

Abstract Submitted  
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**Characterizing Detonator Output Using Dynamic Witness Plates**

MICHAEL MURPHY, RONALD ADRIAN, Arizona State University — A sub-microsecond, time-resolved micro-particle-image velocimetry (PIV) system is developed to investigate the output of explosive detonators. Detonator output is directed into a transparent solid that serves as a dynamic witness plate and instantaneous shock and material velocities are measured in a two-dimensional plane cutting through the shock wave as it propagates through the solid. For the case of unloaded initiators (e.g. exploding bridge wires, exploding foil initiators, etc.) the witness plate serves as a surrogate for the explosive material that would normally be detonated. The velocity-field measurements quantify the velocity of the shocked material and visualize the geometry of the shocked region. Furthermore, the time-evolution of the velocity-field can be measured at intervals as small as 10 ns using the PIV system. Current experimental results of unloaded exploding bridge wire output in polydimethylsiloxane (PDMS) witness plates demonstrate 20 MHz velocity-field sampling just 300 ns after initiation of the wire. Successful application of the PIV system to full-up explosive detonator output is also demonstrated.

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