CAVITIES AROUND FLOATING SPHERES IN A COMPLEX PLASMA UNDER MICROGRAVITY CONDITIONS

Khrapak S. A.,[*1,2] ***Naumkin V.,***[1] ***Lipaev A.,***[1] ***Molotkov V. I.,***[1] ***Huber P.,***[2] ***Thomas H.***[2]

[1]*JIHT RAS, Moscow, Russia,* [2]*DLR, Wessling, Germany*
[*]*sergey.khrapak@gmx.de*

In the last experiment with the PK-3 Plus laboratory onboard the International Space Station, interactions of millimeter-size metallic spheres with a complex plasma were studied. Among the phenomena observed was the formation of cavities or voids (regions free of microparticles forming a complex plasma) surrounding the spheres. The size of the cavity is governed by the balance of forces experienced by the microparticles at the cavity edge. In this talk we first summarize the main observations and then describe a detailed theoretical model for the cavity size and demonstrate that it agrees well with sizes measured experimentally. The model is based on a simple practical expression for the ion drag force, which is constructed to take into account simultaneously the effects of nonlinear ion-particle coupling and ion-neutral collisions. The developed model can be useful for describing interactions between a massive body and surrounding complex (dusty) plasma in a rather wide parameter regime.

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