# Phase-field model for high cycle fatigue life prediction of brittle materials

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## ABSTRACT

Fatigue phenomena is one of the most important sources for material failure in engineering applications, resulting from a usually great number of loading cycles. Numerical modelling of fatigue processes still poses a considerable challenge up to now. While the phase-field approach to numerical fracture modelling has proved its great potential in predicting complex fracture processes such as nucleation, propagation, merging and branching for the cases of monotonic quasi-static and dynamic loadings outlined in [1], it is still lacking a proper definition for the cases of cyclic fatigue loading.

This contribution presents a phase-field model for fatigue fracture modelling of brittle materials, as an extension of the algorithm presented in author's previous study [2]. The extension is based on the introduction of a local energy accumulation variable which takes the structure loading history into account. It is inserted in a fatigue degradation function which degrades the fracture material properties, similar to [3]. An elastic brittle material subjected to loadings characteristic for that of high cycle fatigue is considered in this work. The presented examples show the capability of the model to retrieve the characteristic fatigue fracture features, as also presented in [4]. Moreover, the comparison with experimental results is conducted to validate the presented model. Within the framework of experimental investigations, the crack initiation and propagation tests are carried out on the compact tension and single edged notched specimens.

## REFERENCES

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