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Analysis on turbulent reconnection of three-dimensional resistive MHD simulation

WANG, Shuoyang[1]* ; YOKOYAMA, Takaaki[1] ; ISOBE, Hiroaki[2]
WANG, Shuoyang[1]* ; YOKOYAMA, Takaaki[1] ; ISOBE, Hiroaki[2]

[1]The University of Tokyo, [2]Kyoto University
[1]The University of Tokyo, [2]Kyoto University

This study starts from a three-dimensional current sheet with random perturbation on velocity, in order to understand more on the 3D reconnection in a more general way.

Due to the periodic boundary condition, the core of current sheet quickly develops a resonance netlike pattern under tearing instability. Small reconnection site mainly form two chains on either side of the current sheet center and constitute a zigzag arrangement. The outflow from one reconnection site is fed into the counterpart on the other side thus composes a positive feedback system resembles even double tearing mode. As the inflow being enhanced, slow-mode shocks are identified along the current sheet. The conversion of the magnetic energy is further raised. Total kinetic energy of the current sheet presents 4 steps of development while first 3 exhibit linear growing tendency. At the same time, reconnection rate increases by 5 times compared with the early phase. Thus we have achieved faster reconnection without localized resistivity in a more universal idea.