

NEGATIVE ION EFFECT ON DUSTY PLASMA STRUCTURE

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The effect of negative ions on the structure of dust cloud in a gas discharge plasma is investigated experimentally and theoretically. The experiments were performed in the frame of "Plasmakristall-4" experiment onboard the ISS. The dust structure in the polarity-switched direct current discharge in neon turned out to be very sensitive to the presence of air admixture in the background gas. Simulations of the discharge containing oxygen with the dust particle suspension show that negative ions generated in entire plasma volume are trapped in the vicinity of the tube axis. The ion stream affects the microparticle number density and structure of the suspension.

The effect of the negative ion stream on an interaction between charged absorbing microparticle was investigated theoretically under hydrodynamic approach. Absorption of the positive ions and drift of the negative ions produce the long-range anisotropic tail of the interaction potential decreasing as $1/r$, which can cause the string formation at the relatively high gas pressures, when the positive ion flow can not give significant anisotropy in the potential distribution.

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