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Dusty plasma microparticle cloud control and rapid electrostatic mutual-repulsion expansion in a DC glow discharge ERIC GILLMAN, BILL AMATUCCI, Naval Research Laboratory — Microparticles in plasma discharges rapidly charge up, typically collecting a net negative charge due to the relatively high mobility of electrons compared to ions. Electrostatic forces can be utilized to control charged microparticle behavior and motion in a plasma discharge. In these experiments a metal wire loop is supplied with an electric potential that can be controlled independently from the DC plasma glow discharge electrodes. By varying the voltage on the wire loop, we can attract, trap, manipulate, suspend, and/or repel microparticles that originate from the DC glow discharge. Experiments studied the properties of electrostatic self-repulsion of a cloud of charged microparticles. By pulsing the plasma and controlling wire loop potential, a cloud of trapped microparticles is released and allowed to rapidly expand. A simple force balance simulation code is used as a model to compare and benchmark actual experimental results.
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