Abstract Submitted
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Direct comparison of full-wave and ray-tracing methods for a simple model of multi-dimensional mode conversion[1] Y. XIAO, A. RICHARDSON, E. TRACY, William & Mary — Mode conversion can occur in a nonuniform plasma when two waves of different character are locally resonant. Jaun et al. have recently developed a numerical ray-tracing algorithm for realistic tokamak models that accounts for the ray splitting that occurs at conversions [1,2]. Here we present a comparison of ray-based and full-wave methods by considering a simple model consisting of a pair of coupled wave equations in two spatial dimensions. The two spatially-dependent wave speeds, $c_1(x, y)$ and $c_2(x, y)$ are distinct for almost all (x, y), and are equal only along a line where conversion occurs. We launch a WKB-type wave packet in channel 1. There is initially no excitation in channel 2. Absorbing boundary conditions are used to avoid reflections which would complicate the results. From the full-wave output, we compute the initial energy density as a function of position and consider its evolution along a family of rays which undergo conversion. These full-wave results are then compared to the ray-based predictions. [1] A.Jaun, E.Tracy and A.Kaufman, Plasma Phys. Control. Fusion **49**, 43-67 (2007). [2] E.Tracy, A.Kaufman and A.Jaun, to appear in Phys. Plasmas.

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