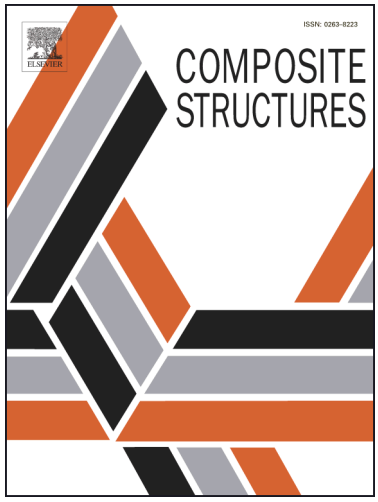

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Generating a statistically equivalent representative volume element with discrete defects

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Abstract

The random nature of the microstructural attributes in fabricated composite material gives rise to developing a representative volume element which incorporates the aforementioned randomness. In this paper we present a methodology for generating a realistic volume element with discrete defects that are statistically equivalent random defects in a Sic/SiNC samples. Data extracted from two dimensional cross-sectional micrographs leads to the geometric statistical characterization of stochastic micro-scale discontinuities. Three dimensional discrete ellipsoidal voids are then introduced to a defect-free eight-harness weave model based on the obtained statistical characteristics, using a Monte-Carlo simulation. The geometric parameters of the generated defects result in target statistics equivalent to that of the defects in the micrographs.

Keywords: Textile composite, Random defects, Representative volume element, Micromechanical model

1. Introduction

The limitless design possibilities, superior mechanical properties and relatively low production coasts are only few of the reasons that made composite materials so popular and attractive to use. Textile composites in particular are

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