XVIII International Conference on Computational Plasticity, COMPLAS 2025
September 2-5, 2025, Barcelona, Spain

DYNAMIC FRACTURE IN NON-LINEAR MATERIALS

Kerstin Weinberg*, Kai Partmann*, Christian Wieners**

* Solid Mechanics Group, University of Siegen

57068 Siegen, Germany

e-mail: kerstin.weinberg@uni-siegen.de

web page: http://https://www.mb.uni-siegen.de/fkm/

** Institute of Applied and Numerical Mathematics, KIT

76133 Karlsruhe, Germany

INVITED SESSION

This Invited Session (IS) addresses one of the biggest challenges in computational mechanics: theprediction of rapid damage, crack growth, and the extent of fragmentation in nonlinear elasticand inelastic materials. While the modeling of the dynamic deformation is per se demanding; in addition, the intricate and non-regular structure of cracks renders numerical simulations of cracking bodies extremely difficult.

Computational fracture mechanics has made significant strides in recent times, with the emergence of several innovative approaches that go beyond well-established and popular methods like extended finite elements. These new methods, such as phase-field techniques, eigenfracture, eigenerosion, and peridynamics, are characterized by a non-local regularization of the evolving crack boundaries with an additional small but finite length scale which, of course, arouses new questions and doubts in particular in coupled problems.

The aim of the IS is twofold. First, we would like to draw a comparative overview of different computational strategies for dynamic fracture by presenting the most innovative solution techniques. Secondly, we would like to open a forum to discuss new horizons and perspectives of nonlocal fracture models with pioneering discretization methods at different length scales. Participation is by invitation only.

Keywords: wave propagation, dynamic fracture, pioneering discretization methods, nonlocal fracture models, nonlinear materials