

Abstract Submitted
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Experimental studies of sheath formation in multiple ion species plasma, electronegative and electropositive¹ GREG SEVERN, Univ. of San Diego, Dept. Physics Biophysics, NOAH HERSHKOWITZ, Univ. Wisconsin-Madison, Dept. Engineering-Physics — Our discovery of anomalous sheath edge velocities using laser-induced fluorescence (LIF) near boundaries in multiple ion species plasma was explained by a new element of sheath formation: ion-ion streaming instabilities, which was shown to be in excellent agreement with our experimental results. No such corresponding measurements for electronegative plasma with multiple negative charge species exist. We present here experiments addressing basic questions for both electropositive and electronegative plasma: 1) What is the velocity at the sheath edge of each of the three ions in a three ion species weakly collisional electropositive plasma? We have already demonstrated that 2 of the species do not reach their individual Bohm speeds. 2) Is the Bohm Criterion (gBC), generalized for multiple positive ion species, satisfied in such plasma, and, does gBC really play the role that current theory assumes it does in sheath formation? 3a) Do the internal sheaths and double layers predicted to exist in electronegative discharges actually exist? 3b.) Is the Bohm Criterion, generalized for electronegative plasma (eBC), satisfied at these internal sheaths, and is the eBC adequate to understand sheath formation electronegative, multiple ion species plasma?

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