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탄소나노튜브 구조를 이용한 NEMS소자의 비선형 동역학

Nonlinear Dynamics of Carbon Nanotube-Based Nanoelectromechanical Device

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Key Words : Nonlinear Dynamics (비선형동역학), NEMS (나노전기역학시스템), Carbon Nanotube (탄소나노튜브)

ABSTRACT

A carbon nanotube-based nanoelectromechanical device in resonance is examined theoretically. Mechanical deflections are electrically induced and resonantly excited at the fundamental frequency in cantilevered carbon nanotube. The electrically conducting elastic beam with van der Waals interactions at the tip is used for the modeling of the carbon nanotube device. Due to the elastic, electrical, and van der Waals interactions, the total energy of the system shows the unsymmetric two-well potentials. The predictions can be made that the device exhibits its nonlinear dynamic features in the two-well potentials. Also it is predicted that the fundamental frequency of the carbon nanotube device was changed by the nonlinear interactions induced by electrical and van der Waals potentials between carbon nanotube and ground surface of the device.

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