

# **A reaction–diffusion–advection model of the early stages of cloud electrification**

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## **Abstract**

The early stages of the electrification processes within a cloud are considered using a four species reaction-diffusion-advection model involving heavy and light initially neutral particles that become charged upon undergoing collisions. The process of charges separation, the electric potential and the electric field profiles, and total electrostatic energy of the system are calculated in one and two dimensional geometries and for a variety of boundary configurations. The conditions under which an electric discharge can occur are examined at the light of this information.