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On the filamentary structure of energetic electrons during reconnection in flares J.F. DRAKE, UC Berkeley, R. FERMO, M. SWISDAK, UMD, M.A. SHAY, U Delaware — Simulations are presented that demonstrate that magnetic reconnection in the corona does not occur as a single large-scale x-line. Rather the narrow current layers that form at x-lines form secondary magnetic islands that grow and merge to produce a turbulent bath of islands. A probability model of island growth is being developed to predict their size spectrum. A consequence of particle acceleration in any multi-island system is that energetic particles are released in narrow streams with characteristic widths controlled by the width of the dissipation region (electron skin depth) as the islands reconnect with the external macro-scale field. Thus, energetic electrons do not propagate away from the reconnection site to the solar surface as a single large-scale front but as a filamentary web. We show that the filaments of energetic particles propagate along the magnetic field as kinetic Alfven waves with propagation speeds comparable to the thermal velocity of the energetic particles. The return current therefore does not inhibit the transport of energetic particles. The kinetic Alfven wave should similarly facilitate the transport of energetic electrons to the ionosphere during substorms in the magnetosphere.

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