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Experimental characterization of solid propellants combustion by digital holography JUN CHEN, MICHAEL POWELL, JIAN GAO, IBRAHIM GUNDUZ, Purdue University, DANIEL GUILDENBECHER, Sandia National Laboratories, STEVE SON, Purdue University — Aluminum and other additions are widely used in solid propellants to improve performance. In this study, we apply digital holography as a three-dimensional diagnostic tool to characterize the burning of composite solid propellants with addition of different composite particles. Structures around the burning surfaces and reaction zones are identified, whereas the drop morphologies and their size/velocity distributions are quantified. The nanosecond exposure of this imaging technique enables time-freezing measurements of the highly dynamic combustion process. The results are compared with discoveries from high-speed imaging. This technique is also applied to study the combustions of solid propellants under high-pressure environment.

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