Abstract Submitted
for the DPP08 Meeting of
The American Physical Society

Full-wave simulations of lower hybrid wave propagation in toroidal plasma with nonthermal electron distributions

E.J. VALEO, C.K. PHILLIPS, PPPL, Princeton, NJ, J.C. WRIGHT, P.T. BONOLI, PSFC, MIT, Cambridge, MA, R.W. HARVEY, CompX, Del Mar, CA, R. BILATO, IPP, Garching, Germany — The computational challenge in simulating heating and current drive in the lower hybrid frequency range is formidable, because the perpendicular wavelength is very much shorter than the plasma size ($k_R \sim 10^3$ in current devices, approaching $10^4$ in ITER). Furthermore, when driven current and plasma heating are significant, wave-induced electron velocity space diffusion considerably alters the shape of $f_e(\psi, \mu, \epsilon)$ from a Maxwellian. Results from combined ray tracing / 3D Fokker Planck codes have provided considerable insight. However, in order to assess the importance of diffraction, caustics, focii, etc, a more general description is required. The full-wave, parallelized, TORIC-LH code solves the linearized Maxwell-Vlasov equations to compute the vector wave field $E = E(r) \exp[i(nphi - \omega t)]$ in an axisymmetric ($\partial/\partial \phi = 0$) toroidal plasma, with general, non-Maxwellian, distribution functions. Results using model nonthermal distributions will be presented for Alcator C-MOD experimental parameters. Efforts underway to include self-consistently computed distributions will be described.

1Work supported by USDOE Contract No. DE-AC02-76CH03073.