

Effects of ECH Electron Heating on Transport and Density Pump-Out in DIII-D Discharges*

R. Prater,¹ E.J. Doyle,² C. Holland,³ T.L. Rhodes,² L. Schmitz,²
A.E. White,⁴ L. Zeng²

¹*General Atomics, PO Box 85608, San Diego, CA 92186 USA*

²*University of California-Los Angeles, CA USA*

³*University of California-San Diego, La Jolla, CA USA*

⁴*Massachusetts Institute of Technology, Cambridge, MA USA*

Electron heating by EC waves may affect the underlying transport of particles, heat, and angular momentum in tokamak plasmas. Enhanced transport of particles has been observed in many devices, leading to a use of ECH as a means to reduce the electron and impurity densities. In DIII-D discharges, the density pump-out is not universal. In some cases with pump-out, reflectometry is used to study the details of the process with excellent temporal and spatial resolution. In an H-mode discharge the first effect is on the density at the minor radius where the ECH is applied, but at longer times the entire profile is reduced. In a QH-mode discharge the density is unaffected but the ion temperature and rotational velocity decrease, ending with $T_e > T_i$ on axis. Fluctuation measurements show that amplitudes increase, suggesting that TEM modes grow, dominating the prior ITG turbulence. Changes in turbulence characteristics may cause the changes in transport.

*This work supported in part by the US Department of Energy under DE-FC02-04ER54698, DE-FG02-08ER54984, DE-FG02-07ER54917 and DE-FC02-93ER54186.