Geophysical Research Abstracts
Vol. 21, EGU2019-13836, 2019
EGU General Assembly 2019

Impact of the IMF rotation on the dynamics of the Alfven Transition Layer : 3D PIC global simulation of the solar wind–terrestrial magnetosphere interaction.

Dongsheng cai (1), Amin Esmaeili (1), and Bertrand Lembege (2)
(1) CS, University of Tsukuba, JAPAN (cai@cs.tsukuba.ac.jp), (2) LATMOS-IPSL-UQSQ

Recent results of 3D PIC simulations (Cai et al., 2015) have analyzed the main features of the cusp in the case of northward configuration of the interplanetary magnetic field (IMF). These have allowed to complete the updated global view of the cusp region (in particular the features not accessible by the MHD approach), and (ii) to compare with statistical results of experimental CLUSTER mission. One striking feature was 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. This ATL is in quite good agreement with experimental statistical data analysis performed by Lavraud et al. (2005) in similar IMF configuration. The ATL reveals to be associated to the complicated 3D particles entry into the cusp region. Moreover, simulation results show that the ATL expands towards areas even far from the cusp region.

The present work is an extension of the previous analysis as the IMF rotates from Northward , to dawn –dusk and to Southward direction. The purpose of the present research is to analyze the impact of this rotation (i) on the dynamics and the shape of the cusp itself and (ii) on the 3D geometrical features and the dynamics of the ATL. A particular interest will be focussed on this impact on (i) its radial width, (ii) its possible extension (outside the cusp region) within and outside the equatorial plane, (iii) the expansion/shrinking of the region surrounded by the ATL.