Thin-Walled Structures
Volume 111, February 2017, Pages 48-57

Full length article

Dynamics of FG-CNT reinforced composite cylindrical panel subjected to moving load

Y. Kiani

https://doi.org/10.1016/j.tws.2016.11.011

Highlights

- Dynamic response of an FG-CNTRC cylindrical panel under the action of a moving load is obtained.
- The velocity and the moving path are both arbitrary.
- The developed solution is based on the conventional Ritz method.
- Characteristics of CNT are in uential on the response of the structure.

Abstract

Present study deals with the dynamic response of a functionally graded carbon nanotube reinforced composite (FG-CNTRC) cylindrical panel subjected to moving load on the panel

surface. Panel is formulated within the framework of first order shear deformation shell theory. Formulation is restricted to be geometrically linear. Distribution of CNTs across the panel thickness is considered to be uniform or functionally graded. Effective properties of the composite media are estimated using a refined rule of mixtures approach with introduction of efficiency parameters. The matrix representation of dynamic equations is obtained according to the Ritz method whose orthogonal shape functions are obtained according to the Gram-Schmidt process. The resulting dynamic equations are traced in time following the Newmark time marching scheme. Parametric studies are given to explore the characteristics of CNTs as reinforcements and influences of boundary conditions. It is shown that, increasing the volume fraction of CNT as reinforcements decreases the dynamic response of the panel. Furthermore, in comparison to other patterns of CNT dispersion, in FG-X pattern of CNT distribution, panel becomes more stiff and dynamic deflection decreases.

Previous Next

Keywords

Carbon nanotube reinforced composite; Ritz method; Gram-Schmidt process; Cylindrical panel; Moving load

Recommended articles Citing articles (58)

View full text