Sherwood 2000 (International Fusion/Plasma Theory Conference)
March 27–29, 2000, Los Angeles, California

Nonlinear Effects in the Calculation of Electron Cyclotron Current Drive in DIII–D

R.W. Harvey,* R. Prater, and Y.R. Lin-Liu.

General Atomics, P.O. Box 85608,
San Diego, California 92186-5608 U.S.A.

The single-pass, second-harmonic interaction of electrons with cyclotron waves injected into DIII–D by the EC system can be strong enough to produce a velocity increment of order the thermal velocity. This is beyond the regime of validity of RF quasilinear diffusion theory which assumes unperturbed particle trajectories to calculate the RF electric field at the particle. Simulations of the DIII–D experiment with the CQL3D RF quasilinear/collisional code show that increasing the wave-particle quasilinear coefficient by a factor of two brings calculations into conformity with observed anomalously high current drive efficiency [1]. Increased absorption reduces the canceling effects of Fisch-Boozer and Ohkawa trapping current. This work will report on EC wave absorption numerically calculated from the nonlinear orbits of electrons in the DIII–D magnetic geometry.

This is a report of work supported by U.S. Department of Energy Contract DE-AC03-99ER54436.

*CompX, P.O. Box 2672, Del Mar, California 92014, U.S.A.
[1] T.C. Luce *et al.*, Phys. Rev. Lett. **83**, 4550, 1999.