

Abstract Submitted
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An implicit-moment Coulomb collision algorithm for particle-in-cell simulations¹ DAVID LARSON, TANIM ISLAM, LLNL — Particle pairing algorithms are the standard tool for including the effects of Coulomb collisions in PIC plasma simulation codes. These algorithms are restricted to resolving the characteristic collision frequency in order to maintain accuracy. We introduce a new algorithm using recent work by Fox and co-workers [1-3] to generate a discrete set of quadrature nodes representing the velocity distribution. These nodes are advanced in time using the collisional drag force. The original set of PIC particles then collides with the time-advanced nodes using the Nanbu collision algorithm [4]. The result is an implicit-moment collision algorithm that works well for large time steps as demonstrated in a variety of test problems.

[1] R.O. Fox, J. Comp. Phys. **227** (2008)

[2] O. Desjardins et al., J. Comp. Phys. **227** (2008)

[3] C. Yuan and R.O. Fox, “Conditional quadrature method of moments for kinetic equations,” J. Comp. Phys. (in review)

[4] K. Nanbu and S. Yonemura, J. Comp. Phys. **145** (1998)

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