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Heterodyne interferometer arrangement for combined normal and transverse velocity measurements in pressure-shear plate impact experiments[1] MICHAEL MELLO, CHRISTIAN KETTENBEIL, GURUSWAMI RAVICHANDRAN, Caltech — Traditional pressure-shear plate impact experiments rely on the transverse displacement interferometer (TDI) [Kim & Clifton, J. Appl. Phys., 1977] for the measurement of in-plane displacement histories. Alternative schemes have leveraged dual VISAR arrangements [Chhabildas, J. Appl. Phys., 1980]. In recent years, there has been a paradigm shift towards the application of heterodyne photonic Doppler velocimetry (PDV) for normal velocity measurements. A similar approach can be taken to measure transverse particle velocity. We present a heterodyne fiber optic interferometer configuration designed to simultaneously monitor normal and transverse particle velocity histories. The technique relies upon a 400 line/mm diffraction grating deposited onto the polished rear surface of the target plate. A PDV measurement system interferes the 0^{th} order beam to probe the normal particle velocity, while a transverse PDV (TPDV) arrangement utilizes a pair of symmetrically diffracted beams to extract the transverse velocity. The novel interferometer configuration was validated through a series of normal plate impact experiments conducted on Y-cut quartz.

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