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On fast reconnection in pair plasmas A. ZOCCO, Politec. di Torino, L. CHACON, ORNL, LANL, A. SIMAKOV, LANL, V. LUKIN, U. Wash. — The relevance of two-fluid effects to fast magnetic reconnection in standard electron-proton plasmas is well-known.[1] The currently accepted view is that such fast reconnection is enabled by fast dispersive waves,[2] which originate in the ion-electron mass difference. However, electron-positron (pair) plasmas do not feature such mass difference, and thus do not support fast dispersive waves. Nevertheless, recent kinetic[3] and fluid[4] pair-plasmas simulations have demonstrated that fast magnetic reconnection is indeed possible, thus casting doubt on the accepted view. In this study, we develop an analytical fluid model for 2D reconnection in non-relativistic, large-guide-field, low-β pair plasmas, including inertia, resistivity, and parallel viscosity.[4] We conclude that fast reconnection is possible in the collisionless (viscosity-dominated) regime, but not in the collisional (resistivity-dominated) one.

[1]J. Birn et al., *J. Geophys. Res.* **106** (A3), pp. 3715–3719 (2001)
[2]M. A. Shay et al., *Geophys. Res. Lett.* **26**, 2163 (1999); B. N. Rogers et al., *Phys. Rev. Lett.* **87**, 195004 (2001)
[3]See e.g. S. Zenitani and M. Hoshino, *Astrophys. J.* **562**, L63 (2001); N. Bessho and A. Bhattacharjee, *Phys. Rev. Lett.* **95**, 245001 (2005); W. Daughton and H. Karimabadi, *Phys. Plasmas* **14**, 72303 (2007).
[4]L. Chacón, A. N. Simakov, V. S. Lukin, A. Zocco, *Phys. Rev. Lett.*, 025003 (2008)

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