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The model and experiment of secondary emission from dust grains

I. Richterová, Z. Němeček, J. Šafránková

Charles University, Faculty of Mathematics and Physics, Prague, Czech Republic
(jana.safrankova@mff.cuni.cz)

It is widely known that particulate matter (dust) is a substantial part of the space environment. The dust in a plasma is charged by various processes and finally reaches an equilibrium state. The most important charging processes are the attachment of ions and electrons of the ambient plasma, photoemission by the solar UV radiation, and secondary electron emission.

We developed a simple numerical model that provides a realistic description of secondary emission process from small (μm) spherical samples of different materials. For a comparison of model results with laboratory simulations, we have chosen the metals as well as insulators or insulators covered by a metallic layer. The fact that results of numerical modeling are in a very good agreement with measurements suggests that the model can be used for considerations on the dust charge under different conditions in the space. Distributions of secondary and backscattered electrons are discussed in detail.