Abstract Submitted
for the SHOCK09 Meeting of
The American Physical Society

High-Resolution Projectile Velocity and Acceleration Measurement using Photonic Doppler Velocimetry[1] SCOTT LEVINSON, SIKHANDA SATAPATHY, The University of Texas at Austin, Institute for Advanced Technology — This paper describes the new photonic Doppler velocimetry (PDV) technique for measuring time-resolved projectile velocity and acceleration profiles. This technique is shown to provide excellent temporal and spatial resolution in measurement for full flight of the launch package launched from single- and two-stage guns. The PDV method measures the minute Doppler shift in the monochromatic light reflected from the moving surface, which is directly proportional to its velocity. The Doppler-shifted laser signal is mixed with the unshifted signal to generate a beat signal. Short-time Fourier analysis of the beat signal produces highly resolved and accurate velocity profiles. Off-the-shelf components developed for the telecommunications industry are used, producing a system that is robust and inexpensive. Other examples of PDV measurements are provided in a companion paper on impact response of glass bars.

[1]The research reported in this document was performed in connection with Contract number W911QX-07-D-0002 with the US Army Research Laboratory.

Sandra Spicher
The University of Texas at Austin, Institute for Advanced Technology

Date submitted: 13 Feb 2009 Electronic form version 1.4