

## **On Energy Stable dG Approximation of the PML for Linear Waves**

We present a provably energy-stable dG approximation of the perfectly matched layer (PML) for the three and two space dimensional (3D and 2D) linear wave equations, in first order form. Our approach is rooted in a rigorous mathematical analysis, beginning from the continuous model down to the discrete problem. We derive continuous energy estimates for the 3D PML in the Laplace space. By emulating the energy estimate in the discrete setting we construct asymptotically stable dG approximation of the PML for the wave equation. The analysis will focus on the 3D linear acoustics wave equation. But, we will demonstrate extensions of our method to the 3D linear elasto-dynamic equations. These have been implemented in the dG code, ExaHyPE, a simulation engine for hyperbolic PDEs on adaptive Cartesian meshes, for exascale supercomputers.