

Simultaneous Measurement of Core Electron Temperature and Density Fluctuations During Electron Cyclotron Heating on DIII-D

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Abstract

New measurements show that long-wavelength ($k_{\theta}\rho_s < 0.5$) electron temperature fluctuations can play an important role in determining electron thermal transport in low-confinement mode (L-mode) tokamak plasmas. In neutral beam-heated L-mode tokamak plasmas, electron thermal transport and the amplitude of long-wavelength electron temperature fluctuations both increase in cases where local electron cyclotron heating (ECH) is used to modify the plasma profiles. In contrast, the amplitude of simultaneously measured long-wavelength density fluctuations does not significantly increase. Linear stability analysis indicates that the ratio of the trapped electron mode (TEM) to ion temperature gradient (ITG) mode growth rates increases in the cases with ECH. The increased importance of the TEM drive relative to the ITG mode drive in the cases with ECH may be associated with the increases in electron thermal transport and electron temperature fluctuations.

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