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**Deterministic Initial Conditions studies of the Richtmyer-Meshkov instability** TIFFANY DESJARDINS, ADAM MARTINEZ, JOHN CHARONKO, Los Alamos National Laboratory — To advance our study of the Richtmyer-Meshkov instability and the transition to turbulence, we need to be able to generate well defined, known, and three-dimensional initial conditions. At Los Alamos, this is also a requirement for validating predictive capabilities of models and simulations. The Vertical Shock Tube facility at Los Alamos has recently been studying the Richtmyer-Meshkov instability using membranes generated via additive manufacturing. These particle packed membranes break easily and allow us to avoid non-diffuse initial conditions while providing deterministic initial conditions. Our first studies with two-dimensional sinusoidal interfaces are being used to determine the effects these types of membranes have on the growth and flow. We use simultaneous PIV and PLIF diagnostics to capture spatially and temporally resolved density and velocity measurements at two locations in time of a shocked air/SF6 interface ( $A = 0.6$ ) with a shock speed of  $M = 1.2$ . We are studying two  $ka_0$  values: 0.24 and 0.72. Preliminary shots show bubble and spike growth that follows the expected growth rate of Sadot *et al.*

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