Variational formulations of guiding-center Vlasov-Maxwell theory

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The variational formulations of guiding-center Vlasov-Maxwell theory based on Lagrange, Euler, and Euler-Poincare variational principles are presented. Each variational principle yields a different approach to deriving guiding-center polarization and magnetization effects into the guiding-center Maxwell equations. The conservation laws of energy, momentum, and angular momentum are also derived by Noether method, where the guiding-center stress tensor is now shown to be explicitly symmetric.