

عنوان مقاله:

Investigation of Vacancy Defects on the Young's Modulus of Carbon Nanotube Reinforced Composites in Axial Direction via a Multiscale Modeling Approach

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نویسندگان:

M.R Davoudabadi - *Department of Mechanical Engineering, Semnan University*

S.D Farahani - *Department of Mechanical Engineering, University of Tehran*

خلاصه مقاله:

In this article, the influence of various vacancy defects on the Young's modulus of carbon nanotube (CNT) - reinforcement polymer composite in the axial direction is investigated via a structural model in ANSYS software. Their high strength can be affected by the presence of defects in the nanotubes used as reinforcements in practical nanocomposites. Molecular structural mechanics (MSM)/finite element (FE) Multiscale modeling of carbon nanotube/polymer composites with linear elastic polymer matrix is used to study the effect of CNT vacancy defects on the mechanical properties. The nanotube is modeled at the atomistic scale using MSM, where as the interface we assumed to be bonded by Vander Waals interactions based on the Lennar-Jonze potential at the interface and polymer matrix. A nonlinear spring is used for modeling of interactions. It is studied for zigzag and armchair Nanotubes with various aspect ratios (Length/Diameter). Finally, results of the present structural model show good agreement between our model and the experimental work.

کلمات کلیدی:

Polymer matrix, Carbon nanotubes, Nonlinear spring, Multiscale modeling, Defect, Inter-phase, Finite element model

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