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Magnetic Energy Release from Electron Scale Reconnection
WENDELL HORTON, JUHYUNG KIM, FULVIO MILITELLO, Institute for Fusion Studies, The University of Texas at Austin, MAURIZIO OTTAVIANI, Association Euratom- CEA DRFC, CEA Cadarache — Magnetic reconnection may occur as bursts of nonlinear plasma dynamics on the electron collisionless skin length scale $d_e = c/\omega_{pe}$ during which a large fraction of the magnetic energy is converted to electron thermal energy and plasma flow energy. The energization mechanism is the crossfield compression of the electron gas between interacting magnetic islands and the parallel electric fields accelerating the small pitch angle electrons. Solutions of the reduced Hall-MHD equations show the heating pulses in nearly collisionless, energy conserving simulations. The electron energization appears to be measured in the 4s, 200km resolution data from Cluster crossing thin, multipeaked current sheets in the geotail at -17 R_E (JGR, Nakamura et al (2006)). The electron PAD and energy fluxes change rapidly consistent with the magnetic fluctuations. In short time (10 ion cyclotron periods or 30s) from 0.5-0.8 keV up to 5 keV in ninety degree pitch angle flux and weak parallel electron beams formed at small pitch angles. Work partially supported by US Dept of Energy, NSF 0539099, and CEA Cadarache.

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