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INFLUENCE OF UNCERTAINTIES IN MATERIAL PARAMETERS ON FINITE ELEMENT SIMULATIONS OF SANDWICH STRUCTURES

Pranav Kumar Dileep[1*], Stefan Hartmann[1], Wei Hua[2], Heinz Palkowski[2], Tobias Fischer[3], and Gerhard Ziegmann[3]

[1]Institute of Applied Mechanics,
Clausthal University of Technology, Adolph-Roemer Str. 2A,
38678 Clausthal-Zellerfeld, Germany,
*pranav.kumar.dileep@tu-clausthal.de
[2]Institute of Metallurgy,
[3]Institute of Polymer Materials and Plastics Engineering

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The practical application of light-weight sandwich structures are of immense interest in various engineering fields. In this work, we investigate the response of steel – glass-fiber reinforced in PA6 polymer – steel structures to forming processes using finite element simulations. In order to do so, constitutive models for steel and composite layers are required. First, a thermo-mechanically consistent finite strain viscoplasticity model as proposed in [1, 2] is chosen for steel. For the composite layer, an orthotropic hyperelasticity relation is used. The material parameters for the constitutive model of steel are identified by evaluating mechanical tensile tests according to [3] and for the composite on the basis of micromechanical approaches using μ-CT data. As the by-products of the identification process, the uncertainties in the material parameters of steel and composite are evaluated. The influence and propagation of these uncertainties on finite element simulations of forming processes are discussed using a Gaussian error propagation concept.

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