Geophysical Research Abstracts
Vol. 17, EGU2015-2941, 2015
EGU General Assembly 2015

Turbulence generated by flux tube instabilities in the solar wind

Zoltan Vörös (1), Teimuraz Zaqarashvili (1), Jury Sasunov (1), Vladimir Semenov (2), and Roberto Bruno (3)

(1) Space Research Institute, Austrian Academy of Sciences, Graz, Austria (zoltan.voeroes@oeaw.ac.at), (2) Physical Institute, Saint Petersburg State University, St. Petersburg, Russia, (3) INAF-IAPS, Istituto di Astrofisica e Planetologia Spaziali, Rome, Italy

Magnetic flux tubes represent basic structures on the Sun and in the solar wind. Flux tubes of solar origin can become magnetically twisted at photospheric, chromospheric or coronal levels and transported into interplanetary space. Twisted or untwisted flux tubes can also be generated by magnetic reconnection in the solar wind. We show here that flux tube instabilities, such as the Kelvin-Helmholtz and the kink instabilities, may significantly contribute to the local generation of turbulence, reconnection and dissipation in the solar wind. The associated "fresh" turbulence may change the field and plasma conditions supporting different local dissipation mechanisms at their characteristic wavenumbers. Recent analytical and numerical calculations show that twisted tubes embedded into twisted external magnetic fields are Kelvin-Helmholtz unstable even for sub-Alfvenic flows. Moving tubes with strong twists are unstable against the kink instability resulting in magnetic reconnection and dissipation.

Vörös et al., ApJL, 797:L10, 2014.
Zaqarashvili et al., A&A, 561, A62, 2014.
Zaqarashvili et al., ApJL, 783:L19, 2014.