## عنوان مقاله:

Validation of Shell Theory for Modeling the Radial Breathing Mode of a Single-Walled Carbon Nanotube

## محل انتشار:

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## خلاصه مقاله:

In this paper, the radial breathing mode (RBM) frequency of single-walled carbon nanotube (SWCNT) is studied based on the thin shell theory. For this purpose, SWCNT is considered as an elastic thincylindrical shell. The dynamic equation of RBM is derived using the Hamilton’s principle. Ananalytical solution of the RBM frequency of SWCNT is obtained. The advantage of this formulation isthat it shows the dependency of the RBM frequency to the mechanical properties of SWCNT, clearly.These investigations are very important to predict the accurate vibrational characteristics of SWCNTs which have potential applications in nanotube-filled nanocomposites that are used as sound absorbers. To show the accuracy of this work, the RBM frequencies of 40 different SWCNTs are obtained which are in excellent agreement with the available experimental results with relative errors less than 1%.Also, the RBM frequencies predicted by the present shell model are compared with those obtained bythe other researchers based on the density-functional theory (DFT), and three-dimensional (3D) elasticity theory. The results emphasize the utility of thin shell theory for modeling and vibrational behavior of the RBM frequency of SWCNT

## کلمات کلیدی:

Analytical Solution ,Elastic Thin Shell Theory,Hamilton’s Principle,,Radial Breathing Mode (RBM) Frequency,Single-Walled Carbon Nanotube (SWCNT