The latest lightning return stroke model of relationship between current propagation and current generation.

Topic session: lightning physics

Mohd Muzafar Ismail, Vernon Cooray

Muzafar.Ismail@angstrom.uu.se
Lightning group, Division Electricity, Engineering Department, Angstrom laboratory, Uppsala university Sweden.

Abstract:

From the mathematical derivation, we investigate the relationship between two basic concept used in engineering return stroke models. The first type, the current propagation (CP) models as known the channel base which the return stroke channel merely acts as a medium for the current propagation with driving source being at the ground. While the second type, the current generation (CG) models, the return stroke is viewed as the discharging and neutralized of a charged transmission lines and the current sources (corona current) are assumed to be distributed along the return stroke channel. In analysis shows that the CP models, such as transmission line (TL) can be converted to CG and the return stroke speed can actually increase initially, reach a peak and continue decay. In this alternative representation, the equivalent corona currents of TL models are bipolar, indicating initial deposition and subsequent removal of positive charges from the channel. This knowledge is applied to develop a simple CG model which generates electric field for static, induction and radiated identical to those obtained with the TL model at longer times and improve the previous method where analysis for the short time.