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PIC Modeling of Argon Plasma Flow in MNX[1] SAMUEL COHEN, ADAM SEFKOW, Princeton Plasma Physics Laboratory — A linear helicon-heated plasma device - the Magnetic Nozzle Experiment (MNX) at the Princeton Plasma Physics Laboratory - is used for studies of the formation of strong electrostatic double layers near mechanical and magnetic apertures and the acceleration of plasma ions into supersonic directed beams. In order to characterize the role of the aperture and its involvement with ion acceleration, detailed particle-in-cell simulations are employed to study the effects of the surrounding boundary geometry on the plasma dynamics near the aperture region, within which the transition from a collisional to collisionless regime occurs. The presence of a small superthermal electron population is examined, and the model includes a background neutral population which can be ionized by energetic electrons. By self-consistently evaluating the temporal evolution of the plasma in the vicinity of the aperture, the formation mechanism of the double layer is investigated.

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Samuel Cohen
Princeton Plasma Physics Laboratory

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