

高电压技术

双断口真空开关瞬态恢复电压分布特性的仿真与实验研究

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摘要: 双断口真空开关介质恢复特性及暂态过程均压关系的探明是其成功开断的理论依据。运用暂态分析软件ATP搭建双断口真空开关仿真平台, 利用其暂态分析控制系统实现了暂态真空电弧模型, 在真空开关两断口有、无均压电容的情况下分别进行故障电流开断的仿真实验。搭建两真空灭弧室串联的双断口真空开关实验模型进行瞬态恢复电压分布特性的实验研究。实验与仿真结果吻合, 共同证明双断口真空开关分断是否成功主要取决于介质恢复过程断口间电压分布是否均匀, 两断口间的分压关系在动态介质恢复过程中主要由电弧电阻决定, 而动态介质恢复完成后主要由断口两端的电容决定。因此, 低分散性操动机构的设计与灭弧室两端均压电容的选定是双断口及多断口真空开关成功开断的关键因素。

关键词: 真空开关 双断口 动态介质恢复 暂态恢复电压 均压电容

Simulation and Experimental Research on Transient Recovery Voltage Distribution Property for Vacuum Switch With Double-break

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Abstract: The explanation of dielectric recovery characteristics and transient recovery voltage distribution properties of vacuum switch with double-break is theoretical basis for its successful interruption. The simulation platform of vacuum switch with double-break was built up by alternative transients program, and the transient vacuum arc model was realized using transient analysis of control systems. The fault current interruption simulations were conducted under the conditions of two interrupters parallel with and without grading capacitors. The experimental model of vacuum switch with double-break was set up, and the transient recovery voltage distribution properties of experimental model were studied. The experimental results and simulation data showed that the successful interruption of vacuum switch with double-break mostly depends on the voltage average distribution between two interrupters in the dielectric recovery process. The voltage distribution between two interrupters is decided by their arc resistances in the dynamic dielectric recovery process, and it is decided by their equivalent capacitors after the dynamic dielectric recovery process. Therefore, the application of low dispersion operation mechanism and the selection of grading capacitors are the key factors of successful interruption of vacuum switch with double-break and multi-break.

Keywords: vacuum switch double-break dynamic dielectric recovery transient recovery voltage grading capacitors

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参考文献:

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2. 裴振江 姚斯立 何俊佳 叶会生. 一种新的特高压断路器合成试验回路[J]. 中国电机工程学报, 2007,27(33): 65-69
  3. 车文俊 千叶智基 张晓星 宋继军 菅雅弘. 1 000 kV瓷外套金属氧化物避雷器的电位分布研究[J]. 中国电机工程学报, 2009,29(22): 53-57
  4. 廖敏夫 段雄英 邹积岩. 单断口和三断口串联真空灭弧室绝缘击穿统计特性[J]. 中国电机工程学报, 2007,27(12): 97-102
  5. 陈明帆 段雄英 黄智慧 邹积岩 董恩源. 真空开关动作时间的自适应控制[J]. 中国电机工程学报, 2010,30(36): 22-26
  6. 文化宾 宋永端 邹积岩 郑占锋. 新型126 kV高压真空断路器的设计及开断能力试验研究[J]. 中国电机工程学报, 2011,31(34): 198-204
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