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A domain-decomposed multi-model plasma simulation of collisionless magnetic reconnection[1] I. A. M. DATTA, U. SHUMLAK, A. HO, S. T. MILLER, Univ of Washington — Collisionless magnetic reconnection is a process relevant to many areas of plasma physics in which energy stored in magnetic fields within highly conductive plasmas is rapidly converted into kinetic and thermal energy. Both in natural phenomena such as solar flares and terrestrial aurora as well as in magnetic confinement fusion experiments, the reconnection process is observed on timescales much shorter than those predicted by a resistive MHD model. As a result, this topic is an active area of research in which plasma models with varying fidelity have been tested in order to understand the proper physics explaining the reconnection process. In this research, a hybrid multi-model simulation employing the Hall-MHD and two-fluid plasma models on a decomposed domain is used to study this problem. The simulation is set up using the WARPXM code developed at the University of Washington, which uses a discontinuous Galerkin Runge-Kutta finite element algorithm and implements boundary conditions between models in the domain to couple their variable sets. The goal of the current work is to determine the parameter regimes most appropriate for each model to maintain sufficient physical fidelity over the whole domain while minimizing computational expense.

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