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Title: Accounting for manufacturing effects in composites virtual prototyping.

Authors: A. Trameçon and Dr Patrick de Luca

Abstract

It is generally felt that the numerical simulation of composite materials has not reached the required level to fully support the long-time promised explosion of the use of composite materials. One of the reasons is that the effects of the manufacturing and assembly processes are not taken into account in the assessment of the mechanical performance of the composite structures (statics, strength and crash). The manufacturing effects include the fibre reorientation, the thickness variations, the local fiber content variations, the fiber waviness, the micro and macro porosities, the degree of cure and of cristallisation, the degree of intimate contact, the tows sections deformations, etc. Another reason is the lack of modelling tools for the ever increasing textile architectures put on the market.

The presentation will review several examples of the effects of the manufacturing process and of the means to incorporate them in the simulation of the shock or crash events. The use of the virtual material characterisation is a key ingredient in addressing these issues (effects of manufacturing and new textile architectures) and it will be presented.