A new normal form for multidimensional mode conversion\(^1\) E. TRACY, A. RICHARDSON, N. ZOBIN, William and Mary, A. KAUFMAN, UC Berkeley and LBNL — Linear conversion occurs when two wave types are locally resonant in a nonuniform plasma \([1]\). In recent work, we have shown how to incorporate a ray-based approach to mode conversion in numerical algorithms \([2,3]\) for the most common type of conversion. Here, we present a new formulation that can deal with more general cases \([4]\). We exploit a new normal form for the 2X2 dispersion matrix defined such that the diagonals Poisson-commute with the off-diagonals (at leading order). Therefore, if we use the diagonals as ray Hamiltonians, the off-diagonals will be constant. Thus, the 2X2 dispersion matrix in normal form has a very natural physical interpretation: the diagonals are the uncoupled ray Hamiltonians and the off-diagonals are the coupling. We further discuss how to incorporate the normal form into ray tracing algorithms. \(^1\) E. Tracy, A. Kaufman and A. Brizard, Phys. Plasmas 10 (2003) 2147. \(^2\) A. Jaun, E. Tracy and A. Kaufman, Plasma Phys. Control. Fusion 49 (2006) 43. \(^3\) E. Tracy, A. Kaufman and A. Jaun, to appear in Phys. Plasmas. \(^4\) A. Kaufman, E. Tracy and A. Brizard, Phys. Plasmas 12 (2005) 022101. \(^5\) E. Tracy and A. Kaufman, PRL 91 (2003) 130402.

\(^1\)Supported by the NSF-DOE Program in Basic Plasma Physics and the DOE OFES.

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Date submitted: 19 Jul 2007

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