

国家重点基础研究项目

115 MHz频段雷电波形特征分析

杜海明,马洪,苏红超,谭萍

武汉光电国家实验室(华中科技大学), 湖北省 武汉市 430074

摘要:

在云闪电定位系统中,根据雷电信号的时域特征设计检测概率高、虚警率低的雷电检测算法至关重要。研制了一套中心频率为115 MHz、带宽为10 MHz的甚高频(very high frequency, VHF)频段雷电信号接收、采集与实时流盘存储系统,基于短时能量参数法对大量实采数据进行了统计分析,初步获得了雷电发生至结束过程中,其VHF频段电磁辐射信号的时域分布规律。以雷电脉冲持续时间、雷电脉冲时间间隔以及相对能量大小为统计特征,雷电信号可分为单峰能量脉冲和多峰能量脉冲群。上述结论可为确定雷电信号检测门限和数据缓存深度、处理吞吐率提供指导。

关键词:

Characteristics Analysis on Lightning Waveforms at 115 MHz Frequency Band

DU Haiming ,MA Hong ,SU Hongchao ,TAN Ping

Wuhan National Laboratory for Optoelectoincs (Huazhong University of Science and Technology),Wuhan 430074, Hubei Province, China

Abstract:

In cloud-lightning location system it is of crucial importance to design a lightning detection algorithm with high detection probability and low false alarm rate according to time-domain characteristics of lightning signals. A lightning signal acquisition and real-time streaming storage system operating at very high frequency (VHF) frequency with an 115 MHz center frequency and a 10 MHz bandwidth is developed, and by use of short-time energy method the statistical analysis on lots of acquired real-time data is performed, thus the time-domain distribution law of electromagnetic radiation signals in VHF frequency band from the beginning to the end of the whole lightning discharge process is preliminarily obtained. Taking the duration of lightning pulse, interval between lightning pulses and the magnitude of short-time energy as statistical characterization, lightning signals can be divided into single-peak energy pulse and the multi-peak energy pulse cluster. Above-mentioned conclusion is available for reference in the determination of the detection threshold, the data cache depth and the throughput rate of lightning signals of real-time lightning signal processing system.

Keywords:

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通讯作者: 杜海明

作者简介:

作者Email: duhaiming-007@163.com

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