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Jonas Dispersyn, Stijn Hertelé, Wim De Waele, Jan Belis

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Assessment of hyperelastic material models for the application of adhesive point-fixings between glass and metal

Jonas Dispersyn[a], Stijn Hertelé[b], Wim De Waele[b], Jan Belis[a*]

[a]Department of Structural Engineering, Ghent University, Ghent, Belgium

[b]Department of Mechanical construction and production, Ghent University, Ghent, Belgium

Jonas.Dispersyn@UGent.be

Stijn.Hertele@UGent.be

Wim.DeWaele@UGent.be

Jan.Belis@UGent.be

[*]Correspondence to: Ghent University, Department of Structural Engineering - Laboratory for Research on Structural Models, Technologiepark-Zwijnaarde 904, B-9052 Ghent, Belgium. Tel.: +32 9 264 54 78; fax: +32 9 264 58 38.

Abstract

For the investigation of adhesive point-fixings a computationally demanding finite element model is required. The accuracy of the numerical results depends highly on the validity of the used material models, which describe the deformation behaviour of the adhesive. The material models are derived from curve-fitting the mathematical expressions to experimental data mostly derived from uniaxial and equibiaxial experiments. In literature the suitability of the used material models is determined by comparing the numerical results from the same uniaxial and equibiaxial experiments to the experimental results. In contrast, in this contribution, the material models are validated by two additional validation experiments, i.e. an adhesive point-fixing loaded in uniaxial tension and an adhesive point-fixing loaded in a combination of tension and shear.

After comparison of the numerical and experimental displacements, it appears that the material models that are calibrated by shear tests or by a combination of shear tests yield the best results. In addition, most