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**Kinetic MHD simulation of large $\Delta'$ tearing mode** JIANHUA CHENG, YANG CHEN, SCOTT PARKER, DMITRI UZDENSKY, University of Colorado at Boulder — We have developed a second-order accurate semi-implicit $\delta f$ method for kinetic MHD simulation with Lorentz force ions and fluid electrons. The model has been used to study the resistive tearing mode instability, which involves multiple spatial scales. In small $\Delta'$ cases, the linear growth rate and eigenmode structure are consistent with resistive MHD analysis. The Rutherford stage and saturation are demonstrated, but the simulation exhibits different saturation island widths compared with previous MHD simulations. In large $\Delta'$ cases, nonlinear simulations show multiple islands forming, followed by the islands coalescing at later times. The competition between these two processes strongly influences the reconnection rates and eventually leads to a steady state reconnection. We will present various parameter studies and show that our hybrid results agree with fluid analysis in certain limits (e.g., relatively large resisitivities).

Jianhua Cheng
University of Colorado at Boulder

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