

Abstract Submitted
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The Hall Effect and Magnetic Fluctuations during Fast Reconnection in MRX¹ Y. REN, M. YAMADA, H. JI, S.P. GERHARDT, Princeton Plasma Physics Laboratory, A. KURITSYN, University of Wisconsin at Madison, R. KULSRUD, Princeton Plasma Physics Laboratory, H. TORREBLANCA, University of California at Los Angeles — Recent breakthroughs show that non-MHD effects, including the Hall effect and electromagnetic fluctuations, can facilitate fast magnetic reconnection. A quadrupole out-of-plane magnetic field in the diffusion region is the hallmark of the Hall effect [1]. This quadrupole magnetic field has been clearly observed in the Magnetic Reconnection Experiment (MRX) [2,3]. The experimental results show good agreement with simulation results. The Hall effect is found to be more significant in the collisionless regime and becomes small as the collisionality increases. Along with the Hall effect, magnetic fluctuations in the lower-hybrid frequency range have also been observed during magnetic reconnection in MRX. These fluctuations are found in the out-flow region as well as the current sheet center [4]. The interrelationship between the non-MHD effects and fast magnetic reconnection will be discussed along with comparison to space observations. [1] J. Birn et al., *J. Geophys. Res.*, 106, 3715, 2001 [2] M. Yamada et al., *Phys. Plasmas*, 13, 052119, 2006 [3] Y. Ren et al., *Phys. Rev. Lett.*, 95, 055003, 2005 [4] H. Ji et al., *Phys. Rev. Lett.*, 92, 115001, 2004

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