

The development of a new Hyper-MHD code including finite electron inertia effects

Daisuke Hayashi[1], Masaki Fujimoto[2]

[1] Earth and Planetary Sci, Titech, [2] DEPS, TITECH

While the Hall-MHD description separating ion and electron fluid velocities does produce various significant results out of the scope of traditional MHD framework, it now seems necessary to step forward to include finite electron inertia effects in order to resolve the important issue of coupling MHD-scale dynamics with electron-scale phenomena. Since full particle simulations are still costly, we have decided to develop a new Hyper-MHD code that takes the finite electron inertia effects into account by modifying the induction equation from Hall-MHD equations. The 5th-order upwind difference scheme is applied for solving the induction equation. Some demonstrative cases indicating the importance of coupling between MHD- and electron-scale dynamics will be presented.