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*Variational time integrators for water-wave, wave-structure and internal-wave dynamics*

Novel and existing variational and Hamiltonian integrators will be (re)derived using a discontinuous Galerkin finite-element framework in time. These can, geometrically, be interpreted as limits of continuous Galerkin finite-element integrators on a non-uniform mesh with a subset of (odd-numbered) elements shrinking to zero in size. The integrators will be and have been applied in simulations of nonlinear water-wave dynamics, (linear and constrained) water-wave-structure interactions, and (linear) internal gravity and inertial waves in asymmetric domains permitting wave attractors. Some simulations will be discussed, possibly including our latest results on a new wave-energy device, which conservative limit satisfies one grand variational principle of coupled wave dynamics, buoy motion and magnetically-induced electrical power.