1044-70-160 **George W Patrick*** (patrick@math.usask.ca), Department of Mathematics and Statistics, University of Saskatchewan, Saskatoon, SK S7N 5E6, Canada. *Local error analysis of variational integrators.*

Discretizations of variational principles of physical systems are towards discrete models that have a status equivalent to the continuous models. For Hamilton's principle of mechanics, such discretizations lead to a class of numerical methods called variational integrators. Existence and uniqueness, and accuracy, of variational integrators, cannot be correctly established without due consideration of their singularities at zero time-step. We show existence and uniqueness for variational integrators by blowing up the variational principle at zero time-step. This gives an accuracy one less than is observed in simulations, a deficit that is recovered by a past–future symmetry of the blown-up principle. (Received August 31, 2008)