

Abstract Submitted  
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**Anomalous Ion Kinetic Effects in RF Plasma Sheaths** MICHAEL BARNES, MS Barnes Engineering, WALTER GEKELMAN, PATRICK PRIBYL, Dept. of Physics and Astronomy, UCLA — An ion PIC code (1d2v) has been written to examine anomalous ion kinetic effects in rf sheaths. These phenomena are more pronounced in low pressure, plasma processing, capacitive applicators, where rf frequencies are typically less than the ion plasma frequency. For computational stability, a Newton Krylov solver was used to solve the Poisson Boltzmann equation. Using this code, the average ion velocity in the pre-sheath can be shown to have dramatic effects on the ion kinetics in sheath and pre-sheath regions when it exceeds the ion sound speed,  $C_s$ . As previously shown [Sternberg & Godyak, IEEE Trans. Plasma Sci., 35(5), 2007], the ion average velocity can be  $\sim 2.5 C_s$  at the pre-sheath/sheath interface - thereby creating a region where the ions in the pre-sheath have a Mach number greater than unity, giving rise to a wave-train of ion acoustic shock waves in a limited region. These waves are critically damped as they enter the sheath and give rise to additional structure in the ion velocity distribution function, particularly at lower sheath voltages. The nature of the dual peaked ion velocity distribution function will also be discussed in terms of ion resonance with the sheath electric field that derives from the motion of the electron sheath.

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