Geophysical Research Abstracts
Vol. 17, EGU2015-8487, 2015
EGU General Assembly 2015

Particles momenta through the Alfven transition layer of the cusp region : 3D global particle-in-cell simulations

DongSheng Cai (1), Bertrand Lembege (2), Amin Esmaeili (1), and Ken-ichi NIshikawa ()

(1) University of Tsukuba, CS, Tsukuba, Japan (cai@cs.tsukuba.ac.jp), (2) LATMOS_IPSL_UVSQ_CNRS, (3) National Space Science and Technology Center, UAH

The cusp region is analyzed with the context of three-dimensional (3D) global full electromagnetic particle-in-cell (PIC) simulations used in order to reproduce the global solar wind-terrestrial magnetosphere interaction. Presently the study is restricted to the case when the Interplanetary Magnetic Field (IMF) is in a northward configuration; in this case the X-reconnection région is extended along the magnetopause tailward with respect to the upper edge of the cusp location. Recent results of PIC simulations (Cai et al., 2015) have recovered the general expected features of the cusp issued from both previous experimental and MHD simulation results. One new striking feature is the evidence of an Alfven transition layer (ATL) almost adjacent to the upper edge of the stagnant exterior cusp (SEC), through which the plasma flow transits from super (from magnetosheath) to sub-(to SEC) Alfvenic regime in a good agreement with experimental data statistics performed by Lavraud and al. (2005) but not mentionned in MHD results. Presents simulations (i) show that the ATL largely extends out of the upper cusp region until even reaching the subsolar région and is a 3D structure, and (ii) focuss on the analysis of the particles macroscopic momenta through the ATL. Two main questions are adressed: (a) the ion fluxes issued from the solar wind (SW) which are shown to penetrate or not the cusp region at the location where the thickness of the ATL is the smallest (which suggests strong local plasma précipitation) and (b) the link of the plasma fluxes issued from the X-reconnection region and the ATL (and the upper cusp) region.