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Multisymplectic integrators for nonsmooth mechanics

We present a class of multisymplectic variational integrators for nonsmooth continuum mechanics. Typical problems are the impact of an elastic body on a rigid surface or the collision of two elastic bodies. The integrators are obtained by combining, at the continuous and discrete levels, the variational multisymplectic formulation of nonsmooth continuum mechanics with the generalized Lagrange multiplier approach for optimization problems with nonsmooth constraints. These integrators verify a spacetime multisymplectic formula that generalizes the symplectic property of time integrators. In addition, they preserve the energy during the impact. In presence of symmetry, a discrete version of Noether's theorem is verified. All these properties are inherited from the variational character of the integrator. Numerical illustrations are presented.