Electron Cyclotron Current Drive Efficiency in General Tokamak Geometry and Its Application to Advanced Tokamak Plasmas[1] Y.R. LIN-LIU, V.S. CHAN, T.C. LUCE, R. PRATER, General Atomics — Owing to relativistic mass shift in the cyclotron resonance condition, a simple and accurate interpolation formula for estimating the current drive efficiency, such as those[2,3] commonly used in FWCD, is not available in the case of ECCD. In this work, we model ECCD using the adjoint techniques. A semi-analytic adjoint function appropriate for general tokamak geometry is obtained using Fisch's relativistic collision model. Predictions of off-axis ECCD qualitatively and semi-quantitatively agrees with those of Cohen,[4] currently implemented in the raytracing code TORAY. The dependences of the current drive efficiency on the wave launch configuration and the plasma parameters will be presented. Strong absorption of the wave away from the resonance layer is shown to be an important factor in optimizing the off-axis ECCD for application to advanced tokamak operations.

[2]S.C. Chiu *et al.*, Nucl. Fusion **29**, 2175 (1989).
[3]D.A. Ehst and C.F.F. Karney, Nucl. Fusion **31**, 1933 (1991).
[4]R.H. Cohen, Phys. Fluids **30**, 2442 (1987).

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