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FRACTURE-RESISTANCE CHARACTERISATION OF STRUCTURAL INTERFACES USING COHESIVE ZONE MODELS

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ABSTRACT

Failure of structural interfaces can be studied using fracture mechanics or cohesive-zone models (CZMs). The former requires the determination of the fracture energy G_c (or critical energy release rate). G_c is the total amount of energy dissipated per unit of new cracked surface, which may be not only the result of elastic damage, but also of a number of other inelastic phenomena, such as friction, visco-elasticity, plasticity, visco-plasticity, fibre-bridging etc. In fracture mechanics all these mechanisms are lumped together into a single value G_c, or J_c if the J-integral is used to account for material nonlinearity. This is the case also for many CZMs developed in the literature although, in the case of CZMs, additional parameters need to be defined (e.g. the peak stress and the initial stiffness). On the other hand, CZMs offer the possibility of a richer description of the problem, for example by separating out different dissipation mechanisms [1, 2] or accounting for geometrical nonlinearity [3], which can significantly increase the predictive capabilities of models. Therefore, the main objective of this Mini-symposium is to discuss how CZMs can be used to characterise the failure behaviour of interfaces. Contributions that offer insight into the current advances in modelling mode-mixity, rate-dependence, friction, plasticity and geometrical nonlinearity as well as in the experimental determination of the model parameters are particularly welcome.

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