SPECIFIC FEATURES OF THE DYNAMICS OF SMALL DUST STRUCTURES IN A MAGNETIC FIELD

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The results of studying the behavior of bulk dust clusters with a countable number of particles in a weak magnetic field are presented. The magnetic field corresponds to the magnetization of electrons and the dominance of the ion drag force in the dynamics of dust particles.

It was found that, depending on the conditions, a dust cluster (which have up to two shells in a horizontal plane perpendicular to the magnetic field) can have two modes of rotation. Rotation develops either from zero magnetic field, or from some of its value, showing the threshold character of unwinding. It is shown that under constant discharge conditions, the value of the threshold magnetic field depends on the number of particles in the cross section. When the number of particles approaches 20, the effects disappear.

The angular velocity of cluster rotation in the above-threshold regime was investigated as a function of the number of particles in the cross section perpendicular to the magnetic field. For a small number of particles (up to two filled cluster shells), the angular velocity increases with the addition of each new particle. Beginning with a certain number of particles, the trend of rapid growth is replaced by an approach to a constant value.

A qualitative interpretation of the effects is also given, which links the change in the rotation dynamics with the change in plasma fluxes in the presence of dusty plasma.