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Physics Considerations for Double-Shell Capsules
W. DAUGHTON, D.S. MONTGOMERY, D. WILSON, A. SIMAKOV, E. DODD, L. MERRITT, T. CARDENAS, J.L. KLINE, S. BATHA, LANL — Double-shell capsules offer an alternative approach for achieving burn on the National Ignition Facility. These capsules consist of a low-Z ablatively driven outer shell that converges a factor of ~ 3 before colliding with a high-Z inner shell filled with liquid DT. Such targets permit short simple laser pulses using near vacuum hohlraum conditions, which have been shown to eliminate laser plasma instabilities, resulting in good coupling efficiency. The adiabat of the fuel is set predominantly by a single strong shock, followed by the nearly adiabatic compression of the fuel volume by a convergence ratio of ~ 9. In this talk, we present some key physics consideration for double-shell targets, including design constraints for optimizing the kinetic energy transfer to the inner shell. These basics considerations are confirmed by a series of 1D simulations, resulting in several optimized point designs. Two-dimensional simulations are employed to evaluate the influence of low-mode asymmetries, as well as the stability of both the outer and inner shells as the implosion proceeds.

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