

A Homogenization-Based Phase Field Approach to Fracture with Special Attention to Tension-Compression Decomposition

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ABSTRACT

The regularized variational theory of fracture [1], or so called phase field approach to fracture, has gained popularity due to its ability to predict crack nucleation, propagation, and branching without extra criteria. This approach works by minimizing a total energy functional with the displacement field and phase field (0=intact material, 1=crack) as arguments, and eliminates the cumbersome geometric tracking compared with traditional discrete crack methods such as the extended finite element method. So far a few variants of this approach have been proposed to account for the unilateral constraint. In this presentation, I will detail our formulation for the unilateral constraint based on the homogenization theory, followed by a comparison with two other approaches that also take into account the local crack orientation [2, 3], stressing the cases in which the models give different responses of the cracked solid for the same load.

REFERENCES

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