



Modeling Fracture in Z-Pinned Composite Co-Cured Laminates Using Smearred Properties and Cohesive Elements in DYNA3D

By Jason K. Freels

Biblioscholar Nov 2012, 2012. Taschenbuch. Book Condition: Neu. 246x189x6 mm. This item is printed on demand - Print on Demand Neuware - The purpose of the present research was three-fold: 1) gain a more sophisticated understanding of the response of co-cured composite joints with and without through-thickness reinforcement (TTR), 2) compare the behavior of specimens reinforced with various sizes and densities of reinforcement, and 3) use experimental data to verify the existing DYNA3D smearred property model. Double cantilever beam, end-notch flexure and T-section specimens reinforced with 0.011' diameter z-pins at 2% and 4% volume densities were tested to determine the mode I, mode II and mixed mode (I and II) behavior. Results were added to preliminary research in which tests were conducted on previously mentioned specimen geometries reinforced with 0.022' diameter z-pins at similar densities. Experiments were modeled in DYNA3D using shell and cohesive elements. The energy release rate, G , determined through a curve fit developed from beam theory, was smearred across the region of reinforcement treating it as a separate material. The research validated Z-pinning as an effective means of improving the fracture toughness of polymer matrix laminated composites in mode I and mixed mode loading conditions and determined that the...



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