安交通大学, 2008. [12] 黄道春, 阮江军, 文武, 等. 特高压交流输电线路电磁环境研究[J]. 电网技术, 2007, 31(1): 6-11. Huang Daochun, Ruan Jiangjun, Wen Wu, et al. Study on electromagnetic environment of UHVAC transmission lines[J]. Power System Technology, 2007, 31(1): 6-11(in Chinese). [13] 陈勇, 万启发, 霍峰, 等. 1?000?kV交流输电线路导线的电晕特性[J]. 高电压技术, 2007, 33(11): 43-45. Chen Yong, Wan Qifa, Huo Feng, et al. Corona characteristics of conductors for 1?000?kV AC transmission lines[J]. High Voltage Engineering, 2007, 33(11): 43-45(in Chinese). [14] 彭宗仁, 刘鹏, 高乃奎. 超/特高压输电线路用复合绝缘子大、小均压环配置结构: 中国, CN1848307[P]. 2006-10-18. [15] 王斌, 彭宗仁. 500?kV线路绝缘子电压分布的有限元法计算[J]. 电瓷避雷器, 2003(1): 13-15. Wang Bin, Peng Zongren. A finite element method for the calculation of the voltage distribution along the 500?kV line insulators[J]. Insulators and Surge Arresters, 2003(1): 13-15(in Chinese). [16] 谢天喜, 刘鹏, 李靖, 等. 交流1?000?kV同塔双回输电线路复合绝缘子电场分布[J]. 高电压技术, 2010, 36(1): 224-229. Xie Tianxi, Liu Peng, Li Jing, et al. Electric field distribution of composite insulator on AC 1?000?kV double circuit transmission line on the same tower[J]. High Voltage Engineering, 2010, 36(1): 224-229(in Chinese). [17] 王泽忠, 刘士利, 孙静. 特高压交流变电站设备附近工频电场计算[J]. 高电压技术, 2010, 36(1): 81-85. Wang Zezhong, Liu Shili, Sun Jing. Calculation of power frequency electric field near equipments in UHVAC substations[J]. High Voltage Engineering, 2010, 36(1): 81-85(in Chinese). [18] Xie Tianxi, Peng Zongren. Study on the voltage-sharing performance of porcelain insulators on 750?kV compact double circuit transmission line [C]//Proceedings of the 9th International Conference on Properties and Applications of Dielectric Materials. Harbin, China: IEEE, 2009: 192-195. [19] 张海峰, 庞其昌, 陈秀春. 高压电晕放电特征及其检测[J]. 电测与仪表, 2006, 43(2): 6-8,31. Zhang Haifeng, Pang Qichang, Chen Xiuchun. The characteristics of high-voltage corona and its detection[J]. Electrical Measurement & Instrumentation, 2006, 43(2): 6-8,31(in Chinese). [20] 刘云鹏, 马国明, 律方成. 基于紫外成像技术的电气设备放电故障定位[J]. 高电压技术, 2007, 33(5): 79-82. Liu Yunpeng, Ma Guoming, Lü Fangcheng. Based on UV imaging technology locating discharge of power equipment[J]. High Voltage Engineering, 2007, 33(5): 79-82(in Chinese).

本刊中的类似文章

1. 龚有军|朱普轩|曾 嵘 .750 kV同塔同窗同相序紧凑型输电技术的可行性研究[J]. 电网技术, 2008,32(13): 50-54
2. 舒立春|赖向平|蒋兴良|余德芬|冯 杰|胡 琴|张建辉|M. Farzaneh.直流正极性下冰柱-冰板电极中电晕放电量的分析[J]. 电网技术, 2007,31(21): 46-51
3. 肖冬萍|何 为|谢鹏举|康 鹏|刘华麟|张占龙.高压输电线路电晕放电特性及其电磁辐射场计算[J]. 电网技术, 2007,31(21): 52-55
4. 曾庆禹.特高压输电线路电气和电晕特性研究[J]. 电网技术, 2007,31(19): 1-8
5. 黄道春|阮江军|文 武|李昊星|赵全江|郑 伟.特高压交流输电线路电磁环境研究[J]. 电网技术, 2007,31(1): 6-11
6. 杨晓琳 律方成 刘云鹏 马国明 .基于数学形态学的电力设备紫外图像放电区域提取[J]. 电网技术, 2008,32(7): 96-99
7. 马 俊|蒋兴良|张志劲|胡建林|舒立春 .交流电场对绝缘子覆冰形成的影响机理[J]. 电网技术, 2008,32(5): 7-11
8. 安冰|丁燕生|王伟|于壮状|李成榕|王益旭|樊飞|杨波 .湿度对电晕笼中导线直流电晕特性的影响[J]. 电网技术, 2008,32(24): 98-100
9. 周勤勇, 郭 强, 冯玉昌, 史可琴, 寇惠珍.可控高压电抗器在西北电网的应用研究[J]. 电网技术, 2006,30(6): 48-52
10. 赖向平, 舒立春, 蒋兴良, 余德芬, 张建辉, M. Farzaneh.冰凌针-板间隙直流正极性下起始电晕特性的研究[J]. 电网技术, 2006,30(7): 32-36
11. 陈政 康义 马怡情.广东—海南500 kV交流跨海联网工程无功补偿及电磁暂态研究[J]. 电网技术, 2009,33(19): 143-147
12. 黄道春 阮江军 吴高波 廖才波 舒胜文 张坤 普子恒 涂其华.具有串并联结构的模块化多断口真空断路器静动态电压分布特性[J]. 电网技术, 2011,35(7): 181-186

