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Space-time discontinuous Galerkin method for the one-dimensional wave equation.

The discontinuous Galerkin finite element method is a very attractive numerical method for partial differential equations due to its exibility and effciency in terms of mesh and shape functions, and a new higher order of convergence can be achieved without many iterations. In this paper, we develop and analyze a space-time discontinuous Galerkin (DG) finite element method for the second-order wave equation in one space dimension. The space-time DG discretization is presented in detail, including the definition of the numerical fluxes, which are necessary to maintain stable and non-oscillatory solutions. The scheme can be made arbitrarily high-order accurate in both space and time. We prove several optimal a priori error estimates in space-time norms for the proposed scheme. Several numerical examples are provided to verify the theoretical estimates. (Received October 04, 2018)