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Kinetic Simulation of the Island Coalescence Challenge of Magnetic Reconnection WEIGANG WAN, GIOVANNI LAPENTA, Los Alamos National Laboratory — We study the full kinetic simulation of the island coalescence instability as an internal driven reconnection problem with CELESTE3D, which is an implicit particle-in-cell code developed by Brackbill and Lapenta et al at LANL. The simulation starts from the standard Fadeev island chain equilibrium of a small length scale and an initial perturbation. We will study the dependence of the maximum reconnection rate on the driven amplitude and other factors. The simulation results in different geometry scales will be compared. The decoupling of electron and ion flows is observed. We will also look into the effect of a guide field. A guide field does not change the reconnection rate here, and the currents rotate after reconnection. Comparing to resistive MHD simulations, one interesting result here is that the coalescence time, and hence the reconnection rate is independent of driving amplitude, meaning reconnection is an intrinsic process. We will test this conclusion in simulations of the Newton reconnection challenge as well.

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