Abstract Submitted
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Variational Integrators for Guiding Center Trajectories[1] C. LELAND ELLISON, HONG QIN, WILLIAM M. TANG, Princeton Plasma Physics Laboratory — Geometric integrators exhibit favorable numerical behavior by mimicking properties of the continuous system on a discrete level. For instance, a discrete symplectic structure may be preserved and a discrete Noether's theorem identifies conserved quantities corresponding to symmetry in the system. The long term numerical fidelity of geometric integrators is well suited for studying long term dynamics, in contrast to standard integration methods (such as fourth-order Runge-Kutta) which exhibit non-physical accumulation or dissipation of energy. The non-canonical guiding center Lagrangian serves as a starting point for obtaining variational integrators for guiding center trajectories. Proper treatment of the degenerate Lagrangian is required to avoid numerical instability, however. Methods for avoiding even-odd decoupling and achieving an adaptive time step will be presented in the context of 3-D tokamak geometry.

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C. Leland Ellison
Princeton Plasma Physics Laboratory

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