

Abstract Submitted
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Collision Models for Particle Orbit Code on SSX¹ M.W. FISHER, D. DANDURAND, T. GRAY, M.R. BROWN, Swarthmore College, V.S. LUKIN, Naval Research Laboratory — Coulomb collision models are being developed and incorporated into the Hamiltonian particle pushing code (PPC) for applications to the Swarthmore Spheromak eXperiment (SSX). A Monte Carlo model based on that of Takizuka and Abe [JCP **25**, 205 (1977)] performs binary collisions between test particles and thermal plasma field particles randomly drawn from a stationary Maxwellian distribution. A field-based electrostatic fluctuation model scatters particles from a spatially uniform random distribution of positive and negative spherical potentials generated throughout the plasma volume. The number, radii, and amplitude of these potentials are chosen to mimic the correct particle diffusion statistics without the use of random particle draws or collision frequencies. An electromagnetic fluctuating field model will be presented, if available. These numerical collision models will be benchmarked against known analytical solutions, including beam diffusion rates and Spitzer resistivity, as well as each other. The resulting collisional particle orbit models will be used to simulate particle collection with electrostatic probes in the SSX wind tunnel, as well as particle confinement in typical SSX fields.

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