



IMF Bx effect on the magnetotail neutral sheet geometry and dynamics

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It is well known that interplanetary magnetic field (IMF) plays a crucial role in the solar wind – magnetosphere coupling and consequently in magnetospheric dynamics. A plenty of works revealed Bz and By IMF influence on energy circulation in the solar wind – magnetosphere system that reflects in peculiarities of magnetic field geometry, properties of current systems etc. At the same time the role of Bx component was overlooked since it does not show any significant correlation with geo-effective indices. Cowley (1981) suggested that Bx IMF can affect on the magnetotail current sheet position. Using global MHD models we found significant IMF Bx-dependence of position (shift in Z direction up to 1.5 Re at X=-20 Re) and geometry of magnetotail neutral sheet, that qualitatively agree with Cowley's model. Moreover, it was found that during substorm expansion phase there is an additional transient motion of neutral sheet, related to redistribution of currents during asymmetric reconnection. The set of Geotail spacecraft data (1995-2005) supported by solar wind measurements was utilized to confirm Cowley's theory and MHD modeling results. This statistical study reveals a clear IMF Bx influence on the magnetotail neutral sheet position.