EFCE
WP Static Electricity in Industry

ELECTROSTATICS 2025 International Conference on Electrostatics

9-12 November 2025, Bologna, Italy

A new stochastic particle charging model

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Abstract:

We present a stochastic model for the contact charging of particles that applies to the flow of insulative particles bounded by conductive and grounded walls. The model extracts statistical properties of controlled impact experiments of PMMA particles on a plane aluminum surface. Then, these statistics are scaled to other impact conditions. Finally, a CFD simulation predicts the charge transfer of each impact using Monte Carlo simulations that apply the scaled statistical properties. The model is computationally fast and successfully predicts size-dependent charging, bipolar charging, charge reversal, and stochastic scatter.

Keywords: Modeling; Particles; Triboelectrification
Category (topic): VI Solid and Powders
Preference: Oral/Poster
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