Energy Transport in Tokamak Plasmas with Central Current Density Control Using Fast Waves

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Abstract

Fast wave current drive has been used to substantially modify the central current density profile in a tokamak plasma. Counter-fast wave current drive (FWCD) applied to discharges with negative central magnetic shear enhances the shear reversal and leads to a distinct transition to a mode of improved core confinement. In this state, the electron thermal diffusivity decreases by $50 \pm 20\%$ and the ion diffusivity by $80 \pm 20\%$, compared to just before the transition. The FWCD and electron heating elucidates the role of the current profile on confinement and stability.

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