Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

Fully kinetic 3D simulations of magnetic reconnection in MRX-relevant geometry including Coulomb collisions V. ROYTERSHTEYN, W. DAUGHTON, L. YIN, B.J. ALBRIGHT, K.J. BOWERS, LANL, S. DORFMAN, H. JI, M. YAMADA, PPPL, H. KARIMABADI, UCSD — Considerable progress has been made in understanding of quasi-stationary reconnection in 2D systems. In contrast, 3D reconnection and, in particular, the role of current-aligned instabilities is less understood. This work investigates the effects of these instabilities on reconnection using fully kinetic simulations with a Monte-Carlo model for Coulomb collisions and boundary conditions mimicking Magnetic Reconnection Experiment (MRX) [1]. The motivation comes from a) experimental observations of both electrostatic and electromagnetic fluctuations in the current sheet made in MRX [2,3] and b) our previous 2D simulations demonstrating a discrepancy in the thickness of the current sheet between both collisionless [1] and weakly collisional simulations and the experimental observations. We describe 3D simulations performed at MRX-relevant levels of collisionality that demonstrate the existence of both short-wavelength Low-Hybrid Drift Instability with $k\rho_e \sim 1$ localized at the edge of the current layer and long-wavelength electromagnetic modes localized at the center. The role of these instabilities in global reconnection dynamics is discussed. [1] S. Dorfman, et al., Phys. of Plasmas **15**, 102107 [2] T. Carter, et al., Phys. Plasmas, **9**, 3272 [3] H. Ji, et al., Phys. Rev. Letters **92**, 115001

Vadim Roytershteyn
Los Alamos National Laboratory

Date submitted: 16 Jul 2009 Electronic form version 1.4