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Simulation of Swarthmore Spheromak Reconnection Experiment Using Hybrid Code Y. LIN, X.Y. WANG, Auburn University, M.R. BROWN, Swarthmore College, M.J. SCHAFFER, General Atomics, C.D. COTHRAN, Swarthmore College — A 3-D hybrid-particle model is developed for investigation of magnetic reconnection in the Swarthmore Spheromak Experiment (SSX). In this numerical model, ions are treated as fully kinetic particles, and electrons are treated as a massless fluid. The plasma responds to the electromagnetic fields in a self-consistent manner. The simulation is performed in a cylindrical domain. Initially, a pair of counter-helicity spheromaks are assumed, in which the magnetic field and plasma pressure are set up according to the MHD equilibrium. The ion particles are loaded with a Maxwellian distribution function. Conducting boundary conditions are applied to all the boundaries. As the simulation proceeds, magnetic reconnection takes place at the current sheet between the pair of spheromak fields. Plasma is ejected away from the X line towards the central axis, where heating of the transmitted ion is found. Meanwhile, quadrupole out-of-plane magnetic field structure associated with the Hall effects is present around the reconnection site. The simulation results will be compared with the SSX experiment in various aspects.

Y. Lin
Auburn University

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