Numerical Evaluation of Curing-Induced Deformations in Composite Stiffened Panels

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Keywords: Virtual Manufacturing, Carrera Unified Formulation, Thermo-chemo-mechanical analysis.

Abstract. The curing process of composite materials involves complex thermal and chemical interactions that can lead to undesirable deformations and residual stresses. This study proposes a multifield numerical model in which the primary variables are temperature, degree of cure, and displacement components to describe the interactions among heat transfer, cure kinetics, and the laminate's mechanical response. The formulation is implemented in a finite element (FE) framework that employs higher-order 1D theories based on the Carrera Unified Formulation (CUF). The capability of the proposed method is demonstrated by solving the three-dimensional thermo-chemo-mechanical problem of a J-reinforced sandwich aeronautical component.