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A multi-model plasma simulation of collisionless magnetic reconnection[1] I. A. M. DATTA, U. SHUMLAK, A. HO, S. T. MILLER, University 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 to plasma energy. A full understanding of this phenomenon, however, is currently incomplete as models developed to date have difficulty explaining the fast reconnection rates often seen in nature, such as in the case of solar flares. Therefore, this behavior represents an area of much research in which various plasma models have been tested in order to understand the proper physics explaining the reconnection process. In this research, the WARPXM code developed at the University of Washington is used to study the problem using a hybrid multi-model simulation employing Hall-MHD and two-fluid plasma models. The simulation is performed on a decomposed domain where different plasma models are solved in different regions, depending on a trade-off between each model's physical accuracy and associated computational expense in each region. The code employs a discontinuous Galerkin (DG) finite element spatial discretization coupled with a Runge-Kutta scheme for time advancement and uses boundary conditions to couple the different plasma models.

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