Lower hybrid wave propagation in tokamaks in weak and strong regimes

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Lower hybrid (LH) waves have the attractive property of damping strongly via electron Landau resonance on relatively fast tail electrons at $(2.5 - 3)\times v_{te}$, where $v_{te} = (2T_e/m_e)^{1/2}$ is the electron thermal speed. The velocity at which damping occurs depends on the non-linear balance between quasilinear diffusion and collisions. For high efficiency current drive, a low parallel index of refraction, $n_{||}$, corresponding to a high phase velocity, is chosen. Depending on the plasma electron temperature this may put the wave propagation in a multi-pass regime. In cases of low parallel refractive index, ray tracing with no SOL has been shown to have differences with experiment [1] and collision effects in the scrape off layer may be important [2]. Using a coupled model of the full wave code, TORLH, and the Fokker-Planck code, CQL3D, and ray tracing code, GENRAY, the importance of diffraction and collisional damping in the edge in various Alcator C-Mod geometries will be examined.

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