Three-dimensional MHD simulations of magnetic reconnection with finite-amplitude fluctuations

Takaaki Yokoyama[1]

[1] School of Science, Univ.Tokyo

http://stp-www.eps.s.u-tokyo.ac.jp/~yokoyama/

The dissipation mechanism at the magnetic X-point of the reconnection process in solar flares is studied. Although the reconnection model is a promissing mechanism to explain the rapid energy release, the detailed structure of the diffusion region is not yet clear. There must be a meso-size scale where the MHD turbulence plays a roll between the global scale of the flare loops and the microscopic scale. In order to study the effect of the MHD turbulence on the magnetic reconnection, we are performing a series of MHD simulations of magnetic reconnection with finite amplitude fluctuations. A temporal evolution of a simple current sheet with almost uniform resistivity is investigated after imposing a finite-amplitude fluctuations (The strength is approximately Alfven speed.) all over the computation domain. As we reported in the previous meeting in last spring, two-dimensional simulations showed no effective enhancement in the energy release rate. This may be because the entanglement of magnetic field lines were inhibited in the two-dimensional space. We therefore performed three-dimensional simulations and expected that the energy release would become more efficient. The preliminary results showed however that the energy release rate does not change much even in the case with fluctuations.