Abstract Submitted
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Tests of a Discontinuous Galerkin scheme for Hamiltonian systems in non-canonical coordinates[1] RUPAK MUKHERJEE, NOAH MANDELL, AMMAR HAKIM, GREGORY W. HAMMETT, Princeton Plasma Physics Laboratory, GKEYLL TEAM — A discontinuous Galerkin scheme for the solution of a general Hamiltonian system written in arbitrary non-canonical coordinates is presented. Examples of such systems are the Vlasov-Poisson equation, the incompressible Euler equations and the gyrokinetic equations. Our algorithm builds on a previous algorithm[1] by introducing an arbitrary coordinate transform in phase-space, with explicit appearance of coordinate metrics in the Poisson bracket operator. We show that a proper discretization of the metric, combined with a continuous representation of the Hamiltonian, leads to a scheme that conserves the total energy (in the time-continuous limit) exactly. We will show tests of the scheme in simpler 2D settings and outline potential extensions needed to solve the full electromagnetic gyrokinetic equations[2] in arbitrary, multi-block X-point geometries using field-aligned coordinates.
A. Hakim, G. Hammett, E. Shi, N. Mandell, arxiv:1908.01814 [2] N. R. Mandell, A. Hakim, G. W. Hammett, M. Francisquez, arxiv:1908.05653

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