

Author's Accepted Manuscript

Free vibration characteristics of a spinning composite thin-walled beam under hygrothermal environment

X. Li, Y.H. Li, Y. Qin



PII: S0020-7403(16)30609-9

DOI: <http://dx.doi.org/10.1016/j.ijmecsci.2016.10.028>

Reference: MS3470

To appear in: *International Journal of Mechanical Sciences*

Received date: 19 July 2016

Revised date: 21 October 2016

Accepted date: 27 October 2016

Cite this article as: X. Li, Y.H. Li and Y. Qin, Free vibration characteristics of a spinning composite thin-walled beam under hygrothermal environment *International Journal of Mechanical Sciences* <http://dx.doi.org/10.1016/j.ijmecsci.2016.10.028>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Free vibration characteristics of a spinning composite thin-walled beam under hygrothermal environment

X. Li, Y.H. Li*, Y. Qin

School of Mechanics & Engineering, Southwest Jiaotong University, Chengdu 610031, PR China

Abstract: This paper focuses on the free vibration characteristics of a spinning composite thin-walled beam under hygrothermal environment. Based on the constitutive relation of single layer material subjected to hygrothermal environment, the dynamic equations of the spinning composite thin-walled beam are built by Hamilton's principle. The solution of the dynamic equations is derived using the Galerkin's method. Numerical simulations are performed to discuss the influences of spinning angular speed, temperature, moisture, length- and thickness-to-radius ratios, and fiber orientation angles on vibration characteristics of spinning composite thin-walled beam. Of particular interest in this process is the combined influence of spinning motion and hygrothermal environment on natural frequencies and critical spinning angular speeds of the beam. The results show that spinning angular speed and hygrothermal environment have remarkable influences on the dynamic characteristics of spinning composite thin-walled beam.

Key words: Hygrothermal environment; Spinning composite thin-walled beam; Free vibration characteristics; Critical spinning angular speeds

*Corresponding author. Tel: +86 028 87600793.
Email address: yhli2007@sina.com (Y. H. Li).

Download English Version:

<https://daneshyari.com/en/article/5016364>

Download Persian Version:

<https://daneshyari.com/article/5016364>

[Daneshyari.com](https://daneshyari.com)