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TITLE

Estimation of the tensile properties of SWCNTs reinforced RET matrix nanocomposites using finite element and theoretical methods

Moslem Najafi, Milad Noorabadi, and Reza Eslami Farsani
Islamic Azad University, Iran

Single-walled carbon nanotubes (SWCNTs) are expected to be ideal reinforcements of composite materials used in aircraft and sports industries due to their high modulus and low density. Understanding the mechanical behaviour of these composites is crucial to their effective application. In this paper, a finite element model of the representative volume element (RVE) for SWCNTs/RET (reactive ethylene terpolymer) nanocomposites was established, and their tensile properties based on the equivalent homogeneous material concept were evaluated. A comparison in various nanotubes volume fraction based on finite element and theoretical models was then presented. It was shown that the mechanical properties of nanocomposites are not only influenced by the nanotube stiffness but also by the volume fraction. A finite element analysis was performed on a wide range of volume fraction of SWCNTs/RETS nanocomposites to observe the SWCNTs content effect on tensile properties of composites. Results indicated improvement on tensile modulus about 7%-65% by the additions of 1-4.5 vol% SWCNTs in RET matrix. For verification, the obtained results were compared by the other approaches, such as modified form of rule of mixture and Halpin-Tsai model and good agreement in experimental results showed that the present approach is an effective tool to characterize SWCNTs/RET nanocomposites.

Biography

Moslem Najafi has completed his B.Sc. at the age of 22 years from Persian Gulf University and M.Sc. from Islamic Azad University at the age of 27 years. He is the chief engineer of a structural design organization. He has published more than 30 papers in journals and international conferences.