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**Fast Magnetic Reconnection and High Power Heating in TS-4 / UTST Spherical Tokamak Merging Experiments with Neutral Beam Injections** YASUSHI ONO, University of Tokyo, TS AND UTST TEAM — The TS-4 and UTST spherical tokamak (ST) merging experiment revealed two types of fast magnetic reconnections: 3-D reconnection and plasmoid (current-sheet) ejection in addition to the anomalous resistivity of current sheet reported in 1995. The 3-D local deformation of current sheet was observed when two tokamak plasmas with low guide-field were over-compressed by external coils. Note that global mode amplitudes of merging toroids were maintained low during the reconnection. The toroidal asymmetry grew locally around the current sheet only during the reconnection and disappeared right after the reconnection. The intermittent reconnections by current sheet/ plasmoid ejection was observed when two tokamaks with high guide-field were over-compressed by the external coils. The reconnection (outflow) speed was slow during the flux pileup and was fast during the ejection. Due to the combination of pileup and ejection, the intermittent reconnection increased the averaged reconnection speed. These fast reconnections enable us to maximize the heating power of merging ST plasmas. High beta /high flow stability tests of ST plasmas are being made in TS-4 and UTST with the assistance of merging/ reconnection and 0.4MW and 0.7MW neutral beam injections (NBI). This work is supported by JSPS Core-to-Core Program 22001.

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