

Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Simulating Coulomb Collisions in Particle Codes FRED HINTON, Hinton Associates, C.S. CHANG, NYU, SCOTT PARKER, Univ. of Colorado — A deterministic algorithm for simulating changes in particle velocities, due to Coulomb collisions, has been developed. This algorithm is similar to a Monte-Carlo algorithm, but differs by using averages defined as sums over given lattice points instead of random sample means. Noise due to sampling errors does not occur, although errors occur due to the finite number of points included in the sums. This use of deterministic quadratures is a generalization of a method due to B.J. Albright, et. al [1], who pointed out that far fewer quadrature points should be needed, compared with the number of M-C samples required, for given accuracy. The Fokker-Planck friction vector and diffusion tensor which are needed are obtained from the Rosenbluth potentials, which are determined by a “field solve” in velocity space. Methods for achieving momentum and energy conservation will be discussed, as well as the possibility of using lattice symmetry to achieve higher order accuracy in the time step.

[1] IEEE Transactions on Plasma Science 31, 19 (2003).

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Date submitted: 24 Jul 2006

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