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**Small-amplitude magnetic Rayleigh-Taylor instability growth in cylindrical liners and Z-pinches imploded in an axial magnetic field** A.L. VELIKOVICH, J.L. GIULIANI, Plasma Physics Division, Naval Research Laboratory, R.W. CLARK, Berkeley Research Associates, D. MIKITCHUK, E. KROUPP, Y. MARON, Weizmann Institute of Science, Israel, A. FISHER, Technion - Israeli Institute of Technology, P.F. SCHMIT, Sandia National Laboratories — Recent progress in developing the MagLIF approach to pulsed-power driven inertial confinement fusion has stimulated the interest in observation and mitigation of the magnetic Rayleigh-Taylor instability (MRTI) of liners and Z-pinches imploded in an axial magnetic field. Theoretical analysis of these issues is particularly important because direct numerical simulation of the MRTI development is challenging due to intrinsically 3D helical structure of the fastest-growing modes. We review the analytical small-amplitude theory of the MRTI perturbation development and the weakly nonlinear theory of MRTI mode interaction, emphasizing basic physics, opportunity for 3D code verification against exact analytical solutions, and stabilization criteria. The theory is compared to the experimental results obtained at Weizmann Institute with gas-puff Z pinches and on the Z facility at Sandia with solid liners imploded in an axial magnetic field. Work supported by the US DOE/NNSA, and by the US-Israel Binational Science Foundation. Sandia National Laboratories is a multiprogram laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

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