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On the energy conversion and particle acceleration during magnetic reconnection XIAOCAN LI, Univ of Alabama - Huntsville, FAN GUO, HUI LI, BILL DAUGHTON, YI-HSIN LIU, Los Alamos National Lab, GANG LI, Univ of Alabama - Huntsville — Using two-dimensional particle-in-cell (PIC) kinetic simulations and magnetohydrodynamic (MHD) simulations, we study energy conversion and particle energization during magnetic reconnection. In the PIC simulations that solve collisionless Vlasov-Maxwell equations, pressure anisotropy develops naturally, and it gets stronger with a stronger guide field. The particle acceleration and energy conversion through particle curvature drift, gradient drift, magnetization current, and parallel electric field are compared. We find that their contributions change with guide field. The results are explained in a drift kinetic approximation, where electric current is associated with pressure anisotropy. This explanation is further verified using high-Lundquist-number MHD simulations of magnetic reconnection, where plasma pressure is assumed to be isotropic. This work demonstrates the importance of considering anisotropic velocity distribution in particle acceleration during magnetic reconnection.

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