COMBINING DISCONTINUOUS GALERKN METHODS WITH SYMPLECTIC TIME INTEGRATORS

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Abstract. We introduce a methodology to combine discontinuous Galerkin methods with symplectic time integrators for wave propagation problems. The numerical methods are designed preserving the Hamiltonian structure of the equations to then prove the energy conservation of the semidiscrete scheme. Then, symplectic time integrators are applied obtaining fully discrete schemes conserving a slightly modified discrete energy. We present numerical examples comparing the long-time behaviour of the energy conserving discontinuous Galerkin methods with their dissipative analogous.

Keywords: finite element methods, discontinuous Galerkin methods, hybrid/mixed methods, symplectic methods, elastodynamics, energy conservation, Hamiltonian systems

Mathematics Subject Classifications (2010): 65M60, 65M15, 65M20

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