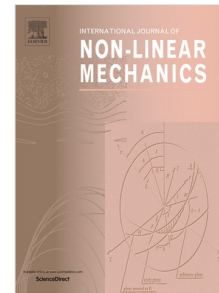


Accepted Manuscript

Nonlinear dynamic response of elliptical cylindrical shell under Harmonic excitation

Ajay Kumar, B.P. Patel



PII: S0020-7462(16)30413-9

DOI: <https://doi.org/10.1016/j.ijnonlinmec.2017.10.008>

Reference: NLM 2912

To appear in: *International Journal of Non-Linear Mechanics*

Received date : 22 December 2016

Revised date : 24 July 2017

Please cite this article as: A. Kumar, B.P. Patel, Nonlinear dynamic response of elliptical cylindrical shell under Harmonic excitation, *International Journal of Non-Linear Mechanics* (2017), <https://doi.org/10.1016/j.ijnonlinmec.2017.10.008>

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 proof before it is published in its final 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.

Nonlinear Dynamic Response of Elliptical Cylindrical Shell under Harmonic Excitation

AJAY KUMAR and B. P. PATEL*

*Department of Applied Mechanics, Indian Institute of Technology Delhi,
Hauz Khas, New Delhi, 110016, India,*

** badripatel@hotmail.com*

Abstract

The nonlinear dynamic response of elliptical cylindrical shell under transverse harmonic excitation is experimentally investigated. The elliptical cylindrical shell depicts softening nonlinearity for the excitation range considered. The circumferential variation of acceleration at different time instants of a cycle depicts standing, travelling waves over part of the circumference and travelling waves along the full circumference with/without variable amplitude depending upon the forcing frequency. For symmetric excitation, the travelling wave response is observed for the forcing frequency $\omega_F = 81, 85-89, 97.5-99.6, 112, 123.2, 149-155, 178-200$ Hz. The participation of different modes involving 1:1, 1:2, 1:3 external, 1:1, 1:2, 2:3 internal resonances and the presence of harmonics including multiples of 1/2, 1/3 are reported.

Keywords Nonlinear vibrations, Travelling wave, Internal/External resonance, Modal participation.

1 Introduction

Cylindrical shells due to their structural efficiency are among the widely used structural components in compressor shells, tanks, heat exchangers, boilers, automotive tyres, vehicle bodies, airplane fuselage, life supporting ducts, nuclear reactor vessels, submarines, roofs of industrial buildings and alike. The shells with variable curvature especially the oval and elliptical cylindrical shells due to either the special external shape or internal storage

Download English Version:

<https://daneshyari.com/en/article/7174521>

Download Persian Version:

<https://daneshyari.com/article/7174521>

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