Abstract Submitted
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Three-Dimensional, Nonlinear MHD Simulations of Spheromak Merging and Plasma Relaxation[1] C.E. MYERS, E.V. BELOVA, PPPL, T. GRAY, C.D. COTHRAN, M.R. BROWN, Swarthmore College — The HYM (Hybrid MHD) code has been used to perform three-dimensional, nonlinear MHD simulations of co- and counter-helicity spheromak merging. Extensive comparisons are made between the simulation results and experimental results from the Swarthmore Spheromak Experiment (SSX). Remarkable agreement is observed in both cases. The analysis of the simulation data is aided by high-quality three-dimensional visualizations that are rendered using the VisIt software package. The co-helicity merging scenario is particularly interesting because the spheromaks are arranged so that they merge in a highly non-axisymmetric fashion. During this process, the spatial profile of the Taylor eigenvalue λ is observed to evolve from a highly non-uniform profile to a nearly-flat profile that represents a relaxed, non-axisymmetric Taylor eigenstate. Additional simulations are used to examine the effects of line-tying and finite plasma pressure on this relaxation process.

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