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Kinetic Plasma Simulation Using a Quadrature-based Moment Method[1] DAVID J. LARSON, LLNL — The recently developed quadrature-based moment method [Desjardins, Fox, and Villedieu, *J. Comp. Phys.* **227** (2008)] is an interesting alternative to standard Lagrangian particle simulations. The two-node quadrature formulation allows multiple flow velocities within a cell, thus correctly representing crossing particle trajectories and lower-order velocity moments without resorting to Lagrangian methods. Instead of following many particles per cell, the Eulerian transport equations are solved for selected moments of the kinetic equation. The moments are then inverted to obtain a discrete representation of the velocity distribution function. Potential advantages include reduced computational cost, elimination of statistical noise, and a simpler treatment of collisional effects. We present results obtained using the quadrature-based moment method applied to the Vlasov equation in simple one-dimensional electrostatic plasma simulations. In addition we explore the use of the moment inversion process in modeling collisional processes within the Complex Particle Kinetics framework.

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