

Abstract Submitted
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Impact Stress Measurement Using Piezoelectric Probes with PZT and LN Elements ALAN MEARS, NATHAN ROUTLEY, PAUL KENDALL, AWE, Aldermaston, UK — Previous gas gun experiments using low density foam flyers examined the dynamic response of Dynasen CA-1136 piezoelectric probes having lead zirconate titanate (PZT) elements for stresses in the range 0.07 to 0.3 GPa. Recent experiments have extended the dataset down to 0.01 GPa, compared PZT based probes with lithium niobate (LN) based probes and compared the measured stress from manganin gauges with the stress from the piezoelectric probes. For 0.1 g/cc polystyrene foam impacting probes with APC 850 PZT elements and generating stresses between 0.1 and 0.2 GPa, the effective piezoelectric charge coefficient was 3 to 4 times the quoted value of 400 pC/N. The coefficient decreased to around 1 to 1.5 times the quoted value as the impact stress was reduced to 0.01 GPa. Differences were observed between 0.3 g/cc polyurethane and 0.1 g/cc polystyrene foams suggesting that the probe response is dependent on both the stress and the material properties of the impactor. The measured stresses from the LN probes were significantly closer to the stresses obtained from the manganin gauges.

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