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Core Plasma Rotation Characteristics of RF-Heated H-Mode Discharges on EAST

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Access to high-confinement plasmas on the EAST tokamak was readily achieved through LHCD, ICRF, or their combined application along with improved wall conditioning and wave-plasma coupling capabilities. Using a tangentially viewing X-ray crystal spectrometer, core plasma rotation profiles and their temporal evolutions were obtained. This paper presented typical plasma rotation behaviors for non-stationary and stationary H-mode discharges generated with concurrent LHCD and ICRF heating. A substantial increase of the co-current core rotation was observed at L-H transitions. For unsteady discharges with multiple L-H and H-L transitions, central rotation velocity varied as the plasma entered and left the H-mode phase. For stationary ELMy H-mode discharges, the rotation increases at an L-H transition and core plasma rotation profile remains very stable during the entire H-mode phase, although the occurrence of ELMs tended to slow down the core rotation. Changes of the steady-state core rotation at L-H transitions were found to be dependent on the plasma parameters for different ELM types. A linear relation between the rotation and stored energy, similar to the Rice scaling was obtained for both ELM-free and ELMy H-mode discharges; and for ELMy-free discharges the slope was by a factor of 1.75 steeper.

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