

Computational study of three dimensional plasmoid evolution in the sheared magnetic field

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Statistical studies of satellite observations have revealed the plasmoid evolution and the characteristics of them (Ieda, 1998, Machida, 2004). In our previous studies (Ugai et al., 2005, Ugai and Zheng, 2005), the plasmoid evolutions in the no-sheared magnetic field have been revealed using MagnetoHydroDynamic (MHD) simulations. However, the magnetic field in the solar corona and the geo-magnetotail are usually sheared. The plasmoid evolution in such sheared magnetic field is studied using MHD simulations on the basis of spontaneous fast reconnection model. These simulation results are compared with actual satellite observations.

Three dimensional growth and propagation of plasmoid in the sheared magnetic field was actually simulated in our model. Due to the sheared magnetic field, the plasmoid twists in the direction of the sheared field. In front of the plasmoid, no-reconnected magnetic field lines in a current sheet accumulate and have a tilt to current sheet. On the other hand, reconnected magnetic field lines accumulate in rear of the plasmoid. This result is able to explain the bipole type variations of magnetic field observed by the in-situ satellites.

References

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