Mid-point embedding of Hamiltonian systems and variational integrators

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SUMMARY

We discuss the definition of discrete Hamiltonian systems in the context of the mid-point embedding. This particular setting is a first step toward the formulation of discrete Hamiltonian for high-order Galerkin emebeddings. We discuss the mid-point derivative and antiderivative, as well as the associated calculus of variations and we derive the expression of the mid-point Euler-Lagrange equation. We compare our result with the classical approach by J.E. Marsden and coworkers on high order variational integrators.

Keywords: Hamiltonian system, variational integrators, embedding formalism.

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