

Abstract Submitted
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Preliminary results of experimental measurements to determine microparticle charge in a complex plasma¹ ERIC GILLMAN, BILL AMATUCCI, Naval Research Laboratory — Microparticles in a dusty plasma typically collect many of the more mobile electrons as they charge up and therefore typically attain a net negative potential. The charge on these microparticles is typically estimated by calculating the charge on a spherical capacitor at the floating potential or by making measurements of particles levitating in the plasma sheath. However, secondary processes can alter the charging process and are significantly altered in the plasma sheath. Currently there is no reliable method to measure microparticle surface charge in the bulk region of complex or dusty plasmas. A novel, non-invasive, experimental method of measuring the charging of microparticles in the bulk region of a plasma will be presented. Ions impinging directly upon the microparticle surface and interacting electrostatically with the charged microparticle, known as collisional and electrostatic Coulomb ion drag, respectively, slows particle acceleration due to gravity as the particle falls through a plasma discharge. Since ion and neutral drag are commonly the dominant forces on microparticles in complex plasmas, the reduced acceleration is measured without a plasma to determine the neutral drag. By repeating the measurement with a plasma and subtracting the neutral drag, the ion drag is obtained. The microparticle net charge is then ascertained from the ion drag on isolated grains falling through a plasma discharge. * This work was supported by the Naval Research Laboratory Base Program.

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