Simulations for a Staged Z-pinch and MagLIF at 26 MA, 130 ns, and 22 MJ\(^1\) HAFIZ RAHMAN, FRANK WESSEL, PAUL NEY, Magneto-Inertial Fusion Technologies, Inc., JEFF NARKIS, JULIO VALENZUELA, FARHAT BEG, University of California, San Diego, RADU PRESURA, Voss Scientific, LLC — Simulations for a Staged Z-pinch (SZP),\(^2\) using a 6-mm diameter, 100-μm thick Silver plasma shell, imploding onto a uniform (target) plasma fill of Deuterium, are compared to MagLIF, configured similarly, except with a 500 μm Beryllium solid liner. Both pinches are pre-magnetized with: \(B_z = 0, 3, 7,\) and \(10\) T and the driver parameters are: \(\tau_{1/4} = 130\) ns, \(I_{\text{peak}} = 26\) MA, \(E_{\text{stored}} = 22\) MJ; the simulation code is MACH2, a 2-1/2 D, radiation-MHD code. Solid-liner simulations reproduce well, experimental results.\(^3\) Plasma-liner simulations exhibit magnetosonic shocks in the liner and ordinary sonic shocks in the target, preheating the plasma. A conduction-channel, shock-front at the interface remains stable throughout compression, even as the liner’s outer surface becomes RT unstable. At peak compression the target decelerates and interface instability appears, triggering ignition and a fusion yield of, \(Y > 200\) MJ; that is, 10\(\times\) greater than \(E_{\text{stored}}\). The yield from the solid liner implosion is 4 orders-of-magnitude less, even though it is more stable than the SZP.

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\(^3\)M. Gomez, et.al., Phys.Plasmas (22)056306:1-10, 2015