

Development of the Global Simulation Model of the Magnetosphere with 1 Re Inner Boundary

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In the recent global MHD simulation of the magnetosphere, the inner boundary is set at 3-5 Re from the Earth. This distance is come from the numerical stability and the computation time which are determined by the Alfvén velocity that is the characteristic velocity of the MHD and increases at the region of high magnitude of magnetic field, that is vicinity of the Earth. It is thought that setting these inner boundaries does not so much affect to focus on the global configuration of the magnetosphere but a problem arises when we want to run the simulation of the magnetosphere and ionosphere coupling because there is the space between two regions so that we cannot connect directly the magnetosphere with ionosphere in the simulation. Thus now the simulation result of magnetosphere is mapped to the ionosphere along the magnetic field lines, however this cannot apply to the mid and low latitude ionosphere due to not calculating the vicinity of Earth. To overcome these problems, I develop the global simulation model with 1 Re inner boundary. There are several techniques to establish this model and I apply the simplest technique which is the cut of time step to the model. However it takes huge time to calculate the global simulation with short time step, I built changing the time step with several region such as the inner magnetosphere and outer magnetosphere into that technique. In this study I will present this model and states of development.