Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Exploration of Strongly Coupled Plasma Dynamics and Equilibrium Using the Particle-in-Cell Methodology[1] D.V. ROSE, D.R. WELCH, T.C. GENONI, Voss Scientific, T.A. MEHLHORN, R.B. CAMPBELL, Sandia National Laboratories — Particle-based numerical simulations are required to study the dynamics and evolution of inhomogeneous nonequilibrium multispecies strongly coupled plasmas. Molecular dynamics (MD) and particle-in-cell (PIC) techniques and been compared previously [K. Y. Sanbonmatsu, et al., J. Phys. IV (France) 10, Pr5-259 (2000)], with the PIC methodology demonstrating the capability of improved accuracy over the MD simulations at high resolution. However, the PIC simulations were significantly slower, limiting their utility. Here we explore several schemes to improve the computational speed of such calculations including non-iterative, implicit EM field solvers and subgrid models. The simulations are compared directly with the results of Sanbonmatsu, et al., and a new theoretical analysis of the hypernetted chain model where all inter-species correlations are retained [V. Schwarz, et al., Contrib. Plasma Phys. 47, 324 (2007)].

[1]Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed-Martin company, for the United States Department of Energys National Nuclear Security Administration, under contract DE-AC04-94AL85000.

David Rose
Voss Scientific

Date submitted: 17 Dec 2007 Electronic form version 1.4