Hermite methods for the scalar wave equation on overset grids

Oleksii Beznosov

April 2, 2017

Abstract

Hermite methods are polynomial based methods whose Degrees of Freedom are the solution and its derivatives at each vertex. These methods can be of arbitrary order and have built in dissipation.

Overset grid techniques are used to design methods that can discretize PDEs on complex domains and that have the efficiency of a Cartesian solver. Overset grid solvers evolve the PDE independently on each grid for each timestep. After a completed timestep information is communicated between two grids by interpolation. The drawback of overset grid techniques is that for centered finite difference methods the interpolation often causes a weak instability.

In this talk we demonstrate that the weak instabilities resulting from interpolation are suppressed by the built in dissipation of our Hermite methods. In particular we present results computed by an in-house Hermite solver for the two dimensional wave equation and a basic overset grid generator. Methods up to order 11 will be considered.