Reproducing displacements of geomagnetic conjugate point using a 3-D visualization system for Global MHD simulation

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Auroras result from precipitation of energetic charged particles that are guided by a field line. Thus, we can expect that nightside auroras appear simultaneously at both the conjugate points. However, simultaneous auroral observations at the conjugate points have not always shown that auroral features may not always be conjugate in comparison with. Previous observations [e.g., Sato et al., 1998; Ostgaard et al., 2005] have suggested that the interplanetary magnetic field (IMF) penetrates the magnetotail and that IMF orientation affects the location of the nightside aurora. Ostgaard et al. [2005] have demonstrated that IMF orientation acts as a main controlling factor of the relative displacement of the aurora in the conjugate hemispheres on the statistical basis. Comparing with the displacement predicted by empirical magnetospheric models (T96, & T02), they found that the tendency is consistent with the observation, but the influence of IMF By on the displacement is significantly underestimated by an order of magnitude. It is suggested that the influence of IMF By on the magnetospheric magnetic field line geometry is inversely proportional to the strength of the ambient geomagnetic field. If the active auroral arc are mapped into the region of the weak magnetic field associated with a substorm, the influence of IMF By will be much more significant. Such transient and spatially localized substorm-related depressions of the magnetic field are not adequately reproduced by these models. In this study, we studied the influence of IMF on relative displacements of geomagnetic conjugate points provided by a global MHD simulation model. In some case, we found that drastic displacements of geomagnetic conjugate points occur at the last 15 minutes before the magnetic reconnection starts in the near-earth magnetotail.