Abstract Submitted
for the DPP05 Meeting of
The American Physical Society

Nonlinear Evolution of Current-Driven Instabilities in Weakly Magnetized Magnetospheric Plasmas[1] DAVID L. NEWMAN, MARTIN V. GOLDMAN, NARESH SEN, University of Colorado at Boulder — In many regions of Earth's magnetosphere, including magnetic reconnection sites, the electrons are weakly magnetized according to the criterion $\Omega_e < \omega_e$. These regions often contain strong currents with gradients perpendicular to **B** (i.e., shear). Reduced Vlasov simulations (N. Sen et al., this meeting), which permit computationally fast evaluation of phase-space dynamics of magnetized plasma species, are employed to simulate the nonlinear evolution of sheared current-driven instabilities in magnetospheric plasmas with weakly magnetized electrons and (effectively) unmagnetized ions. For sufficiently large currents, the plasma will be Buneman unstable. For currents near the Buneman threshold, double layers can form and accelerate electron beams, resulting in secondary two-stream instabilities. Both cases can lead to the formation of electron phase-space holes with bipolar electric field signatures such as those recently observed by *Cluster* near a reconnection site in Earth's magnetotail.[2] In certain regimes, electron holes appear to form in regions of maximum current but later localize near the edge of the current-carrying region. The generation of low- and high-frequency waves and the evolution of the currents will also be discussed.

[1]Research supported by NASA, NSF, and DOE
[2]C. A. Cattell et al., *JGR*, 110, A01211 (2005).

David L. Newman
University of Colorado at Boulder

Date submitted: 26 Jul 2005 Electronic form version 1.4