1163-65-1491 **Samuel F. Potter*** (sfpotter@umd.edu). *Jet marching methods for numerical geometric acoustics.*

Precomputed sound propagation based on solving the wave equation followed by real-time auralization has recently become feasible as a method for simulating sound in the sorts of large, complicated environments arising in e.g. virtual reality. However, its effectiveness is limited to relatively low-frequency sound not encompassing the entire audible spectrum. To address this issue, we propose a novel approach for modeling high-frequency sound propagation based on solving the eikonal equation and computing the amplitude along with it using paraxial ray tracing. This approach involves solving a tree of eikonal problems describing all orders of reflection and diffraction above a chosen amplitude threshold. Crucially for this approach, we have developed a family of high-order, semi-Lagrangian direct solvers for the eikonal equation, which use compact stencils. These solvers march the partial derivatives of the eikonal up to some order in addition to the eikonal itself, using Hermite interpolation to locally approximate the eikonal and minimizing rays when computing semi-Lagrangian updates. We present numerical and theoretical results pertaining to our solvers and show how these solvers can be used in practice to efficiently carry out realistic acoustic simulations. (Received September 15, 2020)