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A Statistical Representation of Pyrotechnic Igniter Output[1]
SHUYUE GUO, MARCIA COOPER, Sandia National Laboratories — The output of simplified pyrotechnic igniters for research investigations is statistically characterized by monitoring the post-ignition external flow field with Schlieren imaging. Unique to this work is a detailed quantification of all measurable manufacturing parameters (e.g., bridgewire length, charge cavity dimensions, powder bed density) and associated shock-motion variability in the tested igniters. To demonstrate experimental precision of the recorded Schlieren images and developed image processing methodologies, commercial exploding bridgewires using wires of different parameters were tested. Finally, a statistically-significant population of manufactured igniters were tested within the Schlieren arrangement resulting in a characterization of the nominal output. Comparisons between the variances measured throughout the manufacturing processes and the calculated output variance provide insight into the critical device phenomena that dominate performance.

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