

Electron profile stiffness and critical gradient studies

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Abstract. Electron profile stiffness was studied in DIII-D L-mode discharges by systematically varying the heat flux in a narrow region with electron cyclotron heating and measuring the local change produced in ∇T_e . Stiffness was found to be independent of plasma toroidal rotation. A critical inverse temperature gradient scale length $1/L_{Te}$ was identified at $\rho = 0.6$. Heat flux and stiffness determined by integrating the measured dependence of the heat pulse diffusivity on $-\nabla T_e$ agreed well with power balance analysis. Stiffness is predicted to increase linearly with $-\nabla T_e$ for values of $-\nabla T_e$ larger than about twice the critical value.

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