Uncertainty Quantification of Inversely Identified Plastic Material Behavior using an Innovative Heterogeneous Mechanical Test for Sheet Metal

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Abstract

The process of calibrating the material parameters of a constitutive model has inherent uncertainty sources. This can lead to large complexities in the parameter identification process and, consequently, to inadequate material behaviour reproduction in numerical simulations. A robust mechanical test is necessary for accurate material mechanical characterization and can lead to a decrease in uncertainty levels. In this work, the uncertainty of the parameter identification of the Swift hardening law and the Yld2000-2d function is quantified with the aid of virtual experiments using synthetically deformed images and 2D Digital Image Correlation. The mechanical test used for the parameter calibration was an optimum-designed interior notched specimen that presents several strain and stress states simultaneously. The synthetic images were generated based on the numerical data and DIC techniques were used to access the strains fields.

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