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Modeling of Argon Plasma Afterglow With Large Dust Density[1]
ILIJA STEFANOVIC, Ruhr-Universität Bochum, Germany, IGOR DENYSENKO, V. N. Karazin Kharkiv National University, Ukraine, BRANKICA SIKIMIC, JÖRG WINTER, Ruhr-Universität Bochum, Germany, NIKOLAY AZARENKOV, V. N. Karazin Kharkiv National University, Ukraine — A spatially-averaged model for argon plasma afterglow with nano-sized particles is presented. The model consists of balance equations for electrons, ions and argon metastable and resonance state atoms, equation for the dust particle charge and power balance equation. The dust charge density is assumed larger than the electron density. The calculated densities in the afterglow are in a good qualitative agreement with those measured in the experiment [1]. The metastable density in the dusty plasma is essentially larger than the density in the dust-free plasma. The metastable density in dusty plasma increases due to enhancement of the electron temperature comparing with the dust-free plasma. In the dust-free as well as dusty plasma afterglows, the argon metastable atoms are lost from the discharge mainly due to their diffusion to the electrodes. In the dusty case, the diffusion loss dominates over the loss in metastable-dust collisions [1]. The electron temperature decreases faster in the dusty plasma afterglow than that in the dust-free plasma. [1] I. Stefanovic, N. Sadeghi, and J. Winter, *J. Phys. D: Appl. Phys.* **43,** 152003 (2010).

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