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Collisionless Reconnection Comparison Between Gyrokinetic and Particle-in-Cell Simulations JASON TENBARGE, University of Maryland, HOMA KARIMABADI, SciberQuest, WILLIAM DAUGHTON, Los Alamos National Laboratory, GREGORY HOWES, University of Iowa — Magnetic reconnection is thought to be responsible for a large portion of the energy conversion between magnetic shear and particle energy in systems as wide ranging as stellar coronae, the solar wind, and terrestrial fusion devices. The gyrokinetic system of equations has long been employed to study turbulence in toroidally confined fusion plasmas and has more recently been applied to study Alfvénic turbulence relevant to the solar wind. In both of these systems, magnetic reconnection is assumed to play some, perhaps significant, role in converting magnetic to particle energy. However, a rigorous comparison between numerical simulations of the kinetic particle-in-cell (PIC) and asymptotically derived gyrokinetic systems has never been performed. We present the results of such a comparison between the PIC code VPIC and the gyrokinetic code AstroGK/GS2 performed at low plasma beta, $\beta = 0.01$, relevant to fusion devices and the solar corona and moderate beta, $\beta = 1$, relevant to the solar wind. The comparison seeks to determine under what parameters, e.g., $\delta B \ll B_g$, the PIC system converges to the gyrokinetic result and how well the converged results compare in terms of energy transport.

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