Abstract Submitted
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Local and Global 3-D Effects in the Magnetic Reconnection Experiment (MRX) S. DORFMAN, H. JI, M. YAMADA, E. OZ, J. YOO, CMSO, PPPL, W. DAUGHTON, V. ROYTERSHTEYN, LANL — One of the key open questions in Magnetic Reconnection is the nature of the mechanism that governs the reconnection rate in real astrophysical and laboratory systems. Comparisons between fully kinetic 2-D simulations of the Magnetic Reconnection Experiment (MRX) and experimental data show that the 2-D, collisionless expression for the electric field due to particle dynamics [1] does not match MRX data; related to this is a factor of 3-5 discrepancy in the layer width [2,3]. Adding collisions to the simulation leads to a broadening of the layer, but the level of collisionality present in MRX may not be high enough to resolve the discrepancy. Ongoing research on MRX explores the role of fluctuations and 3-D effects in the force balance. Significant toroidal asymmetries have been found, manifested by regions of high inductive electric field moving in the electron flow direction within the layer. Electromagnetic fluctuations in the lower hybrid frequency range [4] tend to occur in discharges with high local currents and a rapid local reconnection rate. The precise relation of these phenomena to fast reconnection is actively being investigated. [1] M. Hesse, et al., Phys. Plasmas, 6:1781 (1999). [2] Y. Ren, et al., Phys. Plasmas 15, 082113 (2008). [3] S. Dorfman, et al., Phys. Plasmas 15, 102107 (2008). [4] H. Ji, et al., Phys.Rev.Lett. 92 (2004) 115001. Supported by NDSEG, DOE, NASA, and NSF.

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