Geophysical Research Abstracts
Vol. 21, EGU2019-4018, 2019
EGU General Assembly 2019

Twisted flux rope interactions in the solar wind

Zoltán Vörös (1,2) and Emiliya Yordanova (3)

(1) Space Research Institute, Graz, Austria (zoltan.voeroes@oeaw.ac.at), (2) Geodetic and Geophysical Institute, RCAES, Hungarian Academy of Sciences, Sopron, Hungary, (3) Swedish Institute of Space Physics, Uppsala, Sweden

Turbulence in collisionless space plasmas can generate coherent structures such as ion- and electron-scale (reconnecting) current sheets and small-scale flux ropes (magnetic islands in 2D). In the solar wind, flux ropes with typical sizes corresponding to the inertial range turbulence scales are observed together with the current sheets and particle acceleration signatures. Here we investigate the effect of the flux rope magnetic twist on the level of local turbulence and current sheet generation near the borders of single or interacting flux ropes. The twist will be determined using both force-free and non-force-free flux rope models. Large twist values are associated with instabilities, e.g. kink or Kelvin-Helmholtz instabilities, and with enhanced magnetic free energy which can be potentially converted to kinetic and thermal energy via magnetic reconnection. Recent studies indicate that small-scale flux ropes with durations between 10 minutes and 6 hours are ubiquitous in the solar wind, therefore the magnetic twist can be one of the key parameters controlling the local generation of turbulence, particle acceleration and energy conversion.