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Influence of Line-Tied Boundary Conditions on the Development of Magnetic Reconnection in Force-Free Current Layers CIHAN AKCAY, WILLIAM DAUGHTON, ADAM STANIER, Los Alamos National Laboratory, VY-ACHESLAV LUKIN, Naval Research Laboratory — The evolution of plasmas in magnetically dominated low- β regimes often leads to the formation of nearly force-free current sheets where magnetic reconnection may be triggered by the tearing instability. In this study, we examine the influence of line-tied boundary conditions on the onset and development of three-dimensional magnetic reconnection in kinetic-scale force-free layers. To better understand the physics, we perform cross-comparisons between fully kinetic VPIC simulations and two-fluid HiFi simulations. We focus on a range of guide fields $B_g = (1 - 10)B_0$ relevant to both space and laboratory plasmas, and compare the evolution between systems with line-tied and periodic boundary conditions.

Cihan Akcay
Los Alamos National Laboratory

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