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Three-dimensional Dynamic Deformation Measurements using Stereoscopic Imaging and Digital Speckle Photography HELEN PRENTICE, MARTIN GREENAWAY, WILLIAM PROUD, University of Cambridge — A technique has been developed in order to determine experimentally the three-dimensional displacement field on the rear surface of a dynamically deforming plate. The technique combines speckle analysis with stereoscopy, using a modified translated-lens method: this allows split-frame photography, increased image resolution and a larger effective lens separation in order to increase image disparity and reduce errors in the shape reconstruction. Whilst several analytical models exist to predict deformation in extended or semi-infinite targets, the non-trivial nature of the wave interactions complicates the generation and development of analytical models for targets with significantly finite depth. By interrogating specimens experimentally to acquire three-dimensional strain data points, both analytical and numerical model predictions can be verified more rigorously. The technique is applied to the quasi-static deformation of a rubber sheet and dynamically to sheets of Copper and Mild Steel of various thicknesses.

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