Development of rotating magnetic field coil system in the HIST spherical torus device

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— Coaxial Helicity Injection (CHI) is one of the most attractive methods to achieve non-inductive current drive in spherical torus devices. The current drive mechanism of CHI relies on MHD relaxation process of rotating kink behavior [1], so that there is a possibility to control the CHI by using an externally applied rotating magnetic field (RMF). We have recently started to develop a RMF coil system in the HIST spherical torus device. Eight coils are located above and below the midplane at four toroidal locations so that the RMF is resonant with $n=1$ rotating kink mode driven by the CHI. In addition, the RMF coil set is installed inside a flux conserver of 5 mm thickness (cut-off frequency $\sim 170$ Hz) so that the RMF penetrates into the plasma. The coil winding is made of 20 turns of enameled copper circular wires (1.5 mm$^2$ conductor cross section), covered with a thin stainless steel case of 0.5 mm thickness (cut-off frequency $\sim 710$ kHz). The RMF system is driven by an IGBT inverter power supply (nominal current: 1 kA, nominal voltage: 1 kV) with an operating frequency band from 10 kHz to 30 kHz. The estimated amplitude of RMF neglecting effects of image current at the flux conserver is a few tens Gauss at around the magnetic axis. A preliminary experimental result will be shown in the conference. [1] M. Nagata, et al., Physics of Plasmas 10, 2932 (2003).