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Reconstructing lower hybrid wave fields from ray tracing data¹ A.S. RICHARDSON, P. BONOLI, J. WRIGHT, MIT Plasma Science and Fusion Center — Full wave simulations of lower-hybrid waves in plasmas can now be performed, and some of the results display features that look like rays or beams [1]. While some features of the full wave results can be reproduced using ray tracing methods, other features cannot be. In this work, we use the higher order terms in the ray tracing approximation to construct an approximate wave field from ray tracing data. In order to correctly deal with caustics - such as the reflection of the lower hybrid wave from the cutoff at the plasma boundary - we implemented a field reconstruction algorithm based on wave packet dynamics [2]. We then applied this algorithm to the case of a lower hybrid wave reflecting from the cutoff in a cold plasma slab model, and the preliminary results show good agreement with the analytical solution.

[1] J. Wright, et al. Full wave simulations of lower hybrid wave propagation in tokamaks. Proceedings of the 18th Topical Conference on Radio Frequency Power in Plasmas, 2009.

[2] R. Littlejohn. The semiclassical evolution of wave packets. Physics Reports, 138(4-5):193-291, May 1986.

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