Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

The effect of capsule convergence on ICF design approach[1] YIMING WANG, ROBERT WATT, BAOLIAN CHENG, JAMES MERCER-SMITH, Los Alamos National Laboratory — Recent experiment results of NIF have demonstrated the great challenges faced by the ICF community to achieve thermonuclear ignition in the current NIF design space. In this work, we examined the capsule performances compared to that of the predictions by the codes for both the previous Omega ICF as well as NIF ICF experiment shots [1]. It appears that YOC (yield over calculation) is strongly correlated to the convergence of ICF capsule. The codes (both LASNEX and HYDRA) failed to predict the capsule performance when the convergence is great than 15. Here we give a heuristic explanation of the effect of spherical convergence on the growth rate of Rayleigh-Taylor instability. Based on the experiment data and the lack of predictive capability of physics codes for high convergent capsule design, we propose to explore other design approaches in which the capsule convergence is in the range where the codes had successfully demonstrated the predicted capability. One of these candidates is the double-shell capsule with an opaque pusher using vacuum hohraums [2].

[1] S. W. Haan, J.D. Lindl, et al., Phys. Plasmas 18, 051002 (2011)
[2] P. Amendt, C. Cerjan, et al., Phys. Plasmas 14, 056312 (2007)

[1]This work was performed under the auspices of the U.S. Department of Energy by the Los Alamos National Laboratory under contract number W-7405-ENG-36.

Baolian Cheng
Los Alamos National Laboratory

Date submitted: 20 Jul 2012 Electronic form version 1.4