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Progress in numerical implementation of metaplectic geometrical optics SEAN M. DONNELLY, Iowa State University, NICOLAS LOPEZ, Princeton University, I. Y. DODIN, PPPL — Radiofrequency waves are widely used for auxiliary heating and current drive in fusion plasmas. The design and optimization of such systems is often performed using ray tracing codes, which rely on the geometrical-optics (GO) approximation. However, GO is known to fail at wave cutoffs and caustics. To accurately model the wave behavior in these regions, more advanced and computationally expensive "full-wave" simulations are typically used, but this is not strictly necessary. A new, generalized formulation, called metaplectic geometrical optics (MGO), has been proposed that reinstates GO near caustics [Lopez & Dodin, arXiv: 2004.10639]. The MGO framework yields an integral representation of the wave field, but evaluating the corresponding integral in the general case must be done numerically. We present a survey of numerical integration methods for MGO, including Gaussian quadrature and numerical steepest descent. These methods are benchmarked against analytical solutions in special cases when such solutions are available.

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