

Towards the Ultimate Solver for Wave Equations in the Time Domain
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Efficient time-domain solvers for wave propagation problems must include three crucial components:

- i.** Radiation boundary conditions which provide arbitrary accuracy at small cost (spectral convergence, weak dependence on the simulation time and wavelength)
- ii.** Algorithms for using the information at or near the boundary to directly propagate the solution to remote locations - avoid sampling the wave whenever possible.
- iii.** Reliable high-resolution volume discretizations applicable in complex geometry (i.e. on grids that can be generated efficiently) - we believe that high-resolution methods enabling accurate simulations with minimal dofs-per-wavelength are necessary to solve difficult 3 + 1-dimensional problems with the possibility of error control.

In this talk we will discuss recent developments in all three areas, including our own work on the construction of complete radiation boundary conditions (CRBCs), which are optimal local radiation conditions, as well as novel spectral elements based on Hermite interpolation.