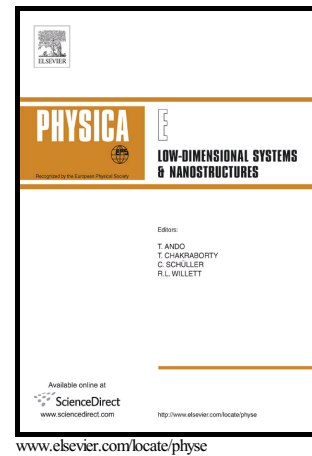


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X. Chen, C.Q. Fang, X. Wang



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**The influence of surface effect on vibration behaviors of carbon nanotubes under
initial stress**

X.Chen^{1,2}, C.Q.Fang¹ and X.Wang^{1*}

¹ School of Naval Architecture, Ocean and Civil Engineering
(State Key Laboratory of Ocean Engineering),
Shanghai Jiaotong University
Shanghai 200240, People's Republic China

² College of Mechanical Engineering,
Shanghai University of Engineering Science,
Shanghai 201600, People Republic of China.

Abstract: An analytical method is presented to solve the influence of surface effect on non-coaxial resonance of multi-walled carbon nanotubes embedded in matrix utilizing laminated structures model. Due to coupled van der Waals forces between adjacent tubes and surface effect exerted carbon nanotubes, the resonance frequencies and amplitude ratios of multi-walled carbon nanotubes under initial stresses show that the resonant characteristics of the multi-walled carbon nanotubes become complex and the numbers of vibrational modes do not keep increase under identical conditions after considering surface effects. The result obtained can be used as a beneficial reference for investigating the electronic and physical behaviors of carbon nanotubes.

Keywords: Multi-walled carbon nanotubes; Surface effects; van der Waals interaction;
Non-coaxial resonance

* Corresponding author. E-mail address: xwang@sjtu.edu.cn

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