Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

Implicit PIC Simulations of Magnetospheric Reconnection Initialized with Fully Kinetic Asymmetric Current-Sheet Equilibria[1] DAVID L. NEWMAN, MARTIN V. GOLDMAN, University of Colorado at Boulder, GIOVANNI LAPENTA, KU Leuven, Belgium, STEFANO MARKIDIS, Royale Institute of Technology, Stockholm, Sweden — A family of one-dimensional kinetic current sheet equilibria has been developed in which the density difference across the sheet is maintained by ambipolar electric fields (with **E** perpendicular to **J** and **B**). These electric fields can form an effective potential barrier that allows particles of one species (e.g., electrons) with the same energy to have different phase-space densities on the two sides of the current sheet, thereby breaking the symmetry. Such solutions necessarily require the inclusion of non-Maxwellian features, and share characteristics with double layers and other nonlinear electrostatic structures. Implicit PIC simulations were initialized with the electron and ion distribution functions corresponding to specific solutions of this type and were found to behave as equilibria that are subject to an asymmetric tearing-mode-like instability. As expected, the instability growth rate increases as the width of the current sheet decreases. Imposing a weak perturbation on the equilibrium allows for a controlled study of the evolution of the asymmetric reconnecting plasma. Examples will be presented of the evolution for different initial states relevant to magnetospheric reconnection, including varying values of the guide magnetic field.

[1]Research supported by NSF and NASA.

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Date submitted: 11 Jul 2013 Electronic form version 1.4