## عنوان مقاله:

Predicting Young’s Modulus of Aggregated Carbon Nanotube Reinforced Polymer

## محل انتشار:

مجله مکانیک سازه های پیشرفته کامپوزیت, دوره 1, شماره 1 (سال: 1393)

تعداد صفحات اصل مقاله: 8

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## خلاصه مقاله:

Prediction of mechanical properties of carbon nanotube-based composite is one of the important issues which should be addressed reasonably. A proper modeling approach is a multi-scale technique starting from nano scale and lasting to macro scale passing in-between scales of micro and meso. The main goal of this research is to develop a multi-scale modeling approach to extract mechanical properties of CNT based nanocomposites emphasizing on meso-scale parameters. Agglomeration and non-straight shapes of CNTs have to be captured in this specific scale. The representative volume element (RVE) for meso-scale is identified considering local concentration of CNTs as the main source of inhomogeneity in the investigated material region. Irregular tessellation technique on the basis of Voronoi method and Bayes algorithm is employed to partition the RVE at meso scale into constitutive polygons containing one single aggregate. A MATLAB code is written to perform this stage on the basis of random pattern. Mechanical properties of the tasseled regions are extracted by a combination of micromechanics rule addressing local position and aggregates in the material region. A bounding technique accounting for non-straight shape of CNT is utilized to consider the any arbitrary shape of wavy CNT. Investigated material region at macro scale is divided into constitutive blocks assigning random volume fractions of CNT to each block implying non-uniformed dispersion of CNT. The results demonstrate the importance of considering the position of local aggregates in modeling procedure. The .obtained results of modeling are compared with experimentally measured mechanical properties

## کلمات کلیدی:

Carbon nanotube, Multi-scale modeling, Irregular tessellation, Stochastic modeling