

On Phase-field Modelling of Strength-based Nucleation

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Abstract

We examine phase-field models for strength-based nucleation with attention to two properties: the ability to approximate sharp models that allow for unbounded stresses, which are known to occur near crack tips as a consequence of linear elasticity, and the preference for fracture to occur perpendicular to directions of maximal tensile stress, both of which are necessary to accord with physical experiments. We present a phase-field model that admits a sharp limit in an appropriate sense realizing both properties.

Keywords:

Quasistatic fracture Phase-field modeling Brittle fracture Strength-based nucleation