Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

Impulsive Magnetic Reconnection in TS-3 and TS-4 Merging Experiments YASUSHI ONO, University of Tokyo, TS AND UTST TEAM — Impulsive effects of magnetic reconnection have been investigated in TS-3 and TS-4 tokamak merging experiments for maximizing reconnection speed. Under low guidefield, over-acceleration of two merging tokamaks caused the 3-D local deformation of current sheet. The toroidal asymmetry grew locally around the current sheet only during the reconnection time, increasing the plasma mass ejection from the current sheet. The local compression of current sheet thickness shorter than ion gyro-radius triggered its anomalous resistivity, causing significant increase in the reconnection speed. Under high guidefield, the sheet resistivity was almost classical due to the sheet thickness larger than ion gyroradius When we over-accelerated the merging tokamaks under high-guide field, large inflow flux and low current-sheet dissipation caused plasma pileup around the sheet. When the flux pileup exceeded a critical limit, the sheet was ejected mechanically from the squeezed X-point area. The reconnection (outflow) speed was slow during the flux pileup and was fast during the ejection During the ejection, the current sheet was often transformed into several current islands, suggesting that the island size comparable with ion gyrorasius increased the sheet resistivity. Those three fast reconnection mechanisms: anomalous reisistvity, plasmoid (sheet) ejection and 3-D reconnection were observed consistently in TS reconnection experiments.

Yaushi Ono
University of Tokyo

Date submitted: 17 Jul 2009 Electronic form version 1.4