

Safety factor scaling of energy transport in L-mode plasmas on the DIII-D tokamak

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Abstract

The scaling of energy transport with safety factor (q) at fixed magnetic shear has been measured on the DIII-D tokamak [Nucl. Fusion **42**, 614 (2002)] for low confinement (L) mode discharges. At constant density, temperature, and toroidal magnetic field strength, such that the toroidal dimensionless parameters other than q are held fixed, the one-fluid thermal diffusivity is found to scale like $\chi \propto q^{0.84 \pm 0.15}$, with the ion channel having a stronger q dependence than the electron channel in the outer half of the plasma. The measured q scaling is in good agreement with the predicted scaling by the GLF23 transport model for the ion temperature gradient and trapped electron modes, but it is significantly weaker than the inferred scaling from empirically-derived confinement scaling relations.