Polar Direct Drive Exploding Pusher Experiments on NIF

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Thin shell, polar direct drive [1] 'exploding pusher' capsule implosions are being developed on NIF as a platform for HED physics experiments. One potential advantage of this platform over alternative indirect drive exploding pusher designs [2] is the possibility of achieving significantly higher fuel temperatures, which could enable time-dependent temperature diagnosis and affords the prospect of studying non-equilibrium plasma physics processes. In addition, the platform has already found application in a recent NIF Discovery Science campaign [3] and a DT variant is expected to deliver high neutron yields [4].

Given the difficulty in predicting the performance and shape of polar direct drive implosions, initial shots focused on platform development attempted to empirically establish implosion symmetry. A sequence of shots was performed in which the power ratio between beams incident near the capsule pole and equator was deliberately varied, with an expectation of bounding a symmetric implosion. Results from the experiments will be presented alongside radiation-hydrocode modelling and analysis, with particular reference to in-flight implosion symmetry.

References

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