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A nonlocal fluid closure for antiparallel reconnection[1] JONATHAN NG, A HAKIM, A BHATTACHARJEE, Center for Heliophysics, PPPL — The integration of kinetic effects in fluid models is an important problem in global simulations of the Earths magnetosphere and space weather modelling. In particular, it has been shown that ion kinetics play an important role in the dynamics of large reconnecting systems, and that fluid models can account of some of these effects[1,2] . Here we introduce a new fluid model and closure for collisionless magnetic reconnection and more general applications. Taking moments of the kinetic equation, we evolve the full pressure tensor for electrons and ions, which includes the off diagonal terms necessary for reconnection. Kinetic effects are recovered by using a nonlocal heat flux closure, which approximates linear Landau damping in the fluid framework [3]. Using the island coalescence problem as a test, we show how the nonlocal ion closure improves on the typical collisional closures used for ten-moment models and circumvents the need for a colllisional free parameter. Finally, we extend the closure to study guide-field reconnection and discuss the implementation of a twenty-moment model. [1] A. Stanier et al. Phys Rev Lett (2015) [2] J. Ng et al. Phys Plasmas (2015) [3] G. Hammett et al. Phys Rev Lett (1990)

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