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GeFi Particle Simulation of Landau Damping and Current Drive of Lower Hybrid Waves LEI QI, XUEYI WANG, YU LIN, Physics Department, Auburn University, Auburn, AL — Landau damping of electrostatic lower hybrid waves (LHWs) is investigated using the gyrokinetic electron and fully-kinetic ion (GeFi) particle simulation code [Lin et al., 2005], in which electrons and ions are treated as gyrokinetic and fully-kinetic particles, respectively. It is found that both the linear electrostatic dispersion relation and the linear electron Landau damping rate of LHWs agree very well with the theoretical predications. Similar to the Langmuir waves, a transition from strong decay at small amplitudes to weak decay at large amplitudes is observed due to the nonlinear Landau damping effects. Unlike the Langmuir waves, however, the LHWs interact directly with both the magnetized electrons and unmagnetized ions through the Landau damping. The decay rate is calculated as a function of the wave amplitude for various electron-to-ion temperature ratio T_e/T_i and the parallel wave number $k_{||}$. In the long-time evolution, the lower hybrid waves are found to evolve to a steady BGK mode with a steady finite amplitude. In addition, the current drive through the LHW electron Landau damping is also investigated. The generated currents are calculated as a function of the wave amplitude. [Lin et al., 2005] Y. Lin, X. Wang, Z. Lin, and L. Chen, Plasmas Phys. Controlled Fusion 47, 657, (2005).

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