Author's Accepted Manuscript

# Free damped vibration analysis of Mindlin plates with hybrid material-foundation viscoelasticity

H.A. Zamani, M.M. Aghdam, M. Salehi


www.elsevier.com/locate/ijmecsci

PII: S0020-7403(16)31097-9
DOI: http://dx.doi.org/10.1016/j.ijmecsci.2016.12.010
Reference: MS3522

To appear in: *International Journal of Mechanical Sciences*

Received date: 24 June 2016
Revised date: 19 November 2016
Accepted date: 14 December 2016

Cite this article as: H.A. Zamani, M.M. Aghdam and M. Salehi, Free damped vibration analysis of Mindlin plates with hybrid material-foundation viscoelasticity, *International Journal of Mechanical Sciences* http://dx.doi.org/10.1016/j.ijmecsci.2016.12.010

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

ACCEPTED MANUSCRIPT

# Free damped vibration analysis of Mindlin plates with hybrid material-foundation viscoelasticity

H. A. Zamani, M. M. Aghdam*, M. Salehi

*Department of Mechanical Engineering, Amirkabir University of Technology, Tehran, Iran*

*Corresponding Author: Tel.: +98-21-64543429; Fax: +98-21-66419736.
*E-mail address:* aghdam@aut.ac.ir (M. M. Aghdam)

## Abstract

Suppressed vibration of shear deformable plates with hybrid viscoelastic damping of material and foundation is investigated. Viscoelasticity of foundation is established by adopting Kelvin-Voigt model while viscoelasticity of materials is expressed by Boltzmann superposition integral, which uses dynamic mechanical analysis (DMA) results in terms of Prony series. Application of Laplace transformation and Mindlin plate theory with Hamilton principle led to a system of coupled integro-PDE of motions. Weighted residual method, numerical iterative algorithm and Fourier transform are implemented to achieve complex frequencies and transient responses of plates. Assessment of accuracy is carried out in the both elastic and viscoelastic domains. In the earlier, the frequencies are compared with counterparts obtained by *p*-version Ritz method and in the latter, dynamic characteristics of Mindlin and classic plates are examined that represent acceptable correlation. The influences of hybrid material-foundation damping, edge conditions, foundation characteristics and geometrical parameters on dynamic characteristics of plates are studied via a set of parametric study.

## Keywords

*Free vibration; Hybrid viscoelastic dampers; Viscos Winkler foundation; Galerkin method; DMA;*

Accepted manuscript

Download English Version:

https://daneshyari.com/en/article/5016295

Download Persian Version:

https://daneshyari.com/article/5016295

Daneshyari.com