SUBSONIC MOTION OF A PROJECTILE IN A FLUID COMPLEX PLASMA UNDER MICROGRAVITY CONDITIONS

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S u m m a r y

Subsonic motion of a large particle moving through the bulk of a dust crystal formed by negatively charged small particles is investigated, by using the PK-3 Plus laboratory on the board of the International Space Station. Tracing the particle trajectories shows that the large particle moves almost freely through the bulk of a plasma crystal, while dust particles move along characteristic α-shaped pathways near the large particle. We develop a theory of the nonviscous motion of dust particles near a large particle and calculate particle trajectories. The deformation of a cavity around a large projectile moving with subsonic velocity in the cloud of small dust particles is investigated with a due regard for the friction between dust particles and atoms of a neutral gas. The pressure of a dust cloud at the surface of a cavity around the projectile can become negative, which entails the emergence of a considerable asymmetry of the cavity, i.e., the cavity deformation. The corresponding threshold velocity is calculated, which is found to decrease with increasing the cavity size. A good agreement with experiment validates our approach.