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Collisionless and Collisional Tearing Mode in Gyrokinetics[1]
RYUSUKE NUMATA, TOMOYA TATSUNO, WILLIAM DORLAND, University of Maryland, BARRET ROGERS, Dartmouth College — We present numerical results of linear tearing mode simulations for collisionless and collisional regimes in a strong guide magnetic field limit using the `AstroGK` astrophysical gyrokinetics code. In the collisionless regime, the two-fluid effect, instead of the resistivity, mediates reconnection. Mirnov *et al.* and Fitzpatrick *et al.* have derived linear and nonlinear versions of reduced two-fluid models for the tearing mode in the presence of the guide field[1,2]. We compare numerically obtained tearing mode growth rate with those theories. For the collisional regime, we compare gyrokinetic simulation results with the classical tearing mode theory by Furth, Kileen, and Rosenbluth, and with a fluid simulation. This benchmarks recently implemented resistivity term in the code. AstroGK can smoothly connect those two regimes. We also discuss the scaling of the growth rate against the collisionality in the intermediate regime, and how the kinetic effects play roles in the tearing mode. 1. V. V. Mirnov, C. C. Hegna, and S. C. Prager, Phys. Plasmas **11**, 4468, (2004). 2. R. Fitzpatrick and F. Porcelli, Phys. Plasmas **11**, 4713 (2004).

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