Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

Efficient hybrid algorithms for collisional plasma simulation[1] A.M. DIMITS, B.I. COHEN, LLNL, R.E. CAFLISCH, C.M. WANG, Y. HUANG, UCLA — We report on the development of efficient hybrid simulation algorithms for plasma systems that span a wide range of collisionality. Investigations of their performance, using ion-sheath and electron-transport test problems, are presented. In these schemes the distribution function is decomposed of into kinetic and fluid components. The fluid component is treated via Eulerian fluid simulation methods. In one class of algorithms, the kinetic component is treated using a combination of fixed-weight particle-in-cell (PIC) and binary Monte-Carlo collision methods. Particles are created by sampling from the fluid component, and paired for collisions with the kinetic particles. In the other class of algorithms, the kinetic component is treated using evolving-weight delta-f-PIC schemes and collision-field algorithms. The performance these algorithms depends strongly on the particular sets of criteria for (a) exchange between the particle and fluid components and (b) creation, destruction, and retention of the simulation particles.

[1]Work performed for U.S. DOE by LLNL under Contract DE-AC52-07NA27344.

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Date submitted: 24 Jul 2009 Electronic form version 1.4