Spike morphology in supernova-relevant hydrodynamics experiments*

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This presentation describes experiments performed on the Omega laser exploring the 3D Rayleigh-Taylor instability at a blast-wave-driven interface. These experiments are well scaled to the He-H interface during the explosion phase of SN1987A. Approximately 5 kJ of laser energy are used to create a planar blast wave in a plastic disk, which then crosses the interface between the disk and a lower-density foam. These circumstances induce the Rayleigh-Taylor instability. The plastic disk has an intentional pattern machined at the plastic/foam interface. This seed perturbation is three-dimensional with a basic structure of two orthogonal sine waves with a wavelength of 71 μm and amplitude of 2.5 μm. Interface structure has been detected under these conditions using dual, orthogonal radiography. Some of the resulting data will be shown. Also, recent advancements in x-ray backlighting techniques have greatly improved the resolution of the x-ray radiographic images. Current experiments are further examining the features of the unstable interface by varying the density jump across it as well as by observing the evolution of the instability at earlier times.

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