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Investigating Typical Additive Manufacturing Defect Geometries using Physical Vapor Deposition Explosives as a Model System[1] CAITLIN O'GRADY, Sandia National Laboratories and Purdue University, ALEXANDER TAPPAN, ROBERT KNEPPER, STEPHEN RUPPER, JONATHAN VASILIAUSKAS, MICHAEL MARQUEZ, Sandia National Laboratories — Additive Manufacturing (AM) techniques are increasingly being utilized for energetic material processes and research. The downside to utilizing current AM techniques is that energetic samples fabricated using these techniques often develop artifacts or defects during the manufacturing process. In this work, we use Physical Vapor Deposition (PVD) explosive samples as a model system to investigate the effects of these typical AM artifacts or defects on explosive samples created through AM techniques. PVD techniques allow for precise control of geometry to simulate typical AM artifacts or defects embedded into explosive samples. This experiment specifically investigates triangular and diamond-shaped artifacts that often result during direct-ink-writing (robocasting). Samples were prepared with different sizes of voids embedded into the films. An ultra-high-speed framing camera and streak camera were used to view the samples under dynamic shock loading. It was determined that both geometry and size of the defects have a significant impact on the detonation front.

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