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Novel Feed-through Richtmyer-Meshkov Instability (RMI) Experiment for Dynamic Material Strength and Phase Transformation Model Validation[1] SAUL OPIE, SUDRISHTI GAUTAM, ELIZABETH FORTIN, JENNA LYNCH, Arizona State Univ, ERIC LOOMIS, Los Alamos National Laboratory, PEDRO PERALTA, Arizona State Univ — While numerous continuum material strength and phase transformation models have been proposed to capture their complicated dependence on intensive properties and deformation history, few experimental methods are available to validate these models, particularly in the large pressure and high strain rate regime typically of strong shock and ramp dynamic loading. One method applicable in this regime that has gained attention recently is the Richtmyer-Meshkov instability (RMI), where a shock front passing through a perturbed material surface excites an impulse like response that can be used for material model validation. In this work we present a novel variation of the typical RMI experiment that involves introducing a perturbed shock front across a flat material interface. The advantage of this approach is that diagnostics of the flat free surface are more easily obtained and there is more information available through both the RMI evolution and the characteristics of the perturbed shock front. We compare preliminary numerical simulations to recently obtained experimental data using the new RM experimental method in iron samples loaded above and below the alpha-epsilon phase boundary.

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