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Damping of spurious numerical reflections off of coarse-fine adaptive mesh refinement grid boundaries[1] SVEN CHILTON, University of California, Berkeley, PHILLIP COLELLA, Lawrence Berkeley National Laboratory — Adaptive mesh refinement (AMR) is an efficient technique for solving systems of partial differential equations numerically. The underlying algorithm determines where and when a base spatial and temporal grid must be resolved further in order to achieve the desired precision and accuracy in the numerical solution. However, propagating wave solutions prove problematic for AMR. In systems with low degrees of dissipation (e.g. the Maxwell-Vlasov system) a wave traveling from a finely resolved region into a coarsely resolved region encounters a numerical impedance mismatch, resulting in spurious reflections off of the coarse-fine grid boundary. These reflected waves then become trapped inside the fine region. Here, we present a scheme for damping these spurious reflections. We demonstrate its application to the scalar wave equation and an implementation for Maxwell's Equations. We also discuss a possible extension to the Maxwell-Vlasov system.

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