

Quick Search
[View search history](#) | [Back to results](#) | [< Previous](#) **14 of 56** [Next >](#)
[Download PDF](#) [Export](#) [Print](#) [E-mail](#) [Create bibliography](#) [Add to My List](#)
Nonlinear Dynamics

Volume 60, Issue 1-2, April 2010, Pages 193-205

 ISSN: 0924090X
 CODEN: NODYE
 DOI: 10.1007/s11071-009-9589-6
 Document Type: Article
 Source Type: Journal
[View references \(25\)](#)[View at publisher](#) |**Non-linear vibration of variable speed rotating viscoelastic beams**Younesian, D.^a Esmailzadeh, E.^b ^a School of Railway Engineering, Iran University of Science and Technology, Tehran, Iran^b Faculty of Engineering and Applied Science, University of Ontario Institute of Technology, Oshawa, ON 1H 7K4, Canada**Abstract**

Non-linear vibration of a variable speed rotating beam is analyzed in this paper. The coupled longitudinal and bending vibration of a beam is studied and the governing equations of motion, using Hamilton's principle, are derived. The solutions of the non-linear partial differential equations of motion are discretized to the time and position functions using the Galerkin method. The multiple scales method is then utilized to obtain the first-order approximate solution. The exact first-order solution is determined for both the stationary and non-stationary rotating speeds. A very close agreement is achieved between the simulation results obtained by the numerical integration method and the first-order exact solution one. The parameter sensitivity study is carried out and the effect of different parameters including the hub radius, structural damping, acceleration, and the deceleration rates on the vibration amplitude is investigated. © Springer Science+Business Media B.V. 2009.

Language of original document

English

Author keywords

Galerkin method; Multiple scales method; Non-linear vibration; Rotating beam; Variable speed; Viscoelastic beam

Index Keywords

Multiple scales methods; Non-linear vibrations; Rotating beam; Variable speed; Viscoelastic beam; Viscoelastic beams

Engineering controlled terms: Equations of motion; Galerkin methods; Rotation; Speed**Engineering main heading:** Vibration analysis**References (25)** [View in table layout](#)
[Export](#) [Print](#) [E-mail](#) [Create bibliography](#)
 Select: Page

- Chung, J., Yoo, H.H.
Dynamic analysis of a rotating cantilever beam by using the finite element method
 (2002) *Journal of Sound and Vibration*, 249 (1), pp. 147-164. Cited 41 times.
 doi: 10.1006/jsvi.2001.3856
[View at publisher](#)
- Chung, J., Jung, D., Yoo, H.H.
Stability analysis for the flapwise motion of a cantilever beam with rotary oscillation
 (2004) *Journal of Sound and Vibration*, 273 (4-5), pp. 1047-1062. Cited 7 times.
[View at publisher](#)
- Yoo, H.H., Lee, S.H., Shin, S.H.
Flapwise bending vibration analysis of rotating multi-layered composite beams
 (2005) *Journal of Sound and Vibration*, 286 (4-5), pp. 745-761. Cited 7 times.
 doi: 10.1016/j.jsv.2004.10.007
[View at publisher](#)
- Lin, S.M., Lee, S.Y.
Prediction of vibration and instability of rotating damped beams with an elastically restrained root
 (2004) *International Journal of Mechanical Sciences*, 46 (8), pp. 1173-1194. Cited 9 times.
 doi: 10.1016/j.ijmecsci.2004.08.002
[View at publisher](#)

Cited by since 1996This article has been cited **0** times in Scopus.

Inform me when this document is cited in Scopus:

[Set alert](#) | [Set feed](#)
Related documents

Showing the 2 most relevant related documents by all shared references:

 Younesian, D., Esmailzadeh, E.
Vibration suppression of rotating beams using time-varying internal tensile force
 (2011) *Journal of Sound and Vibration*

 Cheng, Y., Yu, Z., Wu, X.
Vibration analysis of a cracked rotating tapered beam using the p-version finite element method
 (2011) *Finite Elements in Analysis and Design*
[View all related documents based on all shared references](#) or [select the shared references](#) to use
Find more related documents in Scopus based on:
[Authors](#) | [Keywords](#)
My Applications[Add](#)
















More By These Authors

The authors of this article have a total of **163** records in Scopus:
(Showing 5 most recent)

[Ansari, M., Esmailzadeh, E., Younesian, D.](#)
Frequency analysis of finite beams on nonlinear KelvinVoight foundation under moving loads
 (2011) *Journal of Sound and Vibration*






[Nadafi, K., Mesdaghinia, A., Nabizadeh, R., Younesian, M., Rad, M.J.](#)
The combination and optimization study on RB29 dye removal from water by peroxy acid and single-wall

[Hide Applications](#)

- 5  Lin, C.-Y., Chen, L.-W.
Dynamic stability of a rotating beam with a constrained damping layer
(2003) *Journal of Sound and Vibration*, 267 (2), pp. 209-225. Cited 13 times.
doi: 10.1016/S0022-460X(02)01427-X
[View at publisher](#)
- 6  Fung, E.H.K., Yau, D.T.W.
Vibration characteristics of a rotating flexible arm with ACLD treatment
(2004) *Journal of Sound and Vibration*, 269 (1-2), pp. 165-182. Cited 15 times.
doi: 10.1016/S0022-460X(03)00046-4
[View at publisher](#)
- 7  Hosseini, S.A.A., Khadem, S.E.
Vibration and reliability of a rotating beam with random properties under random excitation
(2007) *International Journal of Mechanical Sciences*, 49 (12), pp. 1377-1388. Cited 12 times.
doi: 10.1016/j.ijmecsci.2007.04.008
[View at publisher](#)
- 8  Das, S.K., Ray, P.C., Pohit, G.
Free vibration analysis of a rotating beam with nonlinear spring and mass system
(2007) *Journal of Sound and Vibration*, 301 (1-2), pp. 165-188. Cited 6 times.
doi: 10.1016/j.jsv.2006.09.028
[View at publisher](#)
- 9  Wei, K., Meng, G., Zhou, S., Liu, J.
Vibration control of variable speed/acceleration rotating beams using smart materials
(2006) *Journal of Sound and Vibration*, 298 (4-5), pp. 1150-1158. Cited 15 times.
doi: 10.1016/j.jsv.2006.05.033
[View at publisher](#)
- 10  Gunda, J.B., Ganguli, R.
Stiff-string basis functions for vibration analysis of high speed rotating beams
(2008) *Journal of Applied Mechanics, Transactions ASME*, 75 (2), pp. 0245021-0245025. Cited 12 times.
doi: 10.1115/1.2775497
[View at publisher](#)
- 11  Valverde, J., Garcia-Vallejo, D.
Stability analysis of a substructured model of the rotating beam
(2009) *Nonlinear Dynamics*, 55 (4), pp. 355-372. Cited 2 times.
doi: 10.1007/s11071-008-9369-8
[View at publisher](#)
- 12  Yang, J.B., Jiang, L.J., Chen, D.Ch.
Dynamic modelling and control of a rotating Euler-Bernoulli beam
(2004) *Journal of Sound and Vibration*, 274 (3-5), pp. 863-875. Cited 20 times.
doi: 10.1016/S0022-460X(03)00611-4
[View at publisher](#)
- 13  Lin, S.-M.
PD control of a rotating smart beam with an elastic root
(2008) *Journal of Sound and Vibration*, 312 (1-2), pp. 109-124. Cited 8 times.
doi: 10.1016/j.jsv.2007.10.027
[View at publisher](#)
- 14  Lee, S.-Y., Sheu, J.-J., Lin, S.-M.
In-plane vibrational analysis of rotating curved beam with elastically restrained root
(2008) *Journal of Sound and Vibration*, 315 (4-5), pp. 1086-1102. Cited 4 times.
doi: 10.1016/j.jsv.2008.02.011
[View at publisher](#)
- 15  Abolghasemi, M., Jalali, M.A.
Attractors of a rotating viscoelastic beam
(2003) *International Journal of Non-Linear Mechanics*, 38 (5), pp. 739-751. Cited 9 times.
doi: 10.1016/S0020-7462(01)00130-5
[View at publisher](#)
- 16  Bhadbhade, V., Jalili, N., Nima Mahmoodi, S.
A novel piezoelectrically actuated flexural/torsional vibrating beam gyroscope
(2008) *Journal of Sound and Vibration*, 311 (3-5), pp. 1305-1324. Cited 21 times.
doi: 10.1016/j.jsv.2007.10.017
[View at publisher](#)
- 17  Luo, A.C.J., Han, R.P.S.
Analytical predictions of chaos in a non-linear rod
(1999) *Journal of Sound and Vibration*, 227 (3), pp. 523-544. Cited 36 times.
[View at publisher](#)
- 18  Mahmoodi, S.N., Jalili, N., Khadem, S.E.
An experimental investigation of nonlinear vibration and frequency response analysis of cantilever viscoelastic beams
(2008) *Journal of Sound and Vibration*, 311 (3-5), pp. 1409-1419. Cited 9 times.
doi: 10.1016/j.jsv.2007.09.027
[View at publisher](#)
- 19  Mahmoodi, S.N., Khadem, S.E., Kokabi, M.
Non-linear free vibrations of Kelvin-Voigt visco-elastic beams
(2007) *International Journal of Mechanical Sciences*, 49 (6), pp. 722-732. Cited 9 times.

doi: 10.1016/j.ijmecsci.2006.10.005

[View at publisher](#)

- 20  Esmailzadeh, E., Jalali, M.A.
Nonlinear oscillations of viscoelastic rectangular plates
(1999) *Nonlinear Dynamics*, 18 (4), pp. 311-319. Cited 11 times.
[View at publisher](#)
- 21  Esmailzadeh, E., Shahani, A.R.
Longitudinal and rotational coupled vibration of viscoelastic bars with tip mass
(1999) *International Journal of Non-Linear Mechanics*, 34 (1), pp. 111-116. Cited 9 times.
[View at publisher](#)
- 22  Nayfeh, A.H., Mook, D.T.
(1979) *Nonlinear Oscillations*. Cited 2812 times.
Wiley-Interscience, New York
- 23  Nayfeh, A.H., Pai, P.F.
(2004) *Linear and Nonlinear Structural Mechanics*. Cited 163 times.
Wiley-Interscience, New York
[View on Web](#)
- 24  Younesian, D., Esmailzadeh, E., Sedaghati, R.
Existence of periodic solutions for the generalized form of mathieu equation
(2005) *Nonlinear Dynamics*, 39 (4), pp. 335-348. Cited 19 times.
doi: 10.1007/s11071-005-4338-y
[View at publisher](#)
- 25  Rao, S.S.
(2007) *Vibration of Continuous Systems*. Cited 45 times.
Wiley, New York

 Esmailzadeh, E.; Faculty of Engineering and Applied Science, University of Ontario Institute of Technology, Oshawa, ON 1H 7K4, Canada; email: ezadeh@uoit.ca
© Copyright 2010 Elsevier B.V., All rights reserved.

Nonlinear Dynamics
Volume 60, Issue 1-2, April 2010, Pages 193-205

[View search history](#) | [Back to results](#) | [< Previous 14 of 56 Next >](#)

[Top of page](#)

Search Sources Analytics My alerts My list My settings

Live Chat Help

About Scopus
[What is Scopus](#)
[Content coverage](#)
[What do users think](#)
[Latest](#)
[Tutorials](#)
[Developers](#)

Contact and Support
[Contact and support](#)
[Live Chat](#)

About Elsevier
[About Elsevier](#)
[About SciVerse](#)
[About SciVal](#)
[Terms and Conditions](#)
[Privacy Policy](#)



Copyright © 2011 Elsevier B.V. All rights reserved. SciVerse® is a registered trademark of Elsevier Properties S.A., used under license. Scopus® is a registered trademark of Elsevier B.V.