

Abstract Submitted
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Flux amplification and sustainment of ST plasmas by multi-pulsed coaxial helicity injection on HIST T. HIGASHI, M. ISHIHARA, Y. KIKUCHI, N. FUKUMOTO, M. NAGATA, University of Hyogo — The Helicity Injected Spherical Torus (HIST) device has been developed towards high-current start up and sustainment by Multi-pulsed Coaxial Helicity Injection (M-CHI) method. Multiple pulses operation of the coaxial plasma gun can build the magnetic field of STs and spheromak plasmas in a stepwise manner. So far, successive gun pulses on SSPX at LLNL were demonstrated to maintain the magnetic field of spheromak in a quasi-steady state against resistive decay [1]. The resistive 3D-MHD numerical simulation [2] for STs reproduced the current amplification by the M-CHI method and confirmed that stochastic magnetic field was reduced during the decay phase. By double pulsed operation on HIST, the plasma current was effectively amplified against the resistive decay. The life time increases up to 10 ms which is longer than that in the single CHI case (4 ms). The edge poloidal fields last between 0.5 ms and 6 ms like a repetitive manner. During the second driven phase, the toroidal ion flow is driven in the same direction as the plasma current as well as in the initial driven phase. At the meeting, we will discuss a current amplification mechanism based on the merging process with the plasmoid injected secondly from the gun. [1] B. Hudson *et al.*, Phys. Plasmas Vol.15, 056112 (2008). [2] Y. Kagei *et al.*, J. Plasma Fusion Res. Vol.79, 217 (2003).

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