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Scaling of Guide-Field Magnetic Reconnection using Anisotropic Fluid Closure[1] O. OHIA, J. EGEDAL, MIT, V.S. LUKIN, NRL, W. DAUGHTON, LANL, A. LE, MIT — Collisionless magnetic reconnection, a process linked to solar flares, coronal mass ejections, and magnetic substorms, has been widely studied through fluid models and fully kinetic simulations. While fluid models often reproduce the fast reconnection rate of fully kinetic simulations, significant differences are observed in the structure of the reconnection regions [1]. However, guide-field fluid simulations implementing new equations of state that accurately account for the anisotropic electron pressure [2] reproduce the detailed reconnection region observed in kinetic simulations [3]. Implementing this two-fluid simulation using the HiFi framework [4], we study the force balance of the electron layers in guide-field reconnection and derive scaling laws for their characteristics.

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