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Asynchronous variational contact mechanics.

An asynchronous, variational method for simulating elastica in complex contact and impact scenarios is developed. Asynchronous Variational Integrators (AVIs) are extended to handle contact forces by associating different time steps to forces instead of to spatial elements. By discretizing a barrier potential by an infinite sum of nested quadratic potentials, these extended AVIs are used to resolve contact while obeying momentum- and energy-conservation laws. A series of two- and three-dimensional examples illustrate the robustness and good energy behavior of the method. (Received August 18, 2010)