

高电压技术

一次多回击自然闪电引发的输电线路感应过电压特征分析

王孝波¹, 陈绍东², 张义军³, 黄智慧², 蔡力⁴

1. 广州市气象局, 广东省 广州市 510060; 2. 广东省防雷中心, 广东省 广州市 510600; 3. 中国气象科学研究院, 北京市 海淀区 100081; 4. 武汉大学 高电压与绝缘技术研究所, 湖北省 武汉市 430072

摘要:

针对野外低压架空输电线路开展了过电压防护试验研究。通过一次典型的多回击自然闪电引起的过电压并结合闪电定位资料, 对输电线路不同位置的入户端及采集器前端的过电压大小、采集器前端电涌保护器(surge protective device, SPD)残压特性及入户端L线过电压和闪电回击电流之间的关系进行了分析和探讨。通过分析发现: 近距离的闪电能在架空输电线路产生几kV的感应过电压, 过电压持续时间平均约1.0 ms, 采集器前端安装SPD动作后, 较远的入户端过电压波形也会受其影响; 采集器前端SPD动作残压持续时间平均约218 ms, 比标准8/20 ms冲击波试验持续时间长; 入户端感应过电压、回击电流与距离有很好的线性拟合关系。

关键词:

Analysis on Characteristics of Induced Over-Voltage in Transmission Line Caused by Natural Lightning With Multi Return Strokes

WANG Xiaobo¹, CHEN Shaodong², ZHANG Yijun³, HUANG Zhihui², CAI Li⁴

1. Guangzhou Meteorological Bureau, Guangzhou 510060, Guangdong Province, China; 2. Guangdong Lightning Protection Center, Guangzhou 510600, Guangdong Province, China; 3. Chinese Academy of Meteorological Sciences, Haidian District, Beijing 100081, China; 4. High Voltage and Insulation Research Institute, Wuhan University, Wuhan 430072, Hubei Province, China

Abstract:

The experimental investigation on over-voltage protection for outdoor low-voltage overhead transmission lines is carried out. Based on a typical natural lightning with multi return strokes and combining with lightning location data, the values of over-voltages at entrance terminals for housings and those at front-side of collector, which locate at different positions of transmission lines and the residual voltage characteristics of surge protective devices (SPD) located at collector front-side as well as the relation between over-voltages of L-lines at entrance terminals for housings and return stroke current of lightning are analyzed and discussed. Analysis results show that close range lightning can lead to induced over-voltage with amplitude of several kilovolts on low-voltage overhead transmission lines and the duration of this over-voltage is about 1.0 ms in average; after the action of SPDs installed at the front-side of collector the over-voltage waveforms at farther entrance terminals for housings will be influenced, and the duration of residual voltage after the action of SPD is about 218 μ s in average, which is longer than the duration from standard 8/20 μ s test waveform; and there is good linear fitting relation between induced over-voltages at entrance terminals for housings and the ratio of return stroke currents to return stroke distances.

Keywords:

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通讯作者: 王孝波

作者简介:

作者Email: wxb-1977@163.com

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