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The Influences of Current Propagation Velocity of CG Lightning Return Stroke and Propagation Medium Conductivity on Lightning Horizontal Electric Fields

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Influences of current propagation velocity of CG lightning return stroke and propagation medium conductivity on lightning horizontal electric fields are very evident and also complicated. The influences have been analyzed by utilizing 3D FDTD at different positions relative to the return channel of CG lightning with not more than 100m of the height and horizontal distance.to the CG lightning channel.
The main results are as follows. As the height is 0m, the peak values of lightning horizontal electric field increase with the increase of current propagation velocity for the horizontal distances within 100m. As the horizontal distance is 0m, the absolute value of average minimum value of lightning horizontal electric field at the height from 20m to 100m decrease with the increase of current propagation velocity. As the horizontal distance is 40m, the absolute value of the minimum value of horizontal electric field decreases with the increase of current propagation velocity at the height from 20m to 100m. While the horizontal distance is 80m, the difference of the absolute value of the minimum value of horizontal electric field for three velocities is not evident at the height from 20m to 100m. The maximum values of horizontal electric field increase with the decrease of the soil conductivity at the height of 0m within the horizontal distance of 100m.