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Electron acceleration during multi-island magnetic reconnection
JAMES DRAKE, MICHAEL SWISDAK, University of Maryland — Electron acceleration during the interaction with many magnetic islands or flux ropes is explored with large-scale PIC simulations and an analytic model. During reconnection with a guide field, reconnecting current layers spontaneously break up to form secondary magnetic islands or flux ropes so that reconnection becomes a multi-island phenomenon. Observations in the magnetosphere and in the solar corona support this picture. We recently developed a probabilistic model for the size distribution of magnetic islands which included island growth due to reconnection and island merging and loss. The action invariants of particles circulating in islands can be used to extend this model to include electron acceleration. We obtain an equation for the distribution of electron parallel and perpendicular velocities, which can be evolved simultaneously with the island distribution. The resulting pressure anisotropy feeds back on the island dynamics self-consistently. The solutions of the resultant equations are being compared with PIC simulations of large-scale current layers with many interacting flux ropes. Implications for particle acceleration in flares will be discussed.

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