

磁気圏境界層的なカレントシートを持つ磁気リコネクションレイヤーの大規模発展

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Development of magnetic reconnection layer with magnetopause like current sheet

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Recent observation of the Earth's magnetopause by the Cluster spacecraft [Retino et al., 2006] has revealed detailed internal structure of the magnetopause with high resolution electron distribution function. The key features of that observation are: (1) the electron density dip appears on the separatrix of the magnetospheric side. (2) The electric field normal to the magnetopause has a peak at the density dip. (3) Strong plasma outflow jet due to the reconnection is seen on the magnetospheric side of the magnetopause. (4) At the separatrix on the magnetospheric side of the magnetopause, both the parallel and anti-parallel electron accelerations are simultaneously observed. Motivated by those results, we model the reconnection layer structure with the magnetopause like current sheet using two-dimensional full-particle simulations. In the first half of this presentation, we see the comparative study between the observation and the simulation. Our simulation results reproduce those key features.

In the latter half of the presentation, we show some preliminary results on very large system size simulations using the density asymmetric current sheet with reconnecting layer. In these simulations, we see the effects of the guide field and the velocity shear on the development of the reconnection layer in the large system. We have found that (1) secondary islands are allowed to develop in the later phase of the simulation. (2) In the presence of the guide field, the X-line starts to slide due to $J \times B$ -force in the vicinity of the X-line. (3) The sliding velocity is mostly independent from the guide field. (4) In the presence of the velocity shear, the X-line starts to slide, too.