

## VISCOELASTIC-VISCOPLASTIC CONSTITUTIVE MODEL FOR UNIDIRECTIONAL FIBRE REINFORCED POLYMERS

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Composite materials are increasingly being introduced in automotive (e.g. BMW i-project) and aeronautical (e.g. Airbus A350 and Boeing 787) applications. These applications are exposed to loading conditions with various energies which result in a complex mechanical response, that is vital to accurately predict. In this work, a constitutive model which takes into account the viscous effects in the mechanical behaviour of a unidirectional carbon-epoxy system is presented. This model at the ply scale is based on the very efficient transversely isotropic elastic-plastic model proposed by Vogler et al. (*Modeling the inelastic deformation and fracture of polymer composites-Part I: Plasticity model*), which can be calibrated for other fibre reinforced polymers (FRPs). An excellent correlation between the measured and numerically predicted stress-strain responses of the specimens was achieved for all specimen types and both strain rate regimes.

### REFERENCES

- [1] Vogler, M. and Rolfes, R. and Camanho, P. P. Modeling the inelastic deformation and fracture of polymer composites-Part I: Plasticity model. *Mechanics of Materials* (2013) **59**, pp. 50–64.