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Hybrid (Kinetic Ion/Fluid Electron) Simulations of Reconnection Including Electron Pressure Anisotropy ARI LE, WILLIAM DAUGHTON, LANL — Fully kinetic simulations have shown that the structure of the thin current sheets that form during collisionless reconnection can fall into a variety of regimes depending on the electron pressure anisotropy [1]. Furthermore, recent two-fluid simulations with anisotropic electron equations of state appropriate for reconnection confirm that the electron pressure anisotropy may drive highly elongated current sheets in the reconnection exhaust [2]. While fully kinetic simulations are useful to model small regions of the Earth's magnetosphere, they are still far too expensive for global modeling. Thus, we have implemented the electron equations of state in the hybrid (kinetic ions and fluid electrons) code H3D [3], and initial 2D hybrid simulations of reconnection agree well with fully kinetic simulations. The updated hybrid code is a first step towards including electron anisotropy and full ion kinetics in global simulations of Earth's magnetosphere and laboratory experiments.

[1] Le et al., Phys. Rev. Lett. 110, 135004 (2013)
[2] Ohia et al., Phys. Rev. Lett. 109, 115004 (2012)
[3] Karimabadi et al., Phys. Plasmas 21, 062308 (2014)

Ari Le
LANL

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