

Characteristics of Current in Thermosphere-Ionosphere-Magnetosphere Coupling Model at Jupiter

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A fast-rotating planet, Jupiter, has a unique solar wind-magnetosphere-ionosphere-thermosphere coupling system. The dominant energy source in the system is transported from the neutral atmosphere corotating with the fast planetary rotation through collisions between ions and neutrals in the ionosphere to the quasi-corotating magnetospheric plasma. In order to investigate the magnetosphere-ionosphere-thermosphere coupling system, we have developed a new numerical model.

The calculated field-aligned current shows the diurnal variation in the maximum density between 0.005 (LT 5h) and 1 (LT 12h) $\mu\text{A}/\text{m}^2$ in the latitudes between 70 (LT 5h) and 73 (LT 12h) degree depending on the ionospheric conductance caused by solar EUV and the interactions among the enforcement current, magnetospheric plasma flow, and the electric field. This would explain the reason why the latitude of the night-side visible aurora is lower by about 1 degree than that of the dayside UV/IR aurora.