

Abstract Submitted
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Local and Global Transient Effect of Magnetic Reconnection¹

YOSHINORI HAYASHI, TORU II, MICHIAKI INOMOTO, YASUSHI ONO, University of Tokyo — Transient effect of magnetic reconnection has been investigated in the TS-4 torus plasma merging device. We found axial mergings of two and three loops, which were caused by local and global effect, respectively. The two loop merging with pull reconnection converts one common flux to two private fluxes. Under strongly driven inflow, the plasma and magnetic flux inflow exceeded the outflow ones, causing flux and density piled-up in the current sheet. This pile-up effect was found to increase the inflow speed without anomalous resistivity effect. Under strong guiding field, a plasmoid grew in the current sheet during plasma pile-up. When flux pile-up reached critical value, a plasmoid was ejected from reconnection region and reconnection speed transiently increased. The plasmoid ejection made the reconnection rate maximum when its acceleration was maximized. In the case of three loop merging, two parallel loops stays for a while in a stable state because of another anti-parallel loop. When global magnetic configuration change, two loop reconnected into one loop impulsively forming another equilibrium state. We found both of these local and global effect cause fast but unsteady magnetic reconnection.

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Yoshinori Hayashi
University of Tokyo

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