

Turbulent convection in the magnetosphere related to the solar wind and intrinsic characters in planets

Keiichiro Fukazawa[1]; Tatsuki Ogino[2]
[1] NICT; [2] STEL, Nagoya Univ.

The configuration and dynamics of the Earth's magnetosphere are largely controlled by the solar wind while Jupiter's magnetosphere is dominated by its massive rotating equatorial current sheet and plasma source at Io. Saturn has a rapid rotation equivalent to Jupiter and has the comparable strength of the magnetic field with Earth. Thus Saturn is often called that the planet has the intermediate character of Jupiter and Earth. In recent our simulation study, we showed that the Kronian magnetosphere always had vortices and turbulent convection which were the result from the interaction of the solar wind and corotation or the solar wind and magnetospheric convection for no IMF, southward and northward IMF by the global magnetohydrodynamics (MHD) simulation. This suggested that the Kronian magnetosphere can be quite different from both Jovian and Earth's magnetospheres.

To examine what dominates the turbulent convection in those planets, we have carried out the simulations of Kronian magnetosphere under various solar wind conditions and compared those results with our Jovian simulation results. When we changed the dynamic pressure double and half, the convection of Kronian magnetosphere dynamically changed. Periodic plasma ejections became more turbulent and the wavy configuration appeared along the magnetopause. Then we ran the simulations including IMF By component. As the results, the vortices and turbulent convection in the magnetosphere appeared as same as the previous our study which included the only IMF Bz.

On the other hands, our Jovian simulation results showed that the turbulent convection was not appeared when we changed the direction of IMF dusk/dawnward and increased/decreased the dynamic pressure except for very small dynamic pressure case. In this case we found that the wavy configuration along the magnetopause and the common parameter related to the configuration of the magnetosphere among these two planets. In this presentation we will show the simulation results of the magnetosphere and the factor of turbulent convection in the magnetosphere.