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FRACTURE AND FRAGMENTATION WITH DEM

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ABSTRACT

Discrete element modelling (DEM) is one of the most efficient computational approaches to the fracture processes of heterogeneous materials on mesoscopic scales. Since it is based on a physical discretization, DEM can account for most of the relevant mesoscopic details of materials making the approach indispensable when experiments provide only a limited insight into the failure process. From the dynamics of single crack propagation through the statistics of crack ensembles to the rapid fragmentation of materials, DEM had a substantial contribution to our understanding over the past decades. Recently, the combination of DEM with other simulation techniques like Finite Element Modelling further extended the field of applicability. Due to its flexibility, DEM has gained widespread applications in materials physics, engineering, and geology playing a crucial role in materials design, in the study of natural catastrophes like landslides, snow and stone avalanches, and also in the modelling of industrial processes.

This session serves as a stage to discuss recent developments of discrete element models and their applications to the fracture and fragmentation of materials with focus on dynamical, collaborative processes resulting in failure. Topics include but are not limited to: development of novel computational tools in the DEM framework; stability, fracture, and fragmentation of materials in industrial applications and geological processes; granular breakage, continuous and dynamic fragmentation, catastrophic failure.