Abstract Submitted
for the GEC13 Meeting of
The American Physical Society

Magnetized Plasma Sheath Simulation with the Kinetic Finite Mass Method[1] CHRISTOPHER YOUNG, Stanford University Plasma Physics Laboratory, DAVID LARSON, Lawrence Livermore National Laboratory, MARK CAPPELLI, Stanford University Plasma Physics Laboratory — First results of a magnetized plasma sheath simulation using the Kinetic Finite Mass (KFM) Method are presented. The KFM Method, derived from the Finite Mass Method of [1], is a gridless Lagrangian simulation technique that partitions the system mass into packets that evolve over time. The packets have finite extent in 1D phase space, continuous Gaussian internal mass distributions, and a defining set of Gauss-Hermite quadrature points that move under the action of forces. Much like in a Particle-In-Cell (PIC) approach, the electric field is calculated by solving Poisson's equation over a temporary grid and the local Lorentz force is mapped back to the particle locations. A Gaussian Mixture Model is employed periodically to reset the Gaussian character of the packets after distortion by the system forces. Sheath results are compared with conventional PIC simulations. This work provides a demonstration of the powerful KFM method in preparation for simulating more complex plasma phenomena.

[1] C. Gauger et al. SIAM J. Numer. Anal. 26, 1744 (2005)

[1]CY acknowledges support from the DOE NNSA Stewardship Science Graduate Fellowship, Contract DE-FC52-08NA28752. This work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory, Contract DE-AC52-07NA27344.

Christopher Young
Stanford University Plasma Physics Laboratory

Date submitted: 14 Jun 2013 Electronic form version 1.4