

Abstract Submitted
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Formation of Ultra High Beta Spherical Tokamak by Use of Merging Spheromak Plasmas¹ TAICHI ITO, TORU II, MICHIAKI INOMOTO, YASUSHI ONO, The University of Tokyo — We formed ultra-high beta spherical tokamak plasmas using both of two spherical plasma merging and ramp-up of external toroidal field.² The merging and reconnection heats ions significantly during magnetic reconnection in TS-3 experiments. The maximum ion temperature $T_i \sim 250$ eV is obtained in two merging spheromaks with counter-helicity and $T_i \sim 120$ eV in those with co-helicity. While the reconnection heating decreases with the external guide toroidal field B_t , the confinement time of toroidal plasma tends to increase with external B_t . In order to confine the maximum ion thermal energy, we applied external B_t to merging low- q plasmas such as spheromaks with co- and counter-helicity after completion of reconnection, transforming the high-beta low- q toroid to an ultra high-beta ST in TS-3^[1] and TS-4. This transformation increases the life times of low- q toroids by fact 2-3. It is noted that the high-beta ST has an absolute minimum B profile with deep magnetic well. With increasing the ramp-up speed of external B_t , the magnetic well increases, but stays longer in low- q state unstable to MHD modes.

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²Y. Ono et al. Nucl. Fusion 43, 789, (2003).

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