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CURRENT CHALLENGES IN COHESIVE-ZONE MODELS

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ABSTRACT

Cohesive-zone models have been widely used for modelling the onset and growth of cracks in structures. The latest versions of most common nonlinear finite element codes incorporate different technologies that use the cohesive-zone model approach to model fracture problems. However, there are still some challenges to be addressed in order to improve the reliability and spread the applicability of these technologies. Among others, some examples of the current challenges in the development of cohesive-zone models are:

- Fatigue crack growth: in the recent years some formulations to simulate crack growth under cyclic loading using cohesive-zone models have been presented.
- Friction: the interaction between progressive interface damage with friction in mixed-mode problems can significantly influence the overall energy dissipation.
- Rate dependence: the dependence of the energy dissipated during crack propagation on the crack speed cannot be ignored for important engineering applications and is currently a very active area of research.
- Path dependence: cohesive laws can be formulated such that the mixed-mode fracture energy is dependent or independent of crack opening history. Effects and consequences of the different formulations are not fully understood.
- Computational aspects: influence of the mesh refinement, element technology, integration scheme, element kinematics and/or convergence criteria is still open for discussion.
- Experimental determination of cohesive laws: one of the key issues for a reliable cohesive-zone modelling is to have the proper material properties to feed the computational models; therefore, the experimental techniques available to obtain the experimental data needed to characterize the cohesive laws will be discussed within the Minisymposium.

In summary, the aim of this Minisymposium is to highlight the current challenges and present the latest developments proposed by the research community in the field of cohesive-zone modelling.