Abstract Submitted
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A contracting island model of electron acceleration during magnetic reconnection J.F. DRAKE, H. CHE, University of Maryland, M. SWISDAK, Naval Research Laboratory, M.A. SHAY, University of Delaware — A Fermi-like model for energetic electron production during magnetic reconnection is described that explains key observations in the magnetosphere and solar corona [1]. Magnetic reconnection with a guide field leads to the growth and dynamics of multiple magnetic islands rather than a single large x-line [2]. Above a critical energy electron acceleration is dominated by the Fermi-like reflection of electrons within the resulting magnetic islands rather than by the parallel electric fields associated with the x-line. Particles trapped within islands gain energy as they reflect from ends of contracting magnetic islands. The pressure from energetic electrons rises rapidly until the rate of electron energy gain balances the rate of magnetic energy release. A Fokker-Planck equation for the distribution of energetic particles, including their feedback on island contraction, is obtained by averaging over the particle interaction with many islands. The steady state solutions in reconnection geometry result from convective losses balancing the Fermi drive. At high energy the electron distribution functions take the form of powerlaws whose spectral index depends on the initial electron β, lower (higher) β producing harder (softer) spectra.
1. Drake *et al.*, Nature, in press.
2. Drake *et al.*, Geophys. Res. Lett. **33**, L13105, 2006.

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