Abstract Submitted
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On the effect of dc resistance on determination of sheath electron density profiles in collisionless plasmas[1] DAVID N. WALKER, SFA, Crofton, MD, DAVID D. BLACKWELL, RICHARD F. FERNSLER, WILLIAM E. AMATUCCI, Naval Research Laboratory — In recent work[+] we examined primarily the high frequency ($\omega_{pe}/2 < \omega < \omega_{pe}$) ac impedance characteristics of a small, negatively-biased, spherical probe immersed in collisionless laboratory plasma. Theoretical solutions indicate that collisionless resistance in the sheath at a given resonant radius is a function of applied frequency and is inversely proportional to the plasma density gradient there, *i.e.*, the gradient is evaluated at the radius where the applied frequency is equal to the plasma frequency. As the calculation nears the probe radius, the gradient increases and the density decreases toward zero causing the ac resistance to vanish in the limit, *i.e.*, $d\omega_{pe}/dr$ approaches a maximum and ω_{pe}, a minimum. However, experiment shows an increasing resistance as the surface is approached and no tendency to exhibit a "cutoff" regardless of bias. We interpret these observations as arising from the dc response of the probe. We present results of experimental studies which include the lower frequency effects.[+]Walker, D.N., R.F. Fernsler, D.D. Blackwell, W.E. Amatucci, S.J. Messer, ***Phys. of Plasmas*, *13***, 032108 (2006)

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