Abstract Submitted
for the DPP14 Meeting of
The American Physical Society

iFP: an optimal, fully conservative, fully implicit, 1D-2V Vlasov-Fokker-Planck solver for ICF capsule simulation L. CHACON, W. TAITANO, A.N. SIMAKOV, D.A. KNOLL, LANL — ICF plasmas can become weakly collisional during the implosion process, with collisional mean-free-paths comparable to the system size. In this regime, kinetic phenomena become important, and a fully kinetic treatment is needed to assess their impact on compression and yield in ICF capsules. In this study, we present the first (to our knowledge) fully conservative (mass, momentum, and energy), fully nonlinearly implicit Vlasov-Rosenbluth-Fokker-Planck solver in 1D-2V. The approach achieves exact numerical conservation by nonlinearly enforcing the collision operator symmetries, and by enslaving numerical truncation errors.[1] The approach features an adaptive scheme in velocity space that optimally resolves the distribution function locally, thus substantially decreasing the velocity space resolution requirements regardless of temperature disparity and variations. Solver-wise, the code relies on demonstrated Jacobian-free Newton-Krylov strategies.[2] We will demonstrate the efficiency and accuracy properties of the scheme with several challenging 0D-2V and 1D-2V numerical examples.

[1]W. Taitano et al, *J. Comput. Phys.*, submitted (2014)
[2]L. Chacón et al, *J. Comput. Phys.*, **157**, 654-682 (2000)

Luis Chacon
LANL

Date submitted: 09 Jul 2014 Electronic form version 1.4