Variational Collision Integrators for Nonholonomic Systems

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A discrete theory for implicit nonholonomic Lagrangian systems undergoing elastic collisions is developed. It is based on the discrete Lagrange–d'Alembert–Pontryagin variational principle, and the dynamical equations thus obtained are the discrete nonholonomic implicit Euler–Lagrange equations together with the discrete conditions for the elastic impact. To illustrate the theory, variational integrators with collisions are built for several examples, including a bouncing ellipse and a nonholonomic spherical pendulum evolving inside a cylinder.

Trabajo en conjunto con Álvaro Rodríguez Abella (Electrical and Computer Engineering Department, University of California, Los Angeles, USA.).