Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

Plasma Pileup and Ejection during Impulsive Magnetic Reconnection in TS-4 Merging Experiment[1] KENSUKE SUZUKI, ATSUSHI MATSUDA, YOSHINORI HAYASHI, MICHIAKI INOMOTO, YASUSHI ONO, University of Tokyo — Plasma pileup and ejection during magnetic reconnection have been investigated in the University of Tokyo Spherical Torus (TS-4) plasma merging experiment. We developed an eight-channel CO_2 laser interferometer to measure the time evolution of 1-D profile of electron density in the reconnection layer. Under the high guide field (B_t/B_p ~5), the strong compression force(I_{Acc} ~60kA) causes electron density to pileup in the current sheet. After the density reaches a certain critical value, the peaked density profile of the current sheet is transformed into hollow profile, indicating ejection of the accumulated plasma in the current sheet. The pileup and ejection are observed to cause large inflow and increase in the reconnection speed. After the ejection, both the inflow speed and the sheet size decrease. Under the weak compression force (I_{Acc} ~0kA), the electron density in the current sheet and the reconnection rate stay constant right up until the end of reconnection. These results clearly indicate that the density pileup and ejection causes the fast reconnection. More detailed parameter dependence of reconnection speed will also be discussed.

[1]JSPS Core-to-Core Program 22001

Kensuke Suzuki
University of Tokyo

Date submitted: 17 Jul 2010 Electronic form version 1.4