GEORGE PATRICK, University of Saskatchewan
Towards automatically generated variational integrators

Many fundamental physical systems have variational formulations, such as mechanical systems in their Lagrangian formulation. Direct discretization of the relevant variational principles leads to what are called variational integrators. For many systems this generates (implicit) symplectic and momentum preserving one step integration methods. However, such methods can be very complicated and time consuming to implement.

I will describe some advances in the basic theory of variational integrators, which allow us to automatically convert any ordinary one step method into a variational integrator of the same order. I will also describe some work in progress towards a system which does that.