R008-26
Zoom meeting D ：11/4 PM2 (15:45-17:30)
15:45-16:00

Plasmoid-dominated Turbulent Reconnection in a Low-beta Plasma

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In magnetohydrodynamics (MHD), magnetic reconnection has been discussed by Sweet--Parker and Petschek models. It was recently found that a laminar Sweet--Parker reconnection evolves to plasmoid-dominated turbulent reconnection in a large-scale system. It is believed that the reconnection rate during the plasmoid-dominated stage is approximately 0.01.

Plasma beta in the inflow region is a key parameter in the reconnection system. However, even though plasma beta is extremely low around reconnection sites in a solar corona, many aspects of the plasmoid-dominated reconnection in the low beta regime remain unclear.

In this contribution, we explore basic properties of plasmoid-dominated reconnection in a low-beta background plasma, by means of resistive MHD simulations. We have found that the system becomes highly complex due to repeated formation of plasmoids and shocks. We have also found that the average rate increases in the beta < 1 regime, in contrast to popular results. We attribute this to compressible effects. We have applied a compressible reconnection theory to this problem. Our key predictions are verified by extensive numerical survey.

We further discuss the relevance to an earlier study. We argue that our results better represent average properties of reconnection after the initial plasmas are ejected.

We will also overview improvements to our simulation code.

Reference:

S. Zenitani and T. Miyoshi, Astrophys. J. Lett., 894, L7 (2020)