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Investigation of the effects of guide field during magnetic reconnection B. MCGEEHAN, M. YAMADA, H. JI, E. OZ, S. DORFMAN, C. JACOBSON, CMSO, PPPL, Princeton University — In the Magnetic Reconnection eXperiment (MRX), external toroidal field coils have been installed to create a steady-state uniform guide field. In the MHD regime as the plasma is convected into the diffusion region, toroidal flux will also be pulled in resulting in a guide field pile-up. This concentration of guide field introduces extra magnetic pressure. Previous experiments with guide field [1,2] and the present research verified that the reconnection rate decreases with stronger guide field. Using magnetics data along with langmuir probe measurements across and along the current sheet, the reconnection rate and effective resistivity of the plasma is investigated with the addition of this extra toroidal field pressure by varying the drive and boundary conditions of the experiment. Because of the versatility of MRX both the MHD and two-fluid regimes of reconnection can be investigated. In the two-fluid regime, other experiments [3] have shown that in-plane hall currents can interact with the background guide field. The effect of this interaction is studied as a function of collisionality, effectively probing the boundary of the two-fluid and MHD regimes. [1] M. Yamada et al, Phys. Rev. Lett. **65**, 721 (1990). [2] T. Sato et al, Phys Fluids B **4**, 450 (1992). [3] S. Y. Bogdanov et al, Plasma Phys. Rep. **33**, 930 (2007). This work is supported by DOE, NSF, and NASA.

Brendan McGeehan
Princeton University

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