

## Numerical modeling of brittle fracture using the phase-field method



Gergely Molnar is a post-doc at 3SR working in the COMHET team. He will give a talk on:

Fracture is one of the main failure modes for engineering materials. However, most of the time design codes apply large safety factors to avoid its manifestation. Additionally, to the devastating consequence of a brittle failure, their evolution is difficult to study in practice. Therefore, predicting the initiation and the propagation path of a fracture is of great importance for practicing engineers and scientists.

In order to simulate brittle fracture in 2D and 3D solids, a staggered phase-field model will be presented, as well as its implementation in the commercial finite element code Abaqus/Standard. The method is based on the rate-independent variational principle of diffuse fracture. The phase-field is a scalar variable between 0 and 1 which connects broken and unbroken regions. If its value reaches one the material is fully broken, thus both its stiffness and stress are reduced to zero. The elastic displacement and the fracture problem are decoupled and solved separately as a staggered solution. Several examples will be provided to explain the advantages and disadvantages of the method. Tutorials will be presented to model diffuse crack propagation in a familiar computational environment.