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A Study of Full-wave and Ray-tracing Methods for Two Simple Models of Multi-dimensional Mode Conversion[1] Y. XIAO, William & Mary — Here we report on our efforts to carry out a direct comparison of ray-based and full-wave methods for coupled wave equations in non-uniform plasmas exhibiting mode conversion. We consider two different types of model wave equations in two spatial dimensions. The first model is taken to be two coupled wave equations with spatially varying wave speeds. These wave speeds are distinct for almost all space, and are equal only along a line where conversion occurs. We launch a WKB-type wave packet in one channel and study its behavior as it crosses the line of conversion. The second case studied uses the model developed by Cook et al. to treat a fast wave crossing a finite temperature minority-ion gyroresonance layer, though here we consider only the case of a cold minority-ion species. In both models, outgoing WKB boundary conditions are used so we can perform a direct comparison with ray tracing results for the same models. [1] D.R. Cook, A.N. Kaufman, E.R. Tracy, T.Flå, Phys. Lett. A. 175 (1993) 326-333

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Yanli Xiao
William & Mary

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