PROPERTIES OF DUST STRUCTURE AND PLASMA TRAP IN THE NARROWING region OF GLOW DISCHARGE CURRENT CHANNEL IN the MAGNETIC FIELD

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The one of the most interesting methods of impact on the plasma is magnetic field because it affect on plasma itself and on dust particles. The magnetic field selectively influences of different components of the plasma. It affects the fluxes in the plasma and the charging of dust particles.

When placing dielectric insert of the special shape that stabilizes the discharge into the discharge tube, there arise a potential trap. In [1] it was found that this dust trap is capable of holding the structure with a large number of particles.

The structure was found to have the shape of a ring with the center coinciding with the axis of the hole in the dielectric insert. In external longitudinal magnetic field dust particles rotate around the discharge axis. The magnitude of the angular velocity of each particle depends on the radius at which the particle is located. The dependences of the angular velocity of rotation of the dust structure on the magnetic field induction are obtained. Earlier observations of dust structures in this trap were carried out in magnetic fields up to 400 G [2]. This paper presents a study in magnetic field of up to 10 kG. The magnitude of the angular velocity of rotation of the dust structure reaches 15 rad/s with a magnetic field of 3 kG. Further, the dependence goes to a constant.

In conclusion, we discuss the possible causes of the rotation of dust particles. We suppose these mechanism are: the force of ion drag and the discharge gas rotation as a result of the Ampere force [3, 4] in a longitudinal magnetic field.

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References

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