SELF ROTATION OF DUST PARTICLES IN A MAGNETIC FIELD

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Charged dust particles rotating around their center of inertia have magnetic moments. This determines the magnetic properties of complex plasma. The work studies the mechanical state of dust tops when an external magnetic field is applied in the range corresponding to the electron magnetization.

The angular velocity of rotation is measured using the coordinate tracing method developed by the authors. The experiment is carried out under conditions of a glow discharge with hollow transparent particles ranging in size from 5 to 60 microns in several inert gases (where the masses of the ions differ by an order of magnitude).

The self rotation of particles appears in the absence of a magnetic field. Observations show that the magnetic field does not change the angular velocity of the particles' self rotation. However, calculations of the angular momentum of ions and a number of literature models predict an increase in the angular velocity to 10^6 rad/s.

The measured values make it possible to estimate the magnetic properties of complex plasma. Its magnetic susceptibility is equal to an extremely small value of the order of 10^{-9}. The magnitude and direction of the magnetic moments of the dust subsystem indicate its paramagnetic properties.

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