Abstract Submitted
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A Two-Fluid Reconnection Code, Implementing the Electron Pressure Tensor With New Anisotropic Equations of State[1] O. OHIA, J. EGEDAL, A. LE, MIT, PSFC, S. LUKIN, NRL, W. DAUGHTON, LANL — Collisionless magnetic reconnection plays an important role in space and laboratory plasmas. Comparing two-fluid and kinetic particle reconnection simulations, it is found that the structure surrounding the electron diffusion region and the electron current layer differ vastly [1]. Recently, a new fluid closure has been obtained for electrons that relate parallel and perpendicular pressures to the density and magnetic field [2]. The closure has been confirmed in fully kinetic simulations and is obtained using an adiabatic solution of the Vlasov equation, which includes the dynamics of electrons trapped in parallel electric fields [3]. Using the HiFi framework (by S Lukin), a two-fluid code is developed that implements the new approximation for the electron pressure tensor in guide-field reconnection. The results of the fluid simulation are compared to a kinetic particle simulation with a similar setup.

[1] Daughton W, et al., Phys. Plasmas 13, 072101 (2006).
[2] Le A, et al., Phys. Rev. Lett. 102, 085001 (2009).
[3] Egedal J, et al., J. Geophys. Res. 113 (2008).

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