

Response of Jovian Magnetosphere to reverse of IMF By component

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We have focused on the unique characters of Jupiter as compared with Earth (huge magnetic field, rapid rotation, plasma production from Io) and have done various global MHD simulations of Jupiter. Recently we described the basic, static configuration of Jovian magnetosphere including IMF By. This time we have simulated and examined the transition state of the magnetosphere when IMF By changed positive to negative.

There were some reports of the influences of IMF By reversal. For example, in case of Earth, it was a storm event in October 2003. This greatly affected Earth observer ADEOS-2. ACE observed the solar wind environment in the time, we set this observed values to the solar wind conditions in the simulation. Then we found that the reverse of IMF By made the plasma sheet veld, twist and the plasma extension (or lobe bifurcation) appeared. In Saturn spacecraft Cassini observed the solar wind environment before arrived at Saturn and it was reported that the auroral emissions of Saturn increased when the IMF By reversed. These suggested that the dynamics of magnetosphere could change with IMF By turning as was shown in case for Earth and Saturn.

In this study we run four conditions of IMF By reversal simulation and investigated the transition phenomena. On each condition we reversed only By component and the four conditions are associated with whether northward IMF was included or not before or after IMF By turned. The solar wind dynamic pressure was set constant. In these conditions we examined the three dimensional configuration of the magnetosphere, energy flux and field aligned currents (FACs) in polar region. As the result, the magnetosphere was complicated in each condition, in particular for the case with only IMF By. In this case the magnetic field in the tail has expanded toward z-direction and the distribution of FACs has changed. Thus we found these transition states clearly differed from steady states. In the presentation we will show the simulation results in detail and compare these with the simulation results of Earth and the observations of Saturn.