Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Numerical Investigation of Kinetic Effects in ICF Capsules using iFP WILLIAM TAITANO, LUIS CHACÓN, ANDREI SIMAKOV, BRETT KEENAN, Los Alamos National Laboratory, IFP TEAM — Contrary to predictions of radiation-hydrodynamics design codes, the National Ignition Campaign and subsequent campaigns were not successful in achieving ignition of inertial confinement fusion (ICF) capsules. Recent experimental evidence suggests that plasma kinetic effects may play an important role during ICF capsules implosion. Consequently, kinetic models and simulations may need to be used to better understand experimental results and design ICF targets. We have developed a new, optimal, fully implicit, and fully conservative 1D2V Vlasov-Fokker-Planck code, iFP, to simulate ICF capsule implosions kinetically. Our approach uses an optimal, O(N), fully implicit temporal advance to step over stiff collision time-scales and optimal adaptive mesh to address grid resolution issues [1,2]. We have implemented a spherical geometry capability and performed an extensive suite of verification campaign (e.g. Guderley problem) as well as comparing against other kinetic codes (e.g. FPion [3]) in order to field the code for full spherical implosion. We present several preliminary results on kinetic effects in spherical geometry, relevant to ICF experiments.

W.T. Taitano et al., JCP 297, 2015.

W.T. Taitano et al., JCP 318, 2016.

O. Larroche, PoP 19, 2012.

William Taitano
Los Alamos National Laboratory

Date submitted: 14 Jul 2016 Electronic form version 1.4