Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Spectral sensitivity to perturbative modes in cylindrical implosion simulations GRANT MEADORS, BRANDON WILSON, JOSHUA SAUPPE, KYLE HICKMANN, Los Alamos National Laboratory — Laser-driven implosion of cylindrical targets are being used to understand inertial confinement fusion (ICF). Convergent Rayleigh-Taylor instability (RTI) growth seeded by perturbations in the targets have been captured by high-fidelity experiments and 2D Eulerian simulations. In this work, we consider sensitivities of RTI growth and implosion dynamics to geometric uncertainties, such as manufacturing tolerances. We characterize the frequency-domain uncertainty in the modal decomposition and the measurable accuracy of a sensitivity analysis using spectral analysis of perturbative modes, driven by M periodically-seeded perturbations in the plane perpendicular to the axis. The minimum detectable and maximum allowable input parameter variations are considered at progressive stages of the simulation. This study helps establish the level of robustness and simulation fidelity in laser-driven experiments, as well as forecasts future computational scaling and requirements.

Grant Meadors
Los Alamos National Laboratory

Date submitted: 18 Aug 2020 Electronic form version 1.4