

Brian Tran, Geometric Integration of Multisymplectic Hamiltonian PDEs. We will begin by discussing the multisymplectic structure associated to Hamiltonian PDEs as a generalization of the symplectic structure associated to Hamilton's equations in classical mechanics. The wave equation, the KdV equation, and the Schrödinger equation are some examples of Hamiltonian PDEs.

Subsequently, we will turn to the question of how to computationally model such Hamiltonian PDEs while preserving the multisymplectic structure at the discrete level. This will lead us to the notion of a multisymplectic integrator. We will introduce a construction of variational integrators for Hamiltonian PDEs which automatically yield multisymplectic integrators. This construction gives a systematic framework for constructing such multisymplectic integrators, based on the notion of a Type II generating functional. We conclude with a numerical example to visualize multisymplecticity of these integrators as splitting into symplecticity in time and space, using a family of sine-Gordon soliton solutions.