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Dependence of Turbulence and Transport on the Electron to Ion Temperature Ratio[1] G.R. MCKEE, R.J. FONCK, U. Wisconsin, C.C. PETTY, GA, T.L. RHODES, G. WANG, L. ZENG, UCLA, J.C. ROST, MIT, D. RUDAKOV, UCSD — Controlled experiments have been performed on the DIII-D tokamak to measure the effect of varying the T_e/T_i ratio, a critical dimensionless quantity, on turbulence and transport. Electron cyclotron heating was used to vary T_e, while ion temperature, rotation, and density profiles were maintained nearly constant. As ECH is applied, the T_e/T_i ratio increases while the ion temperature and rotation transiently decrease, indicating increased thermal and momentum transport. Local fluctuation measurements obtained with beam emission spectroscopy indicate that the turbulence amplitude increases in response to the increasing electron temperature. ITG models of drift wave turbulence predict that as T_e/T_i approaches one (from $T_e/T_i < 1$), transport should increase due to higher turbulence levels. An understanding of this process is critical since the high densities expected in next-generation machines will result in thermal equilibration of ions and electrons.

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