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Probing the seeding of hydrodynamic instabilities from non-uniformities in ablator materials using 2D velocimetry[1]

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Despite the extensive work done to characterize and improve the smoothness of ablator materials used in inertial confinement fusion, features indicative of seeded instabilities from these materials are still observed. A two-dimensional imaging velocimetry technique has been used on Omega (OHRV 2D-VISAR system) to measure the velocity roughness of shock fronts launched by indirect drive in the three ablator materials of current interest. We have used this diagnostic, coupled with extensive pre-shot target metrology, to study the presence of shock-front perturbations in GDP, beryllium, and high density carbon ablators. Observed features are small variations from one-dimensional evolution, but are important for fully understanding the effects of surface topography, dynamic material response, and internal heterogeneities on the stability of ICF capsules. For all three ablators we have quantified perturbations that can dominate conventional surface roughness seeds to hydrodynamic instability.

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