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Theory Experiment

Polarization, Propagation, and Deposition Measurements During ECCD Experiments on the DIII–D Tokamak,* C.C. Petty, T.C. Luce, Y.R. Lin-Liu, J. Lohr, R. Prater, *General Atomics*, M.E. Austin, *University of Texas, Austin* — Electron cyclotron current drive (ECCD) experiments on DIII–D for advanced tokamak scenarios need narrow beams in nearly pure X–mode to satisfy the requirement of highly localized deposition and current drive. Power modulation studies have measured the deposition profile and polarization of the absorbed electron cyclotron waves while the fraction of launched O–mode power was scanned from nearly 0 to nearly 100%. Determination of the polarization was possible since the wave refraction for X–mode and O–mode power were noticeably different even in low density plasmas; therefore, the X–mode and O–mode power were deposited in different regions of the plasma. The deposition profile for different poloidal and toroidal launch angles has also been measured. Additional experiments in ELMing H–mode plasmas will study the potential problems with electron cyclotron wave propagation through the steep density gradient region near the plasma edge, where the WKB approximation may break down and unwanted coupling may occur between the X–mode and O–mode branches, and where ELMs may refract the beam and spread out the deposition region.

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