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Calibration of Commercial Gauges of Varying Geometry to Measure the Lateral Component of Stress Z. ROSENBERG, RAFAEL, N.K. BOURNE, University of Manchester, J.C.F. MILLETT, Cranfield University —
The measurement of complete stress fields in the inelastic loading of materials has proved to be necessary since in many materials the strength is not constant through the loading pulse or with increase in its amplitude. In planar shock, the strain is uniaxial and the axisymmetric stress field only requires definition of the longitudinal and lateral components. Commercial manganin stress gauges have been used to measure longitudinal stress histories for many years and have been successfully calibrated for this by several workers. Their use in the measurement of lateral stresses has reached maturity now after an understanding of the factors which affect their piezoresistive response. Recently, differing gauge geometries have been adopted. These are grid and a T-shaped gauge manufactured by Micromeasurements. It was noticed that this affected the relative resistance change measured by the gauge for nominally the same input stress. A calibration has been conducted for two differing gauge geometries using a series of experiments in which T and grid gauges were mounted side by side for the same shock. It is found that at low stress amplitudes the gauge response differs, whilst at higher stresses their response is the same. The critical value for this change in behaviour is at a relative resistance change of 0.1. The results are presented and the reasons for the differences are discussed.

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