

Characteristics of Medium-low Frequency Magnetic Fields of Initial Continuous Current in Triggered Lightning

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Triggered lightning experiment of Field Experiment Base on Lightning Sciences, China Meteorological Administration (CMA-FEBLS) provides a good opportunity to study the discharge process and its related electromagnetic effects. Based on the data obtained by the magnetic antennas around the launch site, the paper analyzes the electromagnetic characteristics of initial continuous current. Benefitting from the expansion of the bandwidth of the antenna, magnetic pulses of the signal quiet period are observed for the first time. The mean pulse width and inter-pulse interval of these pulses are about $1\ \mu\text{s}$ and $14\ \mu\text{s}$, respectively, which indicating that the propagation of upward leaders during the stage is in the form of small scale breakdown. The magnetic pulse bursts (MPB) can be both observed by close and far antennas, and the mean inter-pulse interval of the MPB ($24.5\ \mu\text{s}$) is larger than that of the signal quiet period pulse. In addition, the channel-base current during the stage of MPB increases to dozens of hundreds of amperes, so it can be included that the electric field condition is conducive to the development of the upward leaders. Furthermore, the measurement of magnetic field can reflect the physical process of the initial continuous current pulse (ICCP) and *M*-component. The regular magnetic pulse (RMP) observed during the stage of ICCP and *M*-component are attributed to the interception of recoil leader with existing lightning channel. The inter-pulse interval of RMP is one order less than that of MPB, which may reflect the differences between the positive polarity breakdown and the negative polarity breakdown of leaders.

Keywords: triggered lightning, initial continuous current, medium-low frequency magnetic fields