Geophysical Research Abstracts
Vol. 18, EGU2016-7376, 2016
EGU General Assembly 2016

Proton fire hose instabilities in the expanding solar wind: Role of oblique magnetic field

Petr Hellinger

Astronomical Institute, AS CR, Solar department, Prague 4, Czech Republic (petr.hellinger@asu.cas.cz)

The double adiabatic (CGL) approximation for the ideal (Parker) interplanetary magnetic field (IMF) predicts generation of the parallel particle temperature anisotropy ($T_\parallel > T_\perp$) for a nearly radial magnetic field whereas for a strongly oblique IMF generation of the opposite temperature anisotropy is expected. The transition between the two behaviours is expected at around 45^o, i.e. around 1 AU in the solar wind in the ecliptic plane. We investigate properties of a proton-electron plasma system in the solar wind using hybrid expanding box simulations starting with an oblique IMF. The simulated system becomes unstable with respect to the parallel and oblique fire hose instabilities and is forced to stay around the corresponding marginal stability. Rotation of the IMF reduces the time system stays near the marginal stability regions and for a strongly transverse IMF the system moves away from the regions unstable with respect to the fire hose instabilities.