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Gyro-kinetic Electron and Fully-Kinetic Ion Particle Simulation of Tearing Mode Instability in a Harris Current Sheet XIANG LU, XUEYI WANG, YU LIN, KONG WEI, CHEN LIU — Two-dimensional simulations are carried out using our gyro-kinetic electron and fully-kinetic ion (GeFi, formerly GKe/FKi [1]) particle simulation model to investigate the collisionless tearing mode instability in a Harris current sheet in the presence of a finite guide field, under a realistic ion-to-electron mass ratio m^i/m^e. The simulation is performed in the plane that contains the anti-parallel magnetic field B^x and the current sheet normal B^z. First, results based on the linearized delta-f scheme are compared with the eigenfunction and linear growth rate obtained from the drift kinetic eigenmode theory as well as the asymptotic matching results of Drake and Lee [2]. Effect of the electron-to-ion temperature ratio T^e/T^i, beta values, and the half-width of the current sheet are investigated. Second, the physics of saturation is studied using the nonlinear simulation scheme.

[1] Lin, Y., X. Y. Wang, Z. Lin, and L. Chen, Plasma Phys. Controlled Fusion, **47**, 657 ,2005.
[2] Drake, J.F, and Y.C.Lee, Phys.Fluids, **20**, 1341, 1977

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