Shih-Yao Kuo, J Material Sci Eng 2018, Volume 7
DOI: 10.4172/2169-0022-C11-123

Vibration of fully functionally graded CNT reinforced graphite/epoxy laminates

Shih-Yao Kuo
Aletheia University, Taiwan

This study provides the first-known vibration analysis of fully functionally graded carbon nanotube reinforced hybrid composite (FFG-CNTRHC) laminates. CNTs are non-uniformly distributed to reinforce the graphite/epoxy laminates. Some CNT distribution functions in the plane and thickness directions are proposed to more efficiently increase the stiffening effect. The rule of mixtures is modified by considering the non-homogeneous material properties of FFG-CNTRHC laminates. The formulation of the location dependent stiffness matrix and mass matrix is derived. The effects of CNT volume fraction and distribution on the natural frequencies of FFG-CNTRHC laminates are discussed. The results reveal that the FFG-CNTRHC laminate is more practical and efficient by adding relatively few CNTs to stiffen the graphite/epoxy laminate. The natural frequencies of the FFG-CNTRHC laminate with the sandwich-like CNT distribution function in the thickness direction are higher than that with the traditional FG-X CNT distribution function. The natural frequencies are highest for the FFG-CNTRHC laminate with the F6 CNT distribution function in the plane direction. The stiffening effects of the CNT distribution functions along the plane and thickness directions are comparable. The FFG layout may further increase the natural frequencies of FFG-CNTRHC laminate.

Biography

Shih-Yao Kuo received his PhD in 2002 from National Cheng Kung University, Taiwan. Currently Prof. Kuo is the Director of Office of Tainan Administration, Aletheia University, Taiwan. Dr. Kuo's main research trust is focused on computational mechanics. His research areas are on development and application of numerical algorithms and finite element method for buckling, vibration and flutter problems in SMA or CNT reinforced composite laminates. He has published 17 SCI and 16 EI journal articles and his publications have been cited over 294. His current h-index is 9.

chengda@mail.au.edu.tw