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Experimental Stress Analysis of a Notched Finite Composite Tensile Plate

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ABSTRACT

Individual displacements and stresses in a vertically-loaded notched finite graphite/epoxy laminated composite are determined by processing measured values of a single component of displacement with an Airy stress function in complex variables. Displacements are recorded using digital image correlation. Traction-free conditions are imposed analytically at the notch using conformal mappings and analytic continuation, and discretely on the vertical free edge. Zero shear stress is also imposed on horizontal line of symmetry. Consequences of employing different amounts and source locations of measured displacements and varying number of coefficients, as well as how displacements are differentiated to provide strains, are considered. Reliability of experimental results is demonstrated by Finite Element and force equilibrium.

Key Words: A. Structural composites; C. Anisotropy, Stress concentration; D. Digital image correlation

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