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Flow and dynamo measurements during the coaxial helicity injection on HIST K. ANDO, T. HIGASHI, M. NAKATSUKA, Y. KIKUCHI, N. FUKUMOTO, M. NAGATA, University of Hyogo — The current drive by Coaxial Helicity Injection (CHI-CD) was performed on HIST in a wide range of configurations from high-q ST to low-q ST and spheromak generated by the utilization of the toroidal field. It is a key issue to investigate the dynamo mechanism required to maintain each configuration. To identify the detail mechanisms, it is needed to manifest a role of plasma flows in the CHI-CD. For this purpose, we have measured the ion flow and the dynamo electric field using an ion Doppler spectrometer (IDS) system, a Mach probe and a dynamo probe. The new dynamo probe consists of 3-axis Mach probes and magnetic pick-up coils. The flow measurements have shown that the intermittent generation of the flow is correlated to the fluctuation seen on the electron density and current signals during the driven phase. At this time, the toroidal direction of the ion flow in the central open flux column is opposite to that of the toroidal current there, i.e. the same direction as electrons. After the plasma enters to the resistive decay phase, the toroidal flow tends to reverse to the same direction as the toroidal current. The results are consistent with the model of the repetitive plasmoid ejection and coalescence proposed for CHI-CD. The plasma jet emanating from the gun source and magnetic field generations through reconnection during the driven phase is well reflected in the 3D MHD simulation.

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