SM13S_12612

XXI International Congress of Theoretical and Applied Mechanics
Warsaw, Poland, August 15–21, 2004

Analytical Models for Stress and Failure Analysis of Notched Hybrid Composites

Lothar Kroll, Martin Lepper, Bernd Grueber, **Pawel Kostka**, Bingquan Zhou

Institut für Leichtbau und Kunststofftechnik (ILK), Technische Universitaet Dresden, Dresden, Germany

The design of notched high-performance composites with fibre and textile reinforcement requires a special stress analysis and a proof of their notched strength, which includes the structural parameters of the component combination, material orientation and layer arrangement. For the description of the notch stress behaviour of hybrid constructions, analytical calculation methods are developed at the Institut für Leichtbau und Kunststofftechnik (ILK). The model presented here is based on the enhanced laminate theory combined with the method of complex-valued displacement functions and the method of conformal mappings, from which adapted approaches for the stresses and displacements can be obtained. Extensive experimental research is also conducted. For developing of more accurate failure models an improved stress analysis of notched anisotropic plates combined with a physically based strength analysis is used. The discussed approach is demonstrated here for the example of textile-reinforced timber constructions.

View the extended summary