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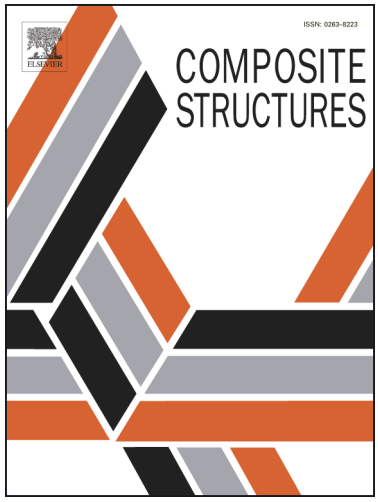

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Experimental and numerical investigation of low velocity impact on electrospun nanofiber modified composite laminates

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Abstract:

Delamination is a common problem in composite laminates which is due to interlaminar crack growth. Toughening of composite laminates using interleaved nanofiber mats is a novel method for increasing the interlaminar fracture toughness of these materials. In fact, this increased interlaminar fracture toughness prevents the delamination. A potential application of such a strengthening method of composites is in cases where the structure is under low velocity impact loading. In this kind of loading, delamination is an important damage. However, most previous studies in this field have been conducted under fracture loading. In this paper, the numerical and experimental low velocity impact problem of electrospun nanofiber modified composite laminates is studied. In order to do so, a finite element model is created to simulate both fracture (mode I and II crack growth) and impact behaviors of the composite laminate. This model takes into account the effect of interleaving of nanofiber mats between the layers of the composite by means of the cohesive elements concept. The results of this model are verified by experimental findings. The results show that interleaving nanofiber mats between the layers of the laminate, reduces the damage induced by the impact loading, specially the size of the delaminated area.

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