

A comparison of the optical and tensometric methods of the tensile test evaluation

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In the experimental mechanics, various contact and contactless techniques for measurement of surface deformations and strains can be used. Direct measurement techniques are mainly based on strain gauge method. The most popular contactless methods include Moiré interferometry, holography, speckle interferometry and Digital Image Correlation (DIC) [1]. Some of these methods have stringent requirements on the measurement equipment, setup procedure or coherent light source.

In the last years, the more robust and effective computational algorithms were developed for tracking the material points and estimation of whole displacement and strain fields. From this reason, the relatively simple and less expensive Digital Image Correlation optical method has been extensively used for displacement and strain field estimation in various applications like material characterization, structural health monitoring, fatigue crack growth, high temperature testing etc. The adaptability of DIC technique is in the image capturing technology obtained by standard cameras to estimate displacement and strain data from the tracking of the material points [2].

The paper focuses on determination the utility of open source MATLAB based 2D DIC software Ncorr [3] for static tensile test evaluation. The tensile tests on flat rectangular specimens were conducted and corresponding displacement and strain fields were estimated using Ncorr. The results generated by Ncorr were compared with commercially available 2D DIC software Vic 2D from correlated solutions. Results of uniaxial strains obtained by optical method were verified by experimental measurements using an installed strain gauge and extensometer.

The good agreement between results attained by evaluation of experiments using optical and standard tensometric methods was found.

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