Abstract Submitted
for the GEC09 Meeting of
The American Physical Society

2D PIC simulations for an EN discharge with magnetized electrons and unmagnetized ions MICHAEL A. LIEBERMAN, EMI KAWAMURA, ALLAN J. LICHTENBERG, University of California, Berkeley, CA 94720 — We conducted 2D particle-in-cell (PIC) simulations for an electronegative (EN) discharge with magnetized electrons and unmagnetized ions, and compared the results to a previously developed 1D (radial) analytical model of an EN plasma with strongly magnetized electrons and weakly magnetized ions [1]. In both cases, there is a static uniform applied magnetic field in the axial direction. The 1D radial model mimics the wall losses of the particles in the axial direction by introducing a bulk loss frequency term ν_L. A special (desired) solution was found in which only positive and negative ions but no electrons escaped radially. The 2D PIC results show good agreement with the 1D model over a range of parameters and indicate that the analytical form of ν_L employed in [1] is reasonably accurate. However, for the PIC simulations, there is always a finite flux of electrons to the radial wall which is about 10 to 30% of the negative ion flux.

[1] G. Leray, P. Chabert, A.J. Lichtenberg and M.A. Lieberman, J. Phys. D, accepted for publication 2009.

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Date submitted: 11 Jun 2009 Electronic form version 1.4