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


1 General Atomics, San Diego, California 92186-9784
2 University of Maryland, College Park, Maryland 20742-3280
3 Oak Ridge National Laboratory, Oak Ridge, Tennessee 37831-8071
4 Massachusetts Institute of Technology, Cambridge, Massachusetts 02139
5 Lawrence Livermore National Laboratory, Livermore, California 94551-9900
6 Centre Canadien de Fusion Magnétique, Varennes, Quebec, Canada

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.

*Present Address: General Atomics, San Diego, California 92186-9784.