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Vibration and buckling analysis of single-walled carbon nanotube under magnetic field based on meshless method

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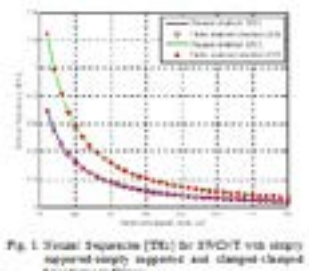
In the present study, the meshless Petrov–Galerkin (MLPG) method is adopted to study the free vibration and axial buckling characteristics of single-walled carbon nanotube (SWCNT) subject to magnetic field. In particular, a nonlocal shell model accounting for the small scale effect is utilized. In the theoretical formulations, a variational form of the Donnell shell equations is constructed over a local sub-domain which leads to derivation of the mass, stiffness and geometrical stiffness matrices. The resonant frequencies and critical axial buckling loads of SWCNT are presented. The influences of boundary conditions, nonlocal parameter and geometrical parameters on the mechanical behavior of SWCNT are investigated and discussed completely. Finally, the numerical results based on the present study are checked by finite element method, they show excellent agreement.



Biography

Tai-Ping Chang received PhD degree in Civil Engineering and Engineering Mechanics from Columbia University, NYC, USA, in 1985. Since 2002, he has been working as a professor and chairman (2002-2008) of Construction Engineering department at National Kaohsiung First University of Science and Technology, Taiwan. His current research interests include Structural Dynamics, Random Vibration, Finite Element Methods, Computational Mechanics, Nano Mechanics, Fluid-Structure Interaction, Disaster Prevention and Mitigation and Hazard Risk Assessment.

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