

عنوان مقاله:

A Numerical Investigation of Interface Properties on Damage Behavior of Fiber Reinforced Composites

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خلاصه مقاله:

This paper investigates the micromechanical damage behavior of composite materials on the transverse tensile response of representative volume elements (RVEs) with various fiber volume fractions. A new algorithm is developed to generate the random distribution of fibers in the RVE, and it is possible to create a fiber distribution with high fiber volume fraction. The fibers and matrix are considered linear elastic and elastoplastic with Drucker–Prager's criterion, respectively. The fiber-matrix debonding is modeled by cohesive elements which lead to matrix cracking. To achieve a more realistic microstructure, the normal cohesive properties distribution is applied for interfaces between fibers and the matrix. To investigate the effect of the position of fibers with the weakest cohesive strength, sensitivity analysis concerning the different arrangements of specific normal cohesive properties on the RVE's strength are performed. Moreover, the effects of different damage parameters such as fiber random distributions and various cohesive strengths on the overall damage behavior of the RVE are described in detail. It is revealed that the application of a normal cohesive distribution strongly reduces the maximum strength of the RVE and shifts the strain of damage .initiation point and crack propagation path

کلمات کلیدی:

RVE, Fiber Matrix Debonding, Matrix Crack, damage mechanics, Composite Material

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