Abstract Submitted
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Tearing Instabilities in the Reversed-Field Pinch in the Presence of Hall Currents and Pressure Gradients[1] MATTHEW GORBY, KAI GERMASCHEWSKI, FATIMA EBRAHIMI, AMITAVA BHATTACHARJEE, CICART, University of New Hampshire — We present simulations of the linear and nonlinear behavior of tearing modes in reversed-field pinch equilibria. In particular, we perform parameter studies, varying the strength of the Hall term and the plasma beta, and investigate the role of the pressure gradient and diamagnetic stabilization. Simulations are performed using our Magnetic Reconnection Code (MRC), a fully 3D extended MHD simulation code which includes Hall current and electron pressure gradient in a generalized Ohm's law. The MRC is an MPI-parallelized finite-volume based simulation code that integrates the extended MHD equations. It supports arbitrary curvilinear coordinate mappings, allowing it to be adapted to cylindrical and toroidal geometries. In order to overcome restrictive time-step limits, it uses implicit time integration. We have carried out comparisons of linear resistive MHD stability results with NIMROD, showing excellent agreement. In the presence of diamagnetic effects, the nonlinear tearing modes exhibit vortical structures and flow-through reconnection. Implications for observations in MST on sawtooth crashes and the dynamo effect will be discussed.

[1]Center for Integrated Computation and Analysis of Reconnection and Turbulence

Kai Germaschewski
CICART, University of New Hampshire

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