

Abstract Submitted
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Experimental investigation of plasma pile-up and ejection using TS-4 plasma merging device¹ KAZUTAKE KADOWAKI, MICHIAKI INOMOTO, YASUSHI ONO, The University of Tokyo — Plasma density pile-up and following plasma ejection were observed for the first time by radial electron density profile measurement using an 8-channel CO₂ laser interferometer during the impulsive magnetic reconnection in the TS-4 spherical tokamak merging experiment. Two merging spherical tokamaks under the high guide field were merged together in the axial direction and their reconnection was as slow as the steady Sweet-Parker model under the small compressional force of the external coils. Under the strong compressional force, we observed multi-cycles of impulsive fast reconnection which is composed of the plasma pile-up inside the current sheet and its ejection from the X-point repetitively. The density pile-up in the current sheet and the plasma ejection inward accelerate the reconnection inflow about 2 times faster than the steady case. We modified the Sweet-Parker model to include those two effects [1], and found that its new theoretical inflow velocity agrees well with the measured velocity.
[1] Y.Ono, *et al.*, Phys. Plasma, vol.18, 111213(2011).

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