



Large-scale global 3D Full particle simulations of the solar wind-terrestrial magnetosphere interaction

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Large-scale global three-dimensional PIC simulations (one grid size equal to 0.2 Earth radii) are performed in order to analyse the dynamics of the magnetotail as the interplanetary magnetic field (IMF) rotates from northward to southward direction. This dynamics reveals to be quite different within meridian/equatorial planes over two successive phases of this rotation. First, as IMF rotates from North to Dawn-Dusk direction, the X-Point (magnetic reconnection) evidenced in the magnetotail (meridian plane) is moving earthward distance at which it stabilizes. This motion is coupled with the formation of "Crosstail-S" patterns (within the plane perpendicular to the Sun-Earth line) through the neutral sheet in the nearby magnetotail. Second, as IMF rotates from dawn-dusk to South, the minimum B field region is expanding within the equatorial plane and forms a ring. This two-steps dynamics is analyzed in strong association with the cross field magnetotail current J_y , in order to recover the signatures of substorms triggering. The scaling problems of PIC code in order to compare with the satellite observation data are discussed. The capability of bow shock generation and its dependence on the grid resolutions and simulation parameters are also discussed.