Abstract Submitted
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A New Kinetic-Based Fluid Approach to Collisionless Magnetic Reconnection[1] A. LE, J. EGEDAL, W. FOX, N. KATZ, A. VRUBLEVSKIS, M. PORKOLAB, MIT, PSFC — We present a new fluid model for the electrons in a current sheet undergoing collisionless magnetic reconnection. Analytical expressions for the electron phase space density were recently derived for general reconnection geometries in the limit of fast electron transit time [1]. This model accounts for kinetic effects associated with extensive trapping of electrons in the reconnection region. First, the electron density and equations of state for the parallel and perpendicular pressures are obtained by taking moments of this distribution function, which is exact for magnetized electrons of negligible mass and takes into account parallel electric fields and the presence of trapped and passing electrons. The model is compared to kinetic simulations. Among other results, excellent agreement is found between the predicted profiles of $p_{\|}$ and $p_{\perp}$ and those observed in the simulation.

[1] J. Egedal, W. Fox, N. Katz, et al., "Evidence and theory for trapped electrons in guide field magnetotail reconnection," submitted to *Journal of Geophysical Research*, 2008.

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