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**Experimental Research on the Capture of Fine Particles in a High-voltage Electric Field** XING JIN, SHUIQING LI, Tsinghua University — Mechanisms for capturing of fine particles through a high-voltage electric field were examined using the electrostatic precipitator (ESP) as an example system. The dimensionless equations governing particle transport were solved and a laboratory-scale ESP was experimentally examined. The analysis indicates that particles in the size range of 0.1-1$\mu$m have the lowest electric migration velocity and there is a capture-effective zone in the middle of the ESP for fine particles. Subsequent increase in length had little effect for grade efficiency because of the influence of electrohydrodynamic (EHD) flow. In the particle boundary layer zone, dipole-dipole force and VDW force play crucial roles in capturing fine particles. The packing structure of fine particles on the collecting plate is investigated by digital microscopy technology. The effects of pre-charging, pre-polarization and external electric field on packing morphologies are discussed. It is found that the dipole-dipole force between particles causes the formation of long particle chains and the maximum length of particle dendrites during the packing is dependent on both the density of external field and deposit structure.

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