Magnetic energy dissipation of plasma sheet under coupling of magnetic reconnection and lower hybrid drift instability

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Understanding of the magnetic energy dissipation process in a current sheet is an important problem in space plasma as well as in MMS science. So far the inertia resistivity by reconnection and the current driven instability such as the lower hybrid drift instability (LHDI) have been discussed as possible candidates for the origin of microscopic process of magnetic energy dissipation. It is well known that while the LHDI is mainly excited in the plasma sheet boundary, the inertia resistivity effectively works at the neutral sheet. Therefore, the role of the LHDI to the magnetic field dissipation is less important than the inertia resistivity involved in the magnetic reconnection. However, the activity of lower hybrid drift waves together with the electron heating is commonly observed in the plasma sheet boundary by modern satellite observations, and their impact on the magnetic field dissipation at the neutral sheet is not necessarily neglected. In addition, the nonlinear coupling between them is not theoretically understood yet. In this talk, we study the coupling of the collisionless reconnection and the LHDI by using a three-dimensional PIC simulation by paying a special attention to electron heating and the magnetic energy dissipation, and discuss the importance of the current driven instability during magnetic reconnection.

Keywords: magnetic reconnection, plasma sheet, palsma heating, lower hybrid drift instability

