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Exact Energy and Momentum Conservation in Variational Macro-Particle Plasma Models[1] B. A. SHADWICK, TIMOTHY KAWAMOTO, M. PERIN, Department of Physics and Astronomy, University of Nebraska-Lincoln — We consider a class of variational macro-particle plasma models that exhibit simultaneous conservation of energy and momentum. These models retain translation invariance by using a Fourier representation of the electromagnetic fields in place of a spatial grid. That is, the Fourier amplitudes of the fields are the fundamental quantities. From the discrete Lagrangian, a canonical Hamiltonian system is obtained in the usual way, for which we introduce a symplectic integrator. We present a general formulation of the method with examples drawn from 1-1/2D studies of intense laser-plasma interactions. We comment on the relative merits of the Lagrangian vs. Hamiltonian formulations and discuss efficiency and practicality of using this technique in three dimensions.

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