Comparison of Structure and Dynamics of Planetary Magnetospheres

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Structure and dynamics of planetary magnetospheres are affected by interaction with the solar wind with interplanetary magnetic field (IMF). Moreover, the individualities of planetary magnetospheres are determined by mass, intrinsic magnetic field, rotation period and plasma sources. Thus three important parameters for planetary magnetospheres can be presented as the magnetopause distance, Alfven radius, where rotational speed equals the Alfven speed, and distribution and species of plasma sources. Therefore, we have studied structure and dynamics of the planetary magnetospheres with intrinsic magnetic field, in particular for Jupiter and Saturn by 3-dimensional global MHD simulation of interaction between the solar wind and magnetospheres and compared with the earth's magnetosphere.

Since Jupiter has the largest mass and intrinsic magnetic field, shortest rotation period and a large amount of plasma source from Io, largest magnetosphere with magnetic disc is formed in the solar system. Saturn is the second largest planet with short rotation period. However, the Saturn's magnetosphere may resemble the earth's one because the effect of intrinsic magnetic field is comparable with earth. Then since the IMF By component is strong by the Parker spiral, it was considered that auroras could be affected by the dynamic pressure of solar wind but less by the IMF. However, it has been pointed out that the magnitude and orientation of IMF can have an important role on the aurora activity in Saturn as well as Jupiter. We will demonstrate comparison the structure and dynamics of planetary magnetospheres in base of global MHD simulation results.