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Shock Velocity Detection using Photonic Doppler Velocimetry
PALAKKAL ASOKA-KUMAR, RICKY CHAU, NEIL C. HOLMES, Lawrence Livermore National Laboratory — Photonic Doppler Velocimetry (PDV) using Doppler-shifted coherent laser light offers a novel way to access the instantaneous of a moving surface. Light scattered from a moving surface is shifted in frequency and when allowed to superpose with the original light will result in intensity modulation at the beat frequency of the two light fields. Such a system is capable of recording the velocities of moving surfaces in a gas gun experiment as demonstrated by O.T. Strand et al.[1] We describe a Photonic Doppler Velocimetry (PDV) System that measures shock arrival times in materials to a wide range of pressure values. The response time for shock arrival detection is similar to or better than the conventional pin recording system. We describe several examples of obtaining dynamic EOS data, sound velocity, and free surface velocity profiles. This work was performed under auspices of the U.S. Department of Energy by the University of California, Lawrence Livermore National Laboratory under Contract W-7405-Eng-48.

[1]O.T. Strand, L.V. Berzins, D.R. Goosman, W.W. Kuhlow, P.R. Sargis, and T.L. Whitworth, *Velocimetry using Heterodyne Techniques*, 26th Int. Congress on High-Speed Photography and Photonics, Alexandria, VA, Sept 19-24, (2004).

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