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Nonlinear Rayleigh-Taylor instabilities in fast z-pinches[1] AARON MILES, Lawrence Livermore National Laboratory — Simplified analytic models are used to describe the implosion of a cylindrical plasma by an azimuthal magnetic field of sufficient magnitude to drive a strong shock wave into the plasma. These models are employed together with buoyancy-drag-based models of nonlinear single-mode and turbulent multimode Rayleigh-Taylor (RT) growth to investigate the mixing process in such fast z-pinches. Together, the implosion and instability models give predictions that characterize limitations that instabilities can impose on the implosion in terms of maximum convergence ratios (CR) attainable for an axially coherent pinch. Results from high-resolution numerical simulations are used to validate both implosion and instability models.

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