Geophysical Research Abstracts
Vol. 19, EGU2017-7272-2, 2017
EGU General Assembly 2017

Detection of different reconnection regions from kinetic simulations during island coalescence after asymmetric magnetic reconnection

Emanuele Cazzola (1), Jean Berchem (2), Maria Elena Innocenti (1), Martin V. Goldman (3), David L. Newman (3), Meng Zhou (2), and Giovanni Lapenta (1)

(1) KULeuven, Centre for mathematical Plasma-Astrophysics, Wiskunde, Leuven, Belgium (emanuele.cazzola@wis.kuleuven.be), (2) Department of Physics and Astronomy, UCLA, Los Angeles, CA, USA, (3) Center for Integrated Plasma Studies, University of Colorado Boulder, Boulder, CO, USA

In this work we present new results from fully kinetic simulations of the magnetic islands coalescence dynamics after asymmetric magnetic reconnection. In a previous work, we have shown that three different reconnection regions can be identified when a new frame of reference based on the local magnetic field is set. These regions were marked as X, D and M whether they describe, respectively, a traditional X-line event, an event between two diverging islands or an event between two merging islands [1, 2].

The results shown here extend the previous analysis to a more realistic regime, including a remarkable temperature transition across the current sheet. In particular, regions X, D, and M are also observed within this new regime, featuring yet new interesting characteristics. Special attention is given to the particles agyrotropic and anisotropic behavior as fundamental signatures for the detection of these regions with satellites.

These results are timely for the ongoing MMS mission, whose data from the magnetopause crossing are presently being analyzed. In fact, data revealed that an intense flux-ropes activity takes place in this region of the magnetosphere, which makes the presence of this set of reconnection regions highly expected.

[1] Cazzola, E., et al. "On the electron dynamics during island coalescence in asymmetric magnetic reconnection." Physics of Plasmas (1994-present) 22.9 (2015): 092901.

[2] Cazzola, E., et al. "On the electron agyrotropy during rapid asymmetric magnetic island coalescence in presence of a guide field." Geophysical Research Letters 43.15 (2016): 7840-7849.