

## Magnetosphere-Ionosphere Coupling using 3-Dimensional MHD Model in Yin-Yang Grid

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In the global MHD model, the ionosphere has been treated as a sheet model with electrical conductivity. However, the sheet model is not sufficient to essentially understand the magnetosphere-ionosphere coupling system. We need the 3D model to self-consistently solve structure and dynamics of ionosphere. When we calculate magnetosphere-ionosphere coupling system in spherical geometry, it takes so long time.

In this study, we adopt Yin-Yang grid composed of two identical spherical grids. The Yin-Yang grid was developed by Kageyama and Sato [2004]. By using this new grid, some problems that occur in high latitude region of latitude-longitude grid are resolved. In addition Yin-Yang grid has some strong advantage that calculation is speedy, we can heighten accuracy easily, it is suitable for massively parallel computers.

We have solved 3D MHD equations extended by Hall term and ion-neutral collision term between an altitude of 80 km and an altitude of 1090 km. A static equilibrium solution of ionosphere is given in the initial state. The simulation result shows that the convection gave at an altitude of 1090km as the outside boundary conditions travels toward the earth, and the current closure is formed in ionosphere. Moreover, we could confirm the effect that collision term strengthens Pederson current and Hall term scatters the current to transfer the perpendicular current to the geomagnetic field. In this time, we present these simulation result on the magnetosphere ionosphere coupling.