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Kinetic MHD simulation of large Δ' tearing mode instability JIANHUA CHENG, YANG CHEN, SCOTT PARKER, DMITRI UZDENSKY, University of Colorado — We have developed a second-order accurate semi-implicit δf method for kinetic MHD simulation with Lorentz force ion and fluid electron. The model has been implemented in GEM code and benchmarked on Alfvén waves, ion sound waves and whistler waves against analytical dispersion relation in a uniform plasma. We have also studied the resistive tearing mode instability by adding a resistive term in the generalized Ohm's law using the Harris sheet equilibrium. For small Δ', the linear growth rate and eigenmode structure are comparable with resistive MHD analysis. The Rutherford stage and saturation are demonstrated, though the simulation exhibits different behaviors than previous MHD simulations. For large Δ', the tearing mode develops multiple islands in the nonlinear regime and the islands start to coalesce later on. The competition between the two processes strongly influences the reconnection rates and eventually leads the reconnection to a steady state. We will identify the role played by particle ions in the process using detailed ion diagnostics.

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