عنوان مقاله:

Meso-Scale Mechanical Response Modeling of Carbon Nanotube Yarns

محل انتشار:

اولین کنفرانس ملی مهندسی زیرساخت ها (سال: 1397)

تعداد صفحات اصل مقاله: 5

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خلاصه مقاله:

In this paper, a numerical model is proposed to predict the mechanical response of Carbon Nanotube (CNT) yarns under uniaxial tensile loading. The model implements a Finite Element (FE) modeling technique to formulate the idealized structure of randomly formed configurations of CNT yarns. In the model, the bundles of the CNT yarn are simulated as bar elements randomly connected to the ends of each other. A set of transverse and diagonal members are introduced to capture the coupling effects of the frictional forces between the adjacent bundles. The FE model is loaded in a step-by-step monotonically-increasing pattern. At each step, the internal forces of the elements are checked against a failure criterion and the elements with internal forces higher than the set strength value are removed. The model is validated by comparing its results with the results of an experimental study conducted elsewhere. A very good correlation is achieved between the FE model results and the benchmark test results.

کلمات کلیدی:

CNT Yarns, Meso-Scale, Stochastic Model, Finite Element Method.