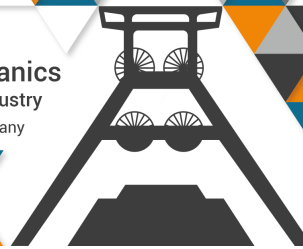


9th GACM

Colloquium on Computational Mechanics
for Young Scientists from Academia and Industry
September 21 to 23, 2022 in Essen, Germany



MS 17

Multi-scale fracture composite finite element modeling

Guillermo Díaz

Multiscale modeling problem of fracture materials is maybe one of the most challenging problems, demanding and complex, that the computational mechanics community has to reliably answer. The complete material failure process is strongly influenced by various phenomena, such as onset and cracks propagation, interaction and coalescence of distributed micro-cracks into a localized macro-crack, the existence of confining pressure, crack bridging effect of fibers, block-crack by the heterogeneous material, and the strong dependence of matrix mixture, among other phenomena. These phenomena occur at different scales ranging from atomistic scale (approx. 10^{-10} m) to the macroscopic scale (approx. 10^{-1} m). From a computational and mechanical point of view, the key idea could be to approximate the most representative phenomena on the atomistic scale and transfer them through a homogenization technique at a microscopic scale, repeating this process of homogenization-representative phenomena until reaching a macroscopic response. Either for homogeneous or composite materials. For this reason, any idea or concept related to upscaling-downscaling, reduced order homogenization, or scale-separation free is welcome to this minisymposium. The aim of this minisymposium is to gather graduate students, academic scientists, and industry researchers involved in the developments and applications of numerical procedures to discuss new ideas and concepts, allowing establishing an approximate mechanical answer with the computational means (FEM) currently available.