DUSTY PLASMA STRUCTURE IN STRONG MAGNETIC FIELD IN A NARROW CURRENT CHANNEL

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Dust plasma in the form of volumetric structures in a glow discharge in a magnetic field shows a number of effects. When studying dust formation in the region of narrowing of the current channel in a magnetic field with an induction of 0.1 T an increase in the speed of rotation of the dust structure to very high values, on the order of 100 rad/s, and a change in the arrangement of particles was discovered - compaction in the section perpendicular to the magnetic field and the formation of circular shells around center of rotation.

According to observations carried out in neon at 0.4 Torr, in argon at 0.23 Torr with identical particles, a strong dependence of the rotation speed on the length of the current channel (narrowing the discharge diaphragm) was discovered with the same waist size. To date, a quantitative interpretation of rotation is available only for a short insertion in a magnetic field of up to 1 T.

The work established that in a magnetic field above 0.1 T in neon the structure rearranges the arrangement of particles. The radial interparticle distance is significantly reduced to 0.1 mm. With a further increase in the magnetic field, the interparticle distance does not change. These changes correlate with measurements of the diameter of the structure in a magnetic field. In this case, circles are formed in a section perpendicular to the magnetic field instead of a hexagonal arrangement of particles. Their appearance is influenced by a high rotation speed, more than 15 rad/s. When viewed vertically, the dust structure rearranged in a magnetic field looks like a system of coaxial cylinders nested one inside the other.

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