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Current sheet formation in a sheared magnetic field¹ YAO ZHOU, YI-MIN HUANG, HONG QIN, AMITAVA BHATTACHARJEE, Princeton University — Recently a variational integrator for ideal magnetohydrodynamics in Lagrangian labeling has been developed using discrete exterior calculus. Its built-in frozen-in equation makes it optimal for studying current sheet formation. We use this scheme to study the Hahm-Kulsrud-Taylor problem, which considers the response of a 2D plasma magnetized by a sheared field under mirrored sinusoidal boundary perturbations. The equilibrium solutions are found to not converge with increasing spatial resolution, which suggests that there exists no smooth equilibrium that preserves the topology of the initial field exactly. Unlike previous studies that examine the current density output, we identify a singular current sheet from the converged part of the fluid mapping.

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