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On the importance of physical optics effects for lower hybrid waves in linear and non-linear regimes[1] JOHN WRIGHT, PAUL BONOLI, MIT-PSFC, ANDREA SCHMIDT, LLNL, RF-SCIDAC TEAM — Lower hybrid waves in fusion plasmas have perpendicular wavelengths of $\approx$ 1mm. Historically, the propogation and power deposition of these waves has been modeled by coupled geometric optics (ray tracing) and Fokker-Planck codes. Recently [Wright, J. et al *Phys. Plasmas* **16** 072502 (2009)] the ability to use physical optics (full wave) in this regime became available. A comparison of the two methods at low and high power demonstrates when reflections, diffraction and interference affect the rf depostion profile in the plasma. At lower input power for which quasilinear effects are not important, ray tracing and full wave results are in close agreement for both low and high phase velocity waves. At higher power when the distribution function is evolved by quasilinear diffusion, significant differences in the power deposition profiles appear when the launched wave phase velocity is high (low $n_{\|}$.) These differences can be explained by intereference effects in the quasilinear diffusion operator which is a quadratic function of the wave electric field.

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