

Propagation of a crack front in a «damaged» material: a phase field study.

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Abstract

The image of a crack propagating in an homogeneous, perfect material is far from actual materials where there are both inclusions and pre-existing cracks. In this presentation I will discuss the effects of pre-existing defects on propagation. The study is performed using a phase field model of dynamic crack propagation in a 3D sample under both plane stress and plane strain conditions. I will first study the interaction of a crack front with a single penny shaped crack and discuss how the position of the defect and its orientation affect the propagation of the crack front. Thereafter I will discuss the effect of an assembly of randomly placed (and oriented) penny shaped defects on the crack propagation. I will show that, surprisingly they can lead to the arrest of a crack that would propagate in an intact material and that this arrest is not related to the lowering of the elastic energy stored in the material.

Keywords:

fracture phase field heterogeneous