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Perturbation Techniques for Distinguishing Between Conduction and Convection in Electron Heat Transport[1] J. PINO, CalTech, C.C. PETTY, T.C. LUCE, J.C. DEBOO, GA, J.M. NELSON, MIT — Obtaining an effective description of electron heat transport within tokamak plasmas is a long-standing problem. The separate effects of heat conduction and convection are not discernible from radial power balance analysis alone. The high power electron cyclotron heating (ECH) system on the DIII-D tokamak is a useful tool for studying heat transport because it locally increases the electron temperature. Modulating the ECH power at frequencies between 25 and 300 Hz produces a series of heat pulses in the plasma that are observed using electron cyclotron emission (ECE). Analytic solutions of the Braginskii energy conservation equation are obtained for various model assumptions, including slab and cylindrical geometries, conductive and convective transport, and damping terms. The analytic solutions are fit to the Fourier analyzed ECE data to determine the salient transport properties of the electron channel. Software tools are developed to compare multi-harmonic data to the models.

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☐ Prefer Oral Session
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