

电工电机

先导-回击模型与人工触发闪电特征参数计算

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摘要: 在关于地闪通道的“先导模型”和“回击模型”基础上, 建立了“先导-回击模型”, 并利用该模型对2005年8月2日3次人工触发闪电中观测到的12次直窜先导和继后回击过程的慢电场变化资料进行了闪电通道特征参量的计算。计算结果发现: 3次人工触发闪电的高度分别在8.68、4.48和10.59km; 直窜先导过程的电荷线密度范围为49.3~130.05mC/m; 先导发展平均速度范围为0.23' 107~1.48' 107 m/s; 先导平均电流范围为0.14~1.87kA; 先导通道电压范围为7.94~20.33MV; 继后回击中和的电荷量范围为0.16~1.21C; 继后回击过程的回击平均速度范围为2.61' 107~11.86' 107m/s; 回击平均电流范围为1.56~12.59kA。分析表明, “先导-回击模型”降低了对观测点站数和观测环境的要求, 同时对通道具有较强的计算能力。

关键词: 人工触发闪电 直窜先导 继后回击 慢电场变化 先导模型 回击模型 通道参量

Leader-return Stroke Model and Calculation of Artificial Triggered Lightning Stroke's Characteristics

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Abstract: On the basis of “leader model” and “return stroke model” about cloud-to-ground lightning stroke channel, “leader-return stroke model” was established. This model was used to calculate the slow electric field change data to explore the characteristics of twelve dart leaders and subsequent return strokes in three artificial triggered lightning on August 2, 2005. The results indicate that the height of three triggered lightning is respectively 8.68, 4.48 and 10.59 km, the line charge density along the leader channel is from 49.31 to 130.05mC/m, the average dart leader speed is from 0.23' 107 to 1.48' 107m/s, the average dart leader current is from 0.14 to 1.87kA, the electric potential of the dart leader channel is from 7.94 to 20.33MV, the charge neutralized by subsequent return stroke is from 0.16 to 1.21C, the average subsequent return stroke speed is from 2.61' 107 to 11.86' 107m/s and the average return stroke current is from 1.56 to 12.59kA. The analysis also indicates the application of “leader-return stroke model” not only reduce the demand for the number of observation station and observation environment but also provided with preferable calculation capability for the lightning stroke channel.

Keywords: artificial triggered lightning dart leader subsequent return stroke the slow electric field change leader model return stroke model characteristics of lightning stroke channel

收稿日期 2005-11-28 修回日期 网络版发布日期 2006-12-01

DOI:

基金项目:

国家自然科学基金项目(40475002); 国家科技部基础平台项目(2004DEA71070).

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