

特高压输电

±800 kV特高压直流线路复合绝缘子均压环优化设计

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摘要:

建立了均压环模型, 分析了±800 kV特高压直流输电线路单V型复合绝缘子悬垂串安装均压环前后的沿面电位和电场强度分布情况, 分析后发现: 未安装均压环时, 绝缘子沿面电位分布极不均匀, 导线侧电场畸变严重; 在导线侧配置大小双均压环、杆塔侧配置中均压环, 可有效改善导线侧特别是金具、芯棒、护套界面处的电场分布, 有利于防止电晕和提高绝缘子运行可靠性; 增加屏蔽深度和外径可明显改善复合绝缘子表面电场分布, 管径对均压环自身的表面场强有显著影响。最后推荐了±800 kV复合绝缘子均压环的优化配置方案。

关键词:

Design Optimization of Grading Ring of Composite Insulators for ±800 kV UHVDC Lines

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Abstract:

The model of grading ring of the composite insulator string is built, and the potential distribution along insulator surface and electric field strength distribution of V-typed overhang composite insulator strings for ±800 kV UHV DC lines before and after the installation of grading rings are calculated. The influences of shield depth, external diameter and internal diameter of grading ring on electric field strength are discussed. Calculation results show that when grading rings are not installed, the potential distribution of along insulator surfaces is extremely non-uniform, and the electric field at conductor side distorts seriously; when big-size and small-size grading rings are configured at conductor side and middle-size grading ring is configured at the tower side, the electric field distributions at conductor side, especially at the fitting-side, core rod of insulator and sheath interface, are effectively improved, and it is favorable to prevent corona and improve the reliability of insulator operation; increasing shield depth and external diameter of grading ring can evidently improve the electric field distribution at insulator surface, and it is discovered that the pipe diameter of grading ring notably impacts the surface electric field strength of grading ring itself. Finally, the optimal configuration scheme of grading ring of composite insulator strings for ±800 kV UHVDC transmission line is recommended. After the installation of optimized grading ring, the maximum electric field strength along insulator surface is 0.457 kV/mm while the electric field strength on grading ring surface is 1.7 kV/mm, and it meets the requirement of UHVDC power transmission project.

Keywords:

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