Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Secondary fast reconnecting instability in the sawtooth crash DANIELE DEL SARTO, Intitut Jean Lamour UMR 7198 CNRS - Universite de Lorraine, France, MAURIZIO OTTAVIANI, CEA, IRFM, Saint-Paul-lez-Durance, France — We consider magnetic reconnection in thin current sheets with both resistive and electron inertia effects. By analysis of secondary instabilities we show that, when the current sheet is produced by a primary instability of the internal kink type (large), reconnection proceeds on a time scale much shorter than the primary instability characteristic time. We find that in the purely resistive regime our estimates agree with the numerical results obtained by [Q. Yu, S. Gunter, K. Lackner, Nucl. Fusion 54, 072005 (2014)] for the internal kink instability in a cylindrical tokamak. We also find that, in the case of a sawtooth crash, non-collisional physics becomes important above a value of the Lundquist number which scales like $S(R/d_e)^{12/5}$, in terms of the tokamak major radius R and of the electron skin depth d_e. This value is commonly achieved in present day devices. As collisionality is further reduced, the characteristic rate increases, approaching Alfvenic values when the primary instability approaches the collisionless regime. All these results have been recently discussed in Ref.[D. Del Sarto, M. Ottaviani, arXiv preprint, arXiv:1603.00276 (2016)].

Daniele Del Sarto
Universite de Lorraine

Date submitted: 15 Jul 2016 Electronic form version 1.4