

Abstract Submitted  
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**A kinetic electron-neutral collision model for particle-in-cell plasma simulation**<sup>1</sup> TIMOTHY POINTON, KEITH CARTWRIGHT, Sandia National Laboratories — Details of a kinetic electron-neutral collision model for particle-in-cell plasma simulation codes are presented. The model uses an efficient scheme to randomly select collision events – elastic, excitation and ionization – with the appropriate probability [H. Sugawara, *et al.*, *J. Comput. Phys.* **223**, 298 (2007).] Ionization events create electron-ion pairs, and the secondary electrons can themselves ionize the gas. To maintain a manageable particle count, a particle merger algorithm can be used to periodically replace all particles of a given species in a cell with a new, smaller set that conserves charge, momentum, and energy [D. R. Welch, *et al.*, *J. Comput. Phys.* **227**, 143 (2007).] Small-scale tests show that results with the merger are in good agreement with non-merged runs. Large simulations can only be done with the merger on, and typically show excellent merger efficiency (>90%).

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