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Acquisition of high-fidelity flyer characteristics using PDV and streak imaging¹ JOSEPH OLLES, RYAN WIXOM, J. PATRICK BALL, Sandia National Laboratories, GRAHAM KOSIBA, Rensselaer Polytechnic Institute — Acquisition of experimental flight characteristics of electrically driven flyers (EDFs) is important in understanding the flyer's role in initiating detonator explosives. The velocity throughout a plastic flyer's flight was measured, as well as the magnitude and duration of the impulse while impacting an acrylic window. Despite the small size, thickness, and large accelerations of the EDFs, diagnostic techniques now have the temporal and spatial fidelity to measure validation-quality flyer characteristics. Using multipoint photonic Doppler velocimetry (PDV) in conjunction with streak imaging through a fiber array the velocity profile, bow shock (air cushion), time of impact, flyer shape at impact, and shock duration were measured. Shock physics simulations were then compared to this high fidelity data as a means of validating equations of state. Through the combination of experiments and simulations we can achieve a greater fundamental understanding of the energy transfer from the EDF to the energetic material prior to initiation.

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