

DETERMINATION OF WHOLE FIELD STRAIN IN COMPOSITE REFLECTOR USING PHOTOGRAMMETRY

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Abstract

Conventional strain measurement techniques cannot be used to obtain the strains in composite reflectors under thermal environment. Though photogrammetry can be used to measure the deformations it cannot provide information on strains. In this work a methodology is developed to determine the strains from the displacements obtained from photogrammetry coordinate measurement. The strains are determined by applying equilibrium conditions and not from the gradient of the displacements. The results are verified using simulated data as well as experiment. It is demonstrated for a composite reflector of a typical spacecraft when subjected to thermal load. The methodology developed in this work helps in obtaining the strain distribution without using expensive digital image correlation equipment. This methodology can be used on wide variety of applications like inflatable structures, flexible structures etc., where strain gauge measurements are not possible to be carried out.

Keywords: Photogrammetry, Strain, Non-destructive Evaluation, Finite Element Analysis, Composite Reflector