Electron cyclotron ray tracing and absorption predictions for Compact Toroidal Hybrid plasmas using TRAVIS

S.F. KNOWLTON, G.J. HARTWELL, D.A MAURER, Auburn University, N.B. MARUSHCHENKO, Y. TURKIN, Max Planck IPP Greifswald, T. BIGELOW, Oak Ridge National Laboratory — Plasmas in the Compact Toroidal Hybrid (CTH), a five field period, $\ell = 2$ torsatron ($B_0 = 0.5 \text{T}, R_0 = 0.75 \text{m}, a_p \approx 0.2 \text{m}$) will be heated by second harmonic X-mode electron cyclotron heating with power provided by a 28 GHz gyrotron capable of producing up to 200 kW. Ray-tracing calculations that will guide the selection of the launching position, antenna focal length, and beam-steering characteristics are performed with the TRAVIS code [1]. Non-axisymmetric vacuum and current-carrying CTH equilibria for the ray tracing are modeled with the V3FIT code [2].

The calculated absorption is highest for vertically propagating rays that traverse the region where a saddle of resonant field strength exists. However, the absorption for top-launched waves is more sensitive to variations in the magnetic equilibrium than for a radial side launch where the magnetic field profile is tokamak-like.


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