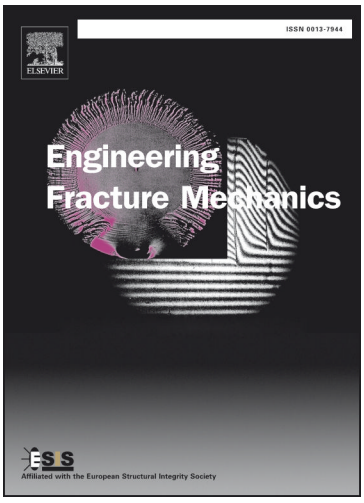

Calibration method of ductile damage model based on hybrid experimental-numerical analysis of uniaxial tensile and hole-expansion tests

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Calibration method of ductile damage model based on hybrid experimental-numerical analysis of uniaxial tensile and hole-expansion tests

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Abstract

The present study details the calibration method of ductile damage model as a useful and sufficiently accurate procedure for modeling ductile failure in sheet metal forming. This calibration method has been performed through a hybrid experimental-numerical analysis of two characterization tests of the material properties namely the uniaxial tensile and the hole-expansion as a newly added feature of this work. Elastic-plastic finite element models with orthotropic anisotropy assumption and experiments of both characterization tests were carried out. The identification of the parameters related to the anisotropic plastic behavior, the strain-hardening after necking and the ductile damage model has been finally achieved by comparing the experimental and numerical results in terms of true tress-true strain and load-displacement relationships for the uniaxial tensile test as well as the state of the final shape resulted from the hole-expansion test. Finally, a flow chart is proposed in this paper as a practical tool which describes properly the calibration procedure.

Keywords: ductile damage, calibration method, finite element model, experiment, uniaxial tensile, hole-expansion.

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