

Abstract Submitted
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Uncertainty Quantification in NIF Ignition Parameter Space¹

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— When we begin to “tune” the NIF target and laser pulse, we will need guidance about how observed capsule performance (e.g., shock timing, imploded shape, etc.) depends on the input parameters at our disposal (e.g., laser pulse shape, hohlraum length, etc.) So it will be necessary to have already predicted this dependence via numerical simulations. Besides being guides for tuning, such simulations also show the sensitivity of NIF capsules to uncertainty in the inputs. We present results of a study of NIF THD capsules, leading to creation of a “surrogate model” (i.e., an analytic fit) for the dependence of the observed capsule performance on the inputs. Treating the inputs as random variables with known distributions, the surrogate is sampled to predict distributions for the outputs, allowing quantitative estimates of uncertainty in the outputs. We show how uncertainty in the laser power during various parts of the pulse (with fixed cone ratio) leads to uncertainty in predictions of the imploded capsule’s shape.

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