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Analytical Model for the Phase-Space Distribution of Electrons in Guide Field Magnetic Reconnection[1] J. EGEDAL, W. FOX, N. KATZ, A. LE, A. VRUBLEVSKIS, M. PORKOLAB, MIT, PSFC — Electron distributions measured in situ by the Wind spacecraft has revealed that electrons were trapped in the electromagnetic geometry of the reconnection event encountered in the deep magnetotail [1]. Here we present a new analytical theory that can account for the anisotropic features of the electron distributions observed by Wind [2]. The anisotropy is related to extensive trapping of electrons in parallel electric fields. Trapping is found to be generic in guide-field reconnection, as it is required in order to maintain the condition of quasi- neutrality. In addition to the spacecraft data, evidence of trapping in numerical simulations is also presented. Trapping is effective in controlling the free-streaming of electrons along magnetic fields. Its importance for fast reconnection is discussed and emphasized by observations in the VTF experiment.

[1] J. Egedal, M. Oieroset, W. Fox, and R. P. Lin., Phys. Rev. Lett., **94**, 025006 (2005).

[2] J. Egedal, W. Fox, N. Katz, et al., *"Evidence and theory for trapped electrons in guide field magnetotail reconnection"*, submitted to Journal of Geophysical Research, 2008.

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