ETG Mode Driven Electron Thermal Transport and Scaling in a Basic Experiment

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Production and identification of electron temperature gradient (ETG) mode have been successfully done in a basic experiment in Columbia Linear Machine CLM [1]. Using a dc bias heating scheme of the core plasma, we are able to produce sufficiently strong electron temperature gradient to induce to induce ETG modes in CLM experiments.

A unique miniature triple probe was used for local measurement of electron temperature and plasma potential fluctuations simultaneously. Their cross-correlation yields the local radial electron thermal flux. A measurement of electron thermal conductivity indicated value $\chi_{\perp e}$ ranged between 2-10 m^2/s, which corresponds to 1-5 $\chi_{\perp e,\mathrm{GB}}$. This result appears to agree with a value of non-local thermal conductivity obtained from a rough theoretical estimation [2], and not inconsistent with gyrokinetic simulation results for tokamaks.

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[1] X. Wei, V. Sokolov and A.K. Sen, *Phys. Plasmas*, **17**, 042108 (2010).

[2] H.L. Berk *et al*, *Nucl. Fusion*, **33**, 263 (1993).