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Hermite Methods for Waves

We discuss a class of numerical methods for hyperbolic systems based on Hermite-Birkhoff interpolation. The methods are high-order in both space and time, stable for any time step satisfying the physical CFL constraint independent of order, and admit highly localized evolution algorithms. We will outline their analysis, which is built around a remarkable projection property of the interpolation operators, and which has recently been extended to highly efficient leap-frog formulations. We will also demonstrate their practical performance, in particular their ability to effectively leverage many-core platforms such as GPUs.