Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

Study of the Effects of Guide Field on Reconnection in MRX[1]

C. JACOBSON, M. YAMADA, H. JI, S. GERHARDT, B. MCGEEHAN, Center for Magnetic Self-Organization, Princeton Plasma Physics Laboratory — In magnetic reconnection, the presence of the third magnetic field component, or guide field, reduces reconnection rate and tends to form O-shaped diffusion regions [2]. In the Magnetic Reconnection Experiment (MRX), cohelicity merging of two plasma toroids created by a pair of flux cores can produce guide field, however, the magnitude is not easily independently controlled and the field is globally nonuniform. A new toroidal field coil set powered by a 50 kJ capacitor bank capable of producing a uniform guide field with strengths up to 1000 G has been installed on MRX. Other guide field hardware is also described. Initial results of reconnection rate, resistivity, and current sheet tilting and as a function of guide field strength are presented as available. Ion flows are measured with a new Mach probe array, which allows simultaneous measurement of two components of the ion velocity at several points in and near the diffusion region.

[1]This work is supported by DOE, NSF, and NASA.
[2]M. Yamada et al., Phys. Rev. Lett. 78, 3117 (1997).

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Date submitted: 20 Jul 2007 Electronic form version 1.4