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Material Strength Effects on Feedthru of the Ablative Richtmyer-Meshkov Instability[1] ERIC LOOMIS, Los Alamos National Labs, PEDRO PERALTA, ELIZABETH FORTIN, JENNA LYNCH, Arizona State University — Mitigating hydrodynamic instabilities in Inertial Confinement Fusion (ICF) is of prime importance for producing self-heating and reaching ignition. One possible mitigation strategy involves the use of metal ablators (e.g., Be) that remain solid following passage of the first shock. Finite material strength in these capsules would alter the feedthru characteristics (oscillation frequency and decay rate) of perturbations initially on the outer surface. To study the physics associated with material strength effects on rippled shock oscillations and feedthru, experiments were performed at the Los Alamos Trident laser. These experiments directly measured the surface height amplitude imprinted by the shock ripple at the opposite free surface with 20 nm precision over a timespan of 25 ns using an in-situ diagnostic called Transient Imaging Displacement Interferometry (TIDI). Simulations from the Lawrence Livermore National Lab code HYDRA predicted that the free surface ripple grows about 3 times more without the use of a strength model in Cu for an initial 5 micron amplitude, 50 micron wavelength sinusoid driven to a free surface velocity of 600 m/s. By increasing the perturbation wavelength we slowed the shock oscillation frequency and decay rate to increase the free surface ripple amplitude to roughly half the perturbations initial amplitude. The time dependent imprinted amplitude was considerably less in high strength Fe versus the softer Cu.

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