Geophysical Research Abstracts
Vol. 20, EGU2018-9273-2, 2018
EGU General Assembly 2018

Triggers of fast reconnection and MHD turbulence

Marco Velli (1), Anna Tenerani (1), and Fulvia Pucci (2)

(1) University of California, Los Angeles, Earth, Planetary and Space Sciences, United States (mvelli@ucla.edu), (2) National Institute for Fusion Science, NINS, Japan and Princeton Plasma Physics Laboratory, Princeton, USA

For thin current sheets of length L (assumed to be of the same order as the macroscopic length scale of the system), the specific dependence of the inverse aspect ratio a/L on the Lundquist number S determines when a reconnection instability becomes fast or “ideal”, where by the latter term it is implied that the growth rate no longer depends explicitly on the Lundquist number (Pucci and Velli, 2014, Landi et al., 2015, Tenerani et al., 2016)."Ideal" tearing is typically a plasmoid instability, in the sense that it leads to the disruption of the sheet into a number of islands. Recently it has been argued that naturally forming current sheets in a turbulent cascade will alter the cascade phenomenology once a similar criterion is established (Loureiro & Boldyrev, 2017). On the other hand, the stability of simple current sheet equilibria is dramatically dependent on the details of the current profiles, the magnetic field structure, and the nature of the surrounding flows. Here we analyze how such properties affect critical aspect ratios and how one must take these effects into account when modeling the nonlinear cascade in MHD.

References: Pucci, F. and M. Velli, Astrophys. J. Lett. 780, L19 (2014), Landi, S., Del Zanna, L., Papini, E., Pucci, F. & Velli, M. Astrophys. J. 806, 131, (2015), Tenerani, A., M. Velli, F. Pucci, S. Landi and A. F. Rappazzo J. Plasma Phys. 82, 535820501, (2016), Loureiro, N. F. and Boldyrev, S. Phys. Rev. Lett. 118, 245101 (2017)