Non-classical Wave Dynamics of Ultrathin Structures



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GRIN Verlag Nov 2012, 2012. Taschenbuch. Book Condition: Neu. 210x148x2 mm. This item is printed on demand - Print on Demand Neuware - Research Paper from the year 2012 in the subject Engineering - Aerospace Technology, printed single-sided, grade: '-', Indian Institute of Science, course: Aerospace Engineering, language: English, comment: Nano Mechanics, abstract: In this paper, the nonlocal elasticity theory has been incorporated into classical 1D-rod model to capture unique features of the rod like structures at Nanoscale, which are considered as ultra-thin structures, under the umbrella of continuum mechanics theory. The strong effect of the nanoscale has been obtained which leads to substantially different wave behaviors of nanoscale-rods from those of macroscopic rods. Nonlocal bar model is developed for nanorods. The analysis shows that the wave characteristics are highly over estimated by the classical rod model, which ignores the effect of small-length scale. The studies also show that the nonlocal scale parameter introduces certain band gap region in axial wave mode where no wave propagation occurs. This is manifested in the spectrum cures as the region where the wavenumber tends to infinite (or wave speed tends to zero). These results are also compared with the Born-Karman model and also with the second and fourth order strain gradient models. The results can provide useful guidance for the study and design of the next generation of nanodevices that make use of the wave propagation properties of single-walled carbon nanotubes. 36 pp. Englisch.

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