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M. Brehm, T.J. Massart, A. Deraemaeker

Towards a More Realistic Representation of Concrete Cracking for the Design of SHM Systems: Updating and Uncertainty Evaluation of Implicit Gradient Cracking Models

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In the context of Structural Health Monitoring (SHM) systems, researchers are interested in generating virtual test data to design new or improve existing damage indicators. For some indicators based on local measurements, such as strains, the numerical models need to be able to represent the local behavior as accurately as possible.

In this paper, a numerical model of a notched concrete beam will be updated with respect to experimental load-deflection-curves using a CMA-ES (Evolution Strategy with Covariance Matrix Adaptation) optimization algorithm. Depending on the chosen objective function, several parameter sets of the constitutive law based on an implicit gradient cracking approach can be found, which lead to a suitable load-deflection-curve. For such optimized parameter sets, the resulting static strains are also similar for small damage levels, especially, when they are averaged.

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Ключевые слова:

Содержание

Abstract

1. Introduction
2. Description of damage and constitutive law
3. Description of experimental
4. Influence of mesh coarseness and dead load
5. Model updating and corresponding static strains
6. Conclusions and discussions