

Abstract Submitted
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Tearing Instability of a Current Sheet Forming by Sheared Incompressible Flow¹ ELIZABETH TOLMAN, NUNO LOUREIRO, Plasma Science and Fusion Center, Massachusetts Institute of Technology, DMITRI UZDENSKY, Center for Integrated Plasma Studies, University of Colorado, Boulder — Sweet-Parker current sheets are unstable to the tearing mode, suggesting they will not form in physical systems. Understanding magnetic reconnection thus requires study of the stability of a current sheet as it forms. Such formation can occur as a result of sheared, sub-Alfvénic incompressible flows into and along the sheet. This work presents an analysis of how tearing perturbations behave in a current sheet forming under the influence of such flows, beginning with a phase when the growth rate of the tearing mode is small and the behavior of perturbations is primarily governed by ideal MHD. Later, after the tearing growth rate becomes significant relative to the time scale of the driving flows, the flows cause a slight reduction in the tearing growth rate and wave vector of the dominant mode. Once the tearing mode enters the nonlinear regime, the flows accelerate the tearing growth slightly; during X-point collapse, the flows have negligible effect on the system behavior. This analysis allows greater understanding of reconnection in evolving systems and increases confidence in the application of tools developed in time-independent current sheets to changing current sheets.

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