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TITLE

Discrete Hamilton-Pontryagin mechanics and generating functions on Lie groupoids

ABSTRACT

We present a discrete analog of the recently introduced Hamilton-Pontryagin variational principle in Lagrangian mechanics. This unifies two, previously disparate approaches to discrete Lagrangian mechanics: either using the discrete Lagrangian to define a finite version of Hamilton's action principle, or treating it as a symplectic generating function. This is demonstrated for a discrete Lagrangian defined on an arbitrary Lie groupoid; the often encountered special case of the pair groupoid (or Cartesian square) is also given as a worked example.