HOT SPOT FORMATION AND STAGNATION PROPERTIES IN SIMULATIONS OF DIRECT DRIVE IMPLOSIONS*

Andrew J. Schmitt[1], S. P. Obenschain[1]
[1]Plasma Physics Division, Naval Research Lab, Washington DC, USA
andrew.schmitt@nrl.navy.mil

In central-ignition ICF target designs, very little of the laser energy coupled to the target ends up in the hot spot that ignites the target [1]. The resulting small hot spot and the relatively large convergence ratios resulting from the limited energy make the targets very sensitive to asymmetries and mix. A recent study of the hot spot formation in response to different void vapor densities [2] showed that more energy could be put into the hot spot and should make the NIF target more robust and less sensitive to drive asymmetries, at the expense of reducing the 1D pellet gain.

We reexamine this study using directly driven targets on the NIF laser. Since direct driven targets couple a much larger fraction of their energy into the imploding fuel capsule, the potential exists for a larger space and more flexibility in the tradeoff between gain and robustness.

We try a variety of methods to increase the energy in the stagnated hot spot. We explore altering the initial target as in the aforementioned study (changing the void density) and also investigate changing the incident laser pulse (e.g., altering the shock timings and/or using pulse shape modifications). 1D simulation studies of direct-drive implosions are used to examine the effects of these methods on the hot spot dynamics. The effects on pellet stability and robustness are further explored using 2D simulations.

*Work supported by US DoE/NNSA

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[2] R.E. Olson and R.J. Leeper, Phys. Plasmas **20**, 092705 (2013).