ROTATION OF DUST STRUCTURES IN A MAGNETIC FIELD IN A DIRECT CURRENT GLOW DISCHARGE

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For both basic research and practical applications, the most important topic of dust plasma is the control of dust particles dynamics, for example, using an external electric field [1], manipulation with a laser [2] and an external magnetic field [3-6]. In particular, the magnetic field is used to control the spatial position, the degree of order as well as the dynamics of dust structures.

This work presents experimental results on the influence of the external magnetic field on the dynamics of the dust structure in the stratified glow discharge of argon gas, where the magnetic field was created with the Helmholtz coil. The experiments were conducted with monodisperse dust particles at B$\leq$28 mT. Angular speed of dust structures at different parameters of gas discharge (current and pressure) was determined. The main mechanism of rotational motion are collision interactions with azimuthal ion flow induced by radial component of magnetic field and axial component of electric field.

Numerical calculations of angular velocity of rotation of monodisperse dust particles at different values of magnetic field induction are obtained. There is a good agreement between experimental and calculated values of angular velocity of dust structures at different values of magnetic field induction.

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