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Particle in Cell Simulations of Double Layers in Xe-Ar Helicon Plasmas[1] A.K. HANSEN, West Virginia University Department of Physics, I.A. BILOIU, U.S. Army Research Laboratory, A. MEIGE, PRESANS / X-Technologie / Ecole Polytechnique, E.E. SCIME, West Virginia University Department of Physics — 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 speed but instead accelerate up to a common bulk sound speed at the sheath-presheath boundary. Since the double layer 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 double layer presheath. In experiments on the Hot hELIcon Experiment (HELIX) at West Virginia University, we find that argon ions in a majority xenon plasma accelerate up to the common speed at the boundary of the double layer also. Simulations of these plasmas have been performed using a particle-in-cell code with Monte Carlo collisions, modified to handle the presence of two ion species in the plasma, We present majority ion flow data at different spatial locations as a function of minority ion doping fraction, and compare with the experimental results.

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