

特高压输电

超/特高压交流输电线路断路器合闸电阻的适用性研究

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摘要: 断路器合闸电阻能较好地限制超高压与特高压交流系统合闸过电压, 但因其结构复杂、成本高等缺点, 故是否有必要采取该措施值得研究。作者采用软件仿真技术, 探讨了不同情况下超高压与特高压交流系统合闸电阻的适用问题。研究表明, 对于500 kV交流系统, 当线路长度在100 km以下时, 通常可以取消合闸电阻; 当长度在100~200 km时, 需根据具体情况进行分析确定是否有必要采用合闸电阻; 当长度在200~400 km时, 一般应采用合闸电阻, 但也可采取在沿线布置2~3组避雷器的方法来替代合闸电阻; 当长度在400~600 km时, 仍应采用合闸电阻限制合空线过电压。对于1 000 kV交流系统, 即使是100 km的短线路, 若不采用合闸电阻就难以将合闸过电压限制在规程规定的范围内。因此, 1 000 kV交流系统通常应采用合闸电阻, 且较长线路宜采用较低阻值, 较短线路宜采用较高阻值。

关键词: 超高压 特高压 合空线过电压 合闸电阻 避雷器

Study on Applicability of Circuit Breaker Closing Resistance in EHV and UHV AC Systems

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Abstract: Closing resistors can effectively restrict switching surges due to closing no load transmission lines of EHV and/or UHV AC power grids. In view of complex structure and high cost of closing resistors, it is worthy to research that whether there is the necessity to adopt this measure or not. By use of software simulation, the applicability of closing resistors in EHV and UHV AC power grids under different conditions is researched. Research results show that for 500 kV AC power grid the closing resistor can usually be not equipped while the length of transmission line is short than 100 km; whether closing resistor has to be equipped or not should be determined according to the analysis results based on concrete conditions while the length of transmission line is within the range from 100 km to 200 km; the closing resistor should be adopted in general while the length of transmission line is within the range from 200 km to 400 km, however, the way of configuring two or three sets of metal oxide arrester (MOA) along the transmission line to substitute for closing resistors could be adopted; the closing resistors should be still equipped to restrict switching surge while the length of transmission line is within the range from 400 km to 600 km. As for 1000 kV AC power grid, it is hardly to restrict the switching surge due to closing no-load line to the specified value given by the code even though the length of transmission line is 100 km when closing resistors are not adopted. Thus, in general closing resistors should be configured in 1000 kV transmission lines, and it is better to adopt closing resistors with low resistance values for longer transmission lines and that with high resistance values for shorter transmission line.

Keywords: extra high voltage (EHV) ultra high voltage (UHV) switching surge due to closing no-load line closing resistor metal oxide arrester (MOA)

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