

Abstract Submitted
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Percolation Modeling of Self-Damaging of Composite Materials.

SERGII DOMANSKYI, VLADIMIR PRIVMAN, Clarkson University — We propose the concept of autonomous self-damaging in “smart” composite materials, controlled by activation of added nanosize “damaging” capsules. Percolation-type modeling approach earlier applied to the related concept of self-healing materials, is used to investigate the behavior of the initial material’s fatigue. We aim at achieving a relatively sharp drop in the material’s integrity after some initial limited fatigue develops in the course of the sample’s usage. Our theoretical study considers a two-dimensional lattice model and involves Monte Carlo simulations of the connectivity and conductance in the high-connectivity regime of percolation. We give several examples of local capsule–lattice and capsule–capsule activation rules and show that the desired self-damaging property can only be obtained with rather sophisticated “smart” material’s response involving not just damaging but also healing capsules.

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