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Propagating gravitational waves through mesh refinement boundaries DAVID FISKE, JOHN BAKER, JOAN CENTRELLA, Laboratory for High Energy Astrophysics, NASA Goddard Space Flight Center — We explore the numerical propagation of gravitational waves across mesh refinement boundaries. We define these waves via the Weyl scalars in the Newman-Penrose formalism, and evolve a linearized wave solution with a non-linear Einstein evolution code. Because we have an analytic solution for the spacetime modeled, we are able to verify that the waves do propagate faithfully through mesh refinement boundaries, paving the way for future work in which strong-field sources generate waves that we would like to track across refinement regions. Looking forward to applications in which we would like to extract spherical harmonic components of waves, we also apply, for the first time, a novel method for computing spherical harmonic components of data represented on a cubic grid. We show that, even though the integration spheres intersect refinement boundaries, it produces accurate and robust results.

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