Impact of the IMF rotation on the cusp dynamics on the dayside: Global 3D PIC simulations

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The dynamics of the cusp region is analyzed with a new version of a global three-dimensional full particle simulation with changing the interplanetary magnetic field (IMF) direction progressively from northward to duskward, then duskward to southward. With the initial northward IMF, bands of weak magnetic field (sash) form poleward of the cusp at high latitudes in each hemisphere (and at high altitudes); these sashes are located approximately around the pole axis. As the IMF rotates duskward, these sashes move toward the equator (within opposite quadrants). Then as the duskward-oriented IMF continue to rotate toward southward, these sashes move further and reach the dayside magnetopause at the equator. During the progressive rotation of the IMF from northward to duskward, (i) the "sash" region widens towards lower latitudes ("banana-shape"), and with the duskward IMF (ii) the size of the "banana-shape" region becomes minimum and its location stops around a maximum deviation of 45degree from the polar axis. It should be noted that the sashes are extended from the dayside to the nightside (tailward). The motion of the sashes is also analyzed during the IMF rotation form duskward to southward.