

Abstract Submitted
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Experimental Investigation of the Wake-Mediated Interaction Forces Between Dust Particles in a Flowing Plasma¹ OLEG PETROV, EVGENY LISIN, KONSTANTIN STATSENKO, Joint Institute for High Temperatures of the Russian Academy of Sciences, Moscow, Russia, TRUELL HYDE, JORGE CARMONA, Center for Astrophysics, Space Physics, and Engineering Research (CASPER), Baylor University, Waco, Texas, USA — An anisotropic spatial dependence of the wake-mediated interaction forces between dust particles in a plasma flow was studied experimentally. The measurements were performed at CASPER for the vertically aligned chain self-organized from 11 microparticles inside a glass box placed on the lower electrode of a RF gas discharge chamber. The experiment was conducted in argon plasma at 137 mTorr and monodisperse MF particles having diameters of 8.93 microns were used. To recover the wake-mediated interaction forces we improved the method based on solving the inverse Langevin problem of the dynamics of many interacting particles. To determine 3D trajectories of the particles we used a stereoscopic video surveillance system. Spatial profiles of the forces with which upstream particles act on downstream ones and vice versa were obtained. The difference between the interparticle interaction forces in the opposite directions indicates its non-reciprocal nature and can be associated with the wake. The peak position of the wake-field and the space charge concentrated in it were evaluated by the force profile analysis.

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