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Collision Models for Plasma Simulation of Thermonuclear Burn: Comparison of Models and Applications DAN WINSKE, BRIAN ALBRIGHT, KEVIN BOWERS, DON LEMONS, Los Alamos National Laboratory — There is renewed interest in examining plasma physics issues related to thermonuclear burn in inertial confinement fusion (ICF) and fast ignition (FI): e.g., the rate of temperature equilibration of electrons and ions, the formation and/or depletion of high energy tails of ion velocity distributions of ions, the slowing of energetic ions in dense plasmas, etc. To address these types of questions, we have developed a new particle-in-cell (PIC) plasma simulation capability, embodied in the code VPIC. To model TN-burn problems in dense plasmas, we have developed a new Coulomb collision model, based on the use of stochastic differential equations and well-known Spitzer rates to describe the collision process, which was presented at last year's meeting. Here we extend the model to included arbitrary weighting of individual simulation particles, rather than just separate weights for each plasma species, which is a feature intrinsic to VPIC. We compare test cases for plasma relaxation and slowing of fast beams using the new collision model with results obtained from an extension of standard particle-pairing collision models to weighted particles for parameter regimes of interest to ICF and FI.

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