Study of Ion Dynamics in Magnetic Reconnection

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In space plasma physics, production of high energy particles is one of the most important topics.

Magnetic reconnection has been thought to be happen everywhere in space, and thought to be a strong driver to accelerate particles by releasing energy of magnetic field in a short period of time, and many simulation studies have revealed the acceleration mechanism of electrons. On the other hand the dynamics of ions in magnetic reconnection still remains an open question. This is because commonly used full-particle simulations are based on electron scale, and they are not good at treating ion scale phenomina.

We investigated ion dynamics in magnetic reconnection by using two dimensional hybrid code. Hybrid code treats ions as particles, like full-particle simulations, but treats electrons as a massless fluid. In other words, because of neglecting electrons' feature as particles, hybrid code has the advantage to describe ion spatial and temporal scale behavior in terms of computational resources and computing time.

In this study, we used predictor-corrector scheme (Winske et al. 1986) and Harris current sheet as the initial condition, and we will discuss ion dynamics through the reconnection process.