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Stability of Ohmic Discharges with Hollow Current Profiles in the HL-2A Tokamak WENDELL HORTON, Institute for Fusion Studies, Univ. of Texas at Austin, MINGKUN HAN, JIAQI DONG, H. HE, Southwestern Institute of Physics, Chengdu, China — New HL-2A Tokamak discharge data shows that equilibrium configurations with hollow current density profiles improve plasma confinement and stability. Stability of the ohmic discharges with hollow current density profiles on the HL-2A tokamak was analyzed and show improved confinement over for a range of plasma poloidal beta β_p, the axial and edge safety factors q_0 and q_s, as well as the minimum safety factor q_{min}. The results determine the restriction to the parameters of discharges with hollow current density profiles that is stricter than that of conventional discharges with peaked current density profiles. The hollow current profile plasma are more stable that the monotonic decreasing current profiles when β_p is higher, indicating that the discharges with hollow current density profiles can achieve higher β_p operations. There are restrictions, however, that both $q_0 2$ and $q_s - q_0 0.7$ are must hold together with $q_0 - q_{min} 0.7$, for the stronger negative central shear to become a strong stabilizing factor. We use simulations together with 3D simulations to confirm the important role of the discharges with hollow toroidal current densities to achieve advanced tokamak (AT) operations.

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