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Current sheet dynamics in transient magnetic reconnection experiment YOSHINORI HAYASHI, TAKUMA YAMADA, MICHIAKI INOMOTO, YASUSHI ONO — The current sheet dynamics was studied in the TS-4 torus plasma merging device using controlled external force and guiding field. Under strong guiding field - five times as much as reconnecting field, the half-width δ of current sheet was always longer than ion Larmor radius ρ_i, so that the low resistivity sheet made the reconnection quasi-steady like the Sweet-Parker model. Without external driving force, δ decreased to ρ_i where dissipation was subject to anomalous resistivity and aspect ratio of current sheet Δ/δ was determined by resistivity. When the reconnection inflow is strongly driven by the coil current, the plasma and magnetic flux inflow exceeded the outflow, causing density piled-up in the current sheet. This pile-up effect increased the reconnection speed without anomalous resistivity effect. With strong guiding field magnetic island (plasmoid) grew in the current sheet and ejected from reconnection region reconnection occasionally. The plasmoid ejection made the reconnection rate maximum when its acceleration was maximized, indicating another transient effect as a new fast reconnection mechanism.

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