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Three-Dimensional Analysis of a Composite Repair and the Effect of Overply Shape Variation on Structural Efficiency

By Air Force Institute of Technology (U. S.). Graduate School of Engineering and Management

Biblioscholar Sep 2012, 2012. Taschenbuch. Book Condition: Neu. 246x189x9 mm. This item is printed on demand - Print on Demand Neuware - This research characterizes, in the elastic range, a scarf joint with overply using digital image correlation photogrammetry and finite element modeling. Additionally, the effect of varying the overply's geometric profile is examined. Specimens are constructed from AS4/3501-6 prepreg with a $[0/45/90]_2S$ layup. A fixture is used to achieve a consistent scarfed hole in each panel. The patch and adhesive (FM 300) are co-cured to the panels using positive pressure, which minimizes repair porosity. Three variations in the overply geometry are used: circular, rooftop-end, and tooth-end. The full strain field in each uni-axially loaded specimen is captured using digital image correlation photogrammetry (ARAMIS). These results validate an ABAQUS 3-D finite element model of a scarf patch with circular overply. Good correlation is evident in the longitudinal strain; strain sensitivity limits correlation in the transverse and shear directions. The finite element model is used to identify peak out-of-plane stresses in the repair joint. Significant normal stresses occur at edge of the overply and at the inner scarf diameter. Finally, the experimentally-measured strains of the 3 overply variations are examined....

Reviews

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