

Optimization of hybrid fiber composite materials, considering stiffness and pseudo-plasticity as criteria.

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ABSTRACT

In this work, two optimization computational models will be presented involving hybrid composite materials. One of the models considers the optimal distribution of two sets of different fibers in a matrix material for a given RVE (Representative Volume Element). The overall stiffness of homogenized properties of the RVE (e.g, [1]) is maximized with respect to the identification of the type of fiber on a random distribution of the fibers within the RVE (see [2]), for a prescribed volume fraction of each type of fiber. The optimization problem is formulated using Topology optimization and Discrete Material optimization ideas (e.g. [3,4]).

A second optimization computational model of the pseudo-ductile behavior of hybrid composite materials will be introduced. A measure of the pseudo-ductile behavior will be maximized considering several combinations of possible fiber types. The pseudo-ductile behavior is modeled following [5]. Several examples will be shown and results discussed.

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