

## Investigation of the Speckle Pattern Effect for Displacement Assessments by Digital Image Correlation

**Authors :** Salim Çalışkan, Hakan Akyüz

**Abstract :** Digital image correlation has been accustomed as a versatile and efficient method for measuring displacements on the article surfaces by comparing reference subsets in undeformed images with the define target subset in the distorted image. The theoretical model points out that the accuracy of the digital image correlation displacement data can be exactly anticipated based on the divergence of the image noise and the sum of the squares of the subset intensity gradients. The digital image correlation procedure locates each subset of the original image in the distorted image. The software then determines the displacement values of the centers of the subassemblies, providing the complete displacement measures. In this paper, the effect of the speckle distribution and its effect on displacements measured out plane displacement data as a function of the size of the subset was investigated. Nine groups of speckle patterns were used in this study: samples are sprayed randomly by pre-manufactured patterns of three different hole diameters, each with three coverage ratios, on a computer numerical control punch press. The resulting displacement values, referenced at the center of the subset, are evaluated based on the average of the displacements of the pixel's interior the subset.

**Keywords :** digital image correlation, speckle pattern, experimental mechanics, tensile test, aluminum alloy

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