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Comparison of Particle in Cell Simulations of Double Layers in a Xe-Ar Helicon Plasma with Experimental Results ALEXANDER HANSEN, I.A. BILOIU, E.E. SCIME, West Virginia Univ. Physics Dept., A. MEIGE, Ecole Polytechnique — Recent experiments in plasma sheaths at grounded boundaries confirmed theoretical predictions that in a multi-ion species plasma presheath, ions do not accelerate up to their own Bohm, i.e., sound, speed in the presheath but instead accelerate up to a common bulk sound speed at the sheath-presheath boundary. Those ion speed measurements were obtained in argon plasmas doped with lighter helium and in xenon plasmas doped with lighter argon. Since the double layer (DL) that forms in expanding helicon source plasmas is essentially a plasma sheath in the plasma volume instead of at the plasma boundary, it was expected that similar effects would be observed in the DL presheath. However, in preliminary experiments on the HELIX device at West Virginia University [Biliou, Ph.D. thesis, WVU], we have found that addition of a small amount of argon in xenon plasma DL experiments suppresses formation of the DL in xenon plasmas. In order to understand this observation, we have performed simulations using a particle-in-cell code with Monte Carlo collisions, [Meige *et al.*, *PoP* (2005)] which we have modified to handle the presence of two ion species in the plasma. We present results from the simulation for unmixed argon and xenon plasmas, for mixed argon and xenon ions, and compare the results with those from the experiment.

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