

Application of color structured light pattern to measurement of large out-of-plane deformation

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Abstract

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Abstract Measurement of out-of-plane deformation is significant to understanding of the deflection mechanisms of the plate and tube structures. In this study, a new surface contouring technique with color structured light is applied to measure the out-of-plane deformation of structures with one-shot projection. Through color fringe recognizing, decoding and triangulation processing for the captured images corresponding to each deformation state, the feasibility of the method is testified by the measurement of elastic deflections of a flexible square plate, showing good agreement with those from the calibrated displacement driver. The plastic deformation of two alloy aluminum rectangular tubes is measured to show the technique application to surface topographic evaluation of the buckling structures with large displacements.

Keywords: Out-of-plane deformation Surface contouring Color structured light Plate deflection Rectangular tube buckling

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