Abstract Submitted
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Inferring electron sheath density profiles in collisionless plasmas: a non-perturbative technique[1] DAVID N. WALKER, SFA, Crofton, MD, RICHARD F. FERNSLER, DAVID D. BLACKWELL, WILLIAM E. AMATUCCI, Plasma Physics Division, Naval Research Laboratory, SARAH J. MESSER, NRL/NRC Postdoctoral Associate — We extend a recently published work[2] which uses a simpler derivation than previous authors of plasma collisionless resistance in spherical geometry. The experimental work is based on measurements of the rf impedance characteristics of a small spherical probe immersed in collisionless laboratory plasma. The plasma resistance is shown to be inversely proportional to the plasma density gradient evaluated at the location where the plasma frequency is equal to the applied frequency. With the assumption that electrons obey the Boltzmann relation, and cold, massive ions, which obey the Bohm condition at the sheath edge, we relate n_e and potential in the presheath. This allows an expression for collisionless resistance in the sheath as a function of applied frequency. Using numerical integration of measured resistance, we are able to infer the sheath electron density profile. We will present results of three experimental studies showing how to construct sheath density profiles using spheres of differing radii. [2]Walker, D.N., R.F. Fernsler, D.D. Blackwell, W.A. Amatucci, S.J. Messer, *Phys of Plasmas*, 13, 032108 (2006).

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