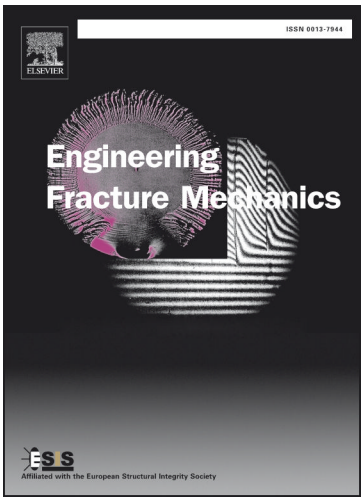

A softening-healing law for self-healing quasi-brittle materials: analyzing with strong discontinuity embedded approach

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A softening-healing law for self-healing quasi-brittle materials: analyzing with strong discontinuity embedded approach

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Abstract

Quasi-brittle materials such as concrete suffer from cracks during their life cycle, requiring great cost for conventional maintenance or replacement. In the last decades, self-healing materials are developed which are capable of filling and healing the cracks and regaining part of the stiffness and strength automatically after getting damaged, bringing the possibility of maintenance-free materials and structures.

In this paper, a time dependent softening-healing law for self-healing quasi-brittle materials is presented by introducing limited material parameters with clear physical background. Strong Discontinuity embedded Approach (SDA) is adopted for evaluating the reliability of the model. In the numerical studies, values of healing parameters are firstly obtained by back analysis of experimental results of self-healing beams. Then numerical models regarding concrete members and structures built with self-healing and non-healing materials are simulated and compared for showing the capability of the self-healing material.

Keywords: Traction separation law, Self-healing, Quasi-brittle materials, Strong Discontinuity embedded Approach (SDA)

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