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Control of instabilities and thermonuclear fusion in Staged Z-pinch[1] H.U. RAHMAN, GTT International/UCI, Riverside, CA, P. NEY, Mount San Jacinto College, Manifee, CA, F.J. WESSEL, N. ROSTOKER, University of California, Irvine, CA — A Staged Z-pinch, configured for discharge parameters characteristic of multi-megajoule facilities, is studied using the 2 and 1/2 D, radiation-MHD code, MACH2. In this configuration a cylindrical, xenon plasma shell implodes radially onto a co-axial,deuterium-tritium plasma target. During implosion shock fronts are formed in both plasma. The shock waves in the DT plasma preheats the plasma up to several hundred eV before adiabatic compression takes over. In the outer region of the liner plasma,a shock front forms causing Xe mass to accumulate at the outer surface of the DT region. This causes the formation of a conduction channel that the discharge current transfers into. The outer surface of Xe liner then becomes Rayleigh-Taylor (RT)unstable while the shock front that compresses the DT target remains stable. The compression ratio of about 25 can achieve the parameters at the peak compression that can produce a thermonuclear yield from fusion neutrons more then breakeven and beyond. The interesting feature is the inner pinch remains stable even with 1% perturbation level and only become unstable when it explodes.

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