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Kinetic Theory and Simulation of Collisionless Tearing in Bifurcated Current Sheets TATSUKI MATSUI, University of Iowa, WILLIAM DAUGHTON, Los Alamos National Laboratory, VADIM ROYTERSHTEYN, University of Iowa — Bifurcated current sheets have been observed in the Earth's magnetotail and also within kinetic simulations. The development of a bifurcated current layer may be the direct result of magnetic reconnection or may be due to the nonlinear evolution of the lower-hybrid drift instability. Although the equilibrium theory of these structures has been considered by a number of researchers, the linear stability has not been rigorously treated. In this work, a Vlasov equilibrium is constructed that permits both the current bifurcation and temperature anisotropy to be independently adjusted. The linear theory for colllisionless tearing is performed using standard techniques and compared against a formally exact numerical treatment. The resulting dispersion relation and mode structure are verified with fully kinetic particle-in-cell simulations. While temperature anisotropy $T_\perp > T_\|$ is always strongly destabilizing, the bifurcated current profile enters as a stabilizing influence on the tearing mode. A simplified analytic theory is reasonably accurate for long wavelength modes, but the short wavelength regime requires the full numerical treatment to accurately compute the growth rate.

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