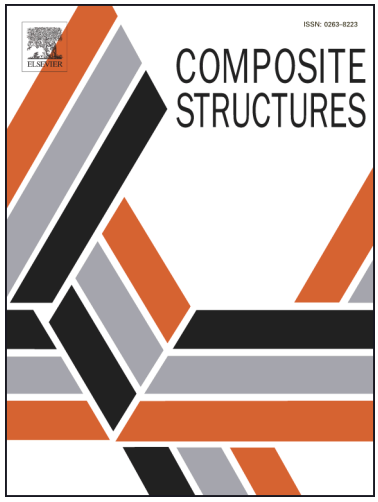

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Spring-in prediction for carbon/epoxy aerospace composite structure

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Abstract. This paper presents an engineering method to predict the spring-back of aircraft thick composite structures produced through an autoclaving process. The model previously developed by the same authors is firstly enhanced to be used in an aeronautic case study: an Airbus A350 rib. Results show that the out-of-plane shear stress distribution in the interface and the through-thickness in-plane normal stress gradient of the laminate are correctly represented. The interface is shown to have only a small influence on the final deformation and therefore a global model of the structure can be proposed. Finally a methodology is proposed to predict complex structures through a global-local approach.

1- Introduction

Post curing permanent deformations of carbon fibre reinforced polymer (CFRP) are engendered by the manufacturing process. Manufactured parts presenting a shape that does not come within the tolerance on the industrial requirement will increase the manufacturing cost and delivery delay as reworking will be necessary or, in the worst case, parts will be scrapped. The use of composites in the aerospace industry has increased significantly in recent decades and a point has been reached with the introduction of the Airbus A350 where more than 50% by weight of the aircraft consists of