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Estimating and Interpreting an "Average" Strength from Richtmyer-Meshkov Instability Experiments. MICHAEL PRIME, Los Alamos Natl Lab — Richtmyer-Meshkov Instabilities (RMI) have recently been used to estimate metal strength at strain rates of about 10ˆ7/s. RMI experiments involve shocking a metal interface with sinusoidal perturbations that invert, grow, and possibly arrest subsequent to shock in a way very sensitive to deviatoric strength. All published RMI-based strength estimates report a strength averaged over the duration of the experiment interrogated by the diagnostic. Since strain, strain rate, temperature and pressure all affect strength and all vary in the experiment, what does "average" strength mean, and is it useful for calibrating a high-rate constitutive model? In this study, we use a series of numerical simulations to establish the regimes and extent of those variables to which the instability is most sensitive. We assess assigning the strength estimate to a point in (strain, strain rate, temperature, pressure) space and using that in to aid in calibration of a strength model. We then apply the findings to experimental RMI data on copper at five different perturbation sizes so we can attempt to fit a PTW constitutive model and reproduce the data. Finally we compare the estimate of average strength to other estimates of high-rate strength in copper.

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