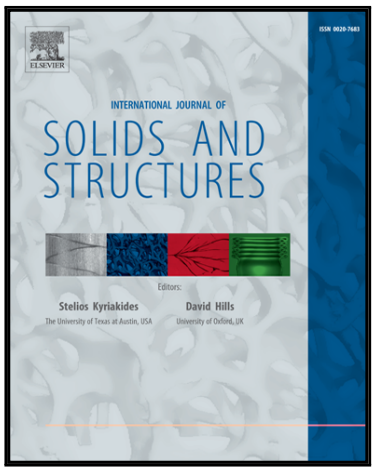

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Optimization of Postbuckling Behaviour of Variable Thickness Composite Panels with Variable Angle Tows: Towards "Buckle-Free" Design Concept

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Abstract

Variable Angle Tow (VAT) laminates that generally exhibit variable stiffness properties not only provide extended design freedom, but also offer beneficial stress distributions. In this paper, the prospect of VAT composite panels with significantly reduced loss of in-plane compressive stiffness in the postbuckled state in comparison with conventional structures, is studied. Specifically, we identify that both thickness and local fiber angle variation are required to effectively define "buckle-free" panels under compression loading. In this work, the postbuckling behaviour of variable thickness VAT composite panels is analyzed using an efficient and robust semi-analytical approach. Most previous works on the postbuckling of VAT panels assume constant thickness. The additional benefits of tailoring thickness variation in the design of VAT composite panels are seldom studied. However, in the process of manufacturing VAT laminates, either by using the conventional Advanced fiber Placement (AFP) machine (tow overlap) or the newly developed Continuous

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