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Current sheet formation and the plasmoid instability in large, hyperresistive Hall MHD systems[1] AMITAVA BHATTACHARJEE, BRIAN SULLIVAN, YI-MIN HUANG, Center for Integrated Computation and Analysis of Reconnection and Turbulence, University of New Hampshire — Recently, it has become clear that in high Lundquist number, resistive MHD simulations of magnetic reconnection, a super-Alfvénic plasmoid instability may significantly alter the dynamics of the reconnection process. Collisionless particle-in-cell simulations also exhibit copious plasmoid formation. Resistive Hall MHD simulations have been only recently shown to demonstrate similar behavior. Here it is found that not only resistive current sheets, but also current sheets in the presence of hyperresistivity or electron viscosity can exhibit violent plasmoid formation. We delineate the requirements for plasmoid formation in Hall MHD systems under such conditions. For sufficiently large Hall MHD systems, there exists a range of hyperresistivity for which plasmoids appear significant in generating sub-ion skin depth scale current sheets and in triggering Hall reconnection. In the plasmoid-unstable regime, previously obtained scaling laws for the dependence of the reconnection rate on hyperresistvity are altered, leading to regime where the reconnection rate becomes weakly dependent on hyperresistivity.

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