

Applications of Electron Cyclotron Waves in the DIII-D Tokamak*

R. Prater, J. Lohr, and the DIII-D Physics and Operations Groups
General Atomics, P.O. Box 85608, San Diego, California USA

In the few years electron cyclotron heating (ECH) and electron cyclotron current drive (ECCD) have progressed from being the subject of experiments to a prime tool for carrying out experiments on other topics. ECH has different characteristics than neutral beam heating: ECH heats only the electrons, heats very locally, does not inject momentum or particles, and may be arranged to drive highly localized currents or to just heat. These differences make ECH useful in a very wide range of experiments. For example, in the 2008 campaign ECH was used in 895 of the total 2550 shots. Experiments were performed using ECH/ECCD in studies of torque-free plasma rotation and effect of core rotation on scrape-off layer flows; effect of pure electron heating on the H-mode threshold power; T_e profile control for NBCD experiments and dimensionally similar scaling experiments; resistive wall mode experiments in slowly rotating plasmas; suppression of some types of Alfvén eigenmodes by ECH; 2nd harmonic pre-ionization; and modifying the T_e gradient for turbulence studies. The use of ECH in these experiments will be described.

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