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Numerical simulations of separatrix instabilities in collisionless magnetic reconnection ANDREY DIVIN, GIOVANNI LAPENTA, KU Leuven, STEFANO MARKIDIS, KTH, DAVID NEWMAN, MARTY GOLDMAN, University of Colorado, MMS THEORY TEAM TEAM, SWIFF EC-FP7 (SWIFF.EU) TEAM — Electron scale dynamics of magnetic reconnection separatrix jets is studied in this paper. Instabilities developing in directions both parallel and perpendicular to the magnetic field are investigated. Implicit particle-in-cell simulations with realistic electron-to-ion mass ratio are complemented by a set of small scale high resolution runs having the separatrix force balance as the initial condition. A special numerical procedure is developed to introduce the force balance into the small scale runs. Simulations show the development of streaming instabilities and consequent formation of electron holes in the parallel direction. A new electron jet instability develops in the perpendicular direction. The instability is closely related to the electron MHD Kelvin-Helmholtz mode and is destabilized by a flow, perpendicular to magnetic field at the separatrix. Tearing instability of the separatrix electron jet is modulated strongly by the electron MHD Kelvin- Helmholtz mode. Divin et al., PoP, 19, 042110 (2012)

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