Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

A new nonlinear collision method for a particle code EISUNG YOON, RAVI SAMTANEY, Princeton Plasma Physics Laboratory, TING RAO, DAVID KEYES, Columbia University, C.S. CHANG, HAROLD WEITZNER, L. GREENGARD, New York University — A new nonlinear collision operation method for a particle code is presented, which does not use the Monte Carlo scheme. Particle information is gathered on a 2D velocity grid and the particle distribution function is obtained by a penalized spline operation which conserves mass, momentum, energy, and entropy. After performing the fully nonlinear Rosenbluth-McDonand-Judd Fokker-Planck operation using advanced mathematical methods, the collision information is sent back to the particles. The new collision operation can reduce the discrete particle noise while performing physical Coulomb collisions. It can also significantly reduce the required frequency of collision operations due to absence of the Monte Carlo noise. Comparison with a well-known binary collision method will be given. The conservation properties will be discussed.

Eisung Yoon
Princeton Plasma Physics Laboratory

Date submitted: 20 Jul 2007 Electronic form version 1.4