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Studying the Relaxation and Merging of Taylor State Plasma with the Dedalus Computational Framework ERCONG LUO, MICHAEL BROWN, Department of Physics and Astronomy, Swarthmore College, SWARTHMORE SPHEROMAK EXPERIMENT TEAM — Here we present magnetohydrodynamic (MHD) simulations of three different plasma configurations using the Dedalus project as the computational framework of choice. First, we demonstrate the validity of our computational approach by presenting simulations of Hartmann flow, a well-known problem in MHD with analytical solutions. Secondly we will show a simulation of the evolution of a Taylor state plasma in a cylindrical flux conserver. Lastly we will show the time evolution of a system with two merging Taylor states. Magnetic reconnection has been observed at the Swarthmore Spheromak Experiment (SSX) for the last configuration. The goal of our simulations is to present both the effectiveness and limitations of using MHD numerical simulations to study plasma configurations that involve magnetic reconnection.

Ercong Luo
Department of Physics and Astronomy, Swarthmore College

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