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Experimental test of Baalrud's model for ion velocity at the sheath edge for a two ion species plasma[1] NOAH HERSHKOWITZ, CHI-SHUNG YIP, University of Wisconsin-Madison, GREG SEVERN, University of San Diego — Recent experiments have shown that ions in plasmas containing two ion species reach a common velocity at the sheath-presheath boundary [1]. A new theory [2] suggests that collisional friction between the two ion species enhanced by two stream instability affects the drift velocity of each ion species near the sheath edge and finds that the difference in ion velocities at the sheath-presheath boundary is given by $\sqrt{\frac{1}{2\alpha}(v_{th1}^2 + \alpha v_{th2}^2)}$, where $\alpha = n_1 M_1/(n_2 M_2)$. We report the first experimental test of this model. We measure ion velocity distribution functions (ivdfs) near sheath edge in Argon/Xenon and Argon/Helium plasmas as a function of the concentration ratios. We show that for sufficiently great relative Xenon concentration, ions do not reach a common speed at the sheath edge. The relative concentration of the two ion species, which determines α, is inferred from Ion Acoustic Wave phase velocity measurements, the ivdfs are determined by Laser Induced Florescence. [1] Lee, D; Hershkowitz, N; Severn, GD. Appl. Phys. Lett. 91, 041505 (2007) [2] S.D. Baalrud, J.D. Callen, and C.C. Hegna, GEC 2009

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Greg Severn
University of San Diego

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