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Three dimensional simulations of DT fuel compression by an imploding Z-pinch liner J.P. CHITTENDEN, Imperial College, B. APPELBE, S.A. SLUTZ, Sandia National Laboratory, R.A. VESEY, K. PETERSON, D.B. SINARS, M.E. CUNEO, M.C. HERRMANN — Z-pinch implosions provide a method of directly compressing fusion fuel to high densities and temperatures, with excellent energy coupling efficiency. The presence of large magnetic fields also provides a method of suppressing thermal conduction losses and increasing alpha particle confinement, significantly reducing the rho-R criterion required for ignition. We present three dimensional resistive magneto-hydrodynamic simulation results of one such scheme (S.A. Slutz et. al., this conference), in which a preheated, magnetised fuel is compressed by an imploding metal liner Z-pinch. Large scale parallel computing methods allowed the full liner volume to be modelled at relatively fine scale resolution. The results are used to examine how important the three dimensional structure of the magneto-Rayleigh-Taylor instability is in determining the neutron yield. Sensitivities of the fusion performance to fuel pre-heat, magnetic field configuration and current pulse shaping are also examined. This work was supported by Sandia National Laboratories.

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