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Kink Stability of MHD Equilibria with Line Tying EVSTATI EVSTATIEV, GIAN LUCA DELZANNO, JOHN M. FINN, GIOVANNI LAPENTA, LANL — We have studied the line-tied kink stability of cylindrical equilibria for applications to solar loops and flux core spheromak formation. Our semi-analytic formulation allows in principle for plasmas or arbitrary length and arbitrary current density profiles; it involves expansion in a series of basis function which are radial eigenfunctions, some with real k_z and some for which k_z is complex. The boundary conditions are applied on a set of radial grid points at the ends, or alternatively integrating over selected distributed basis functions. The dispersion relation is found from the determinant of the resulting matrix. For most cases, the matrix becomes prohibitively stiff for even a moderate number of basis functions. We have modified the process so that the boundary conditions at the ends overdetermine the basis function coefficients, and we therefore satisfy the boundary conditions in a least squares sense. The effectiveness of this approach will be discussed. We also show nonlinear simulations, leading to a nonlinearly saturated kink with topological changes due to magnetic reconnection. Results with stabilization due to hollow pressure profile, possibly related to collimation of astrophysical jets, will be shown.

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