Abstract Submitted
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High-order continuum Vlasov-Maxwell simulations of collisionless plasmas G.V. VOGMAN, Applied Science and Technology Program, University of California - Berkeley, P. COLELLA, Computational Research Division, Lawrence Berkeley National Laboratory, U. SHUMLAK, Aerospace and Energetics Research Program, University of Washington — Plasma kinetic theory treats each constituent species as a probability distribution function in phase space. Numerically, the velocity dependence of the distribution function can be sampled discretely as in particle-in-cell methods, or represented smoothly as in continuum methods. Continuum methods for solving kinetic theory governing equations are advantageous in that they can be cast in conservation-law form, are not susceptible to noise, and can be implemented using high-order numerical methods, which provide enhanced solution accuracy. A fourth-order accurate finite volume method has been developed to solve the continuum kinetic Vlasov-Maxwell equation system in 2D2V phase space using the Chombo library. The evolving species are collisionless, and are coupled through electromagnetic fields. The algorithm is validated against theoretical predictions using benchmarks based on the Dory-Guest-Harris instability and the Harris current sheet. Extension of the algorithm to cylindrical coordinates and its application to axisymmetric plasma configurations like the Z-pinch are also presented.

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