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Active Forming Manipulation of Composite Reinforcements for the Suppression of Forming Defects

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Abstract

For composite applications in automotive serial production, reinforcement textiles are brought into the desired shape by forming processes. The preform quality depends on the interacting factors of tool geometry, textile material, and forming process. The primary cause of defects in multilayer draping is relative movements of the plies, and the occurrence of wrinkles. Thus, the reduction of the interactions between plies is crucial to enhance preform quality. This was achieved with active metal sheets between the fabric layers. Those intermediate layers are additionally stimulated with piezo actors to reduce friction. Additional local and ply-specific clamping of layers was achieved with tension rods and segmented actuators. Defects and wrinkles in the preform could be eliminated or reduced significantly and fiber orientation could be controlled. Thus, a forming process providing high-quality preforms from multiple fabric layers was developed. Furthermore, automation complexity could be reduced significantly by utilizing rigid interlayers.

Keywords

A. Carbon fibres; A. Fabrics/textiles; C. Process modelling; E. Forming

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