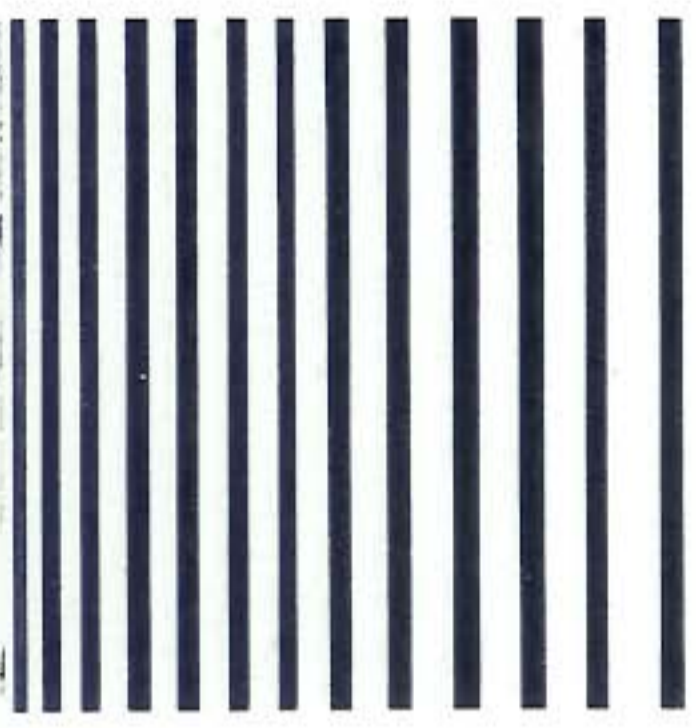


ETABS
S559
129
10.6
Reference

VOLUME 29, NO. 6
NOVEMBER/DECEMBER 1997



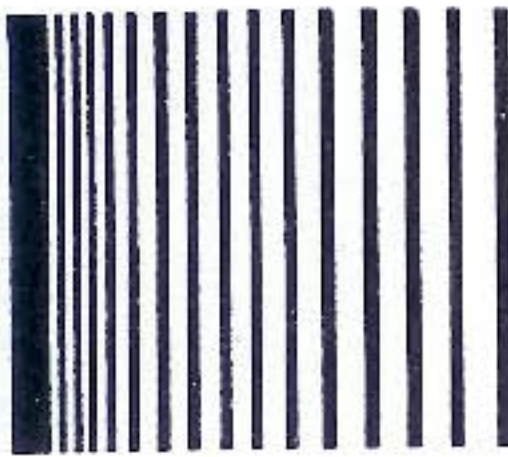
THE SHOCK AND VIBRATION DIGEST

A Publication of the

VIBRATION INSTITUTE
A NOT-FOR-PROFIT CORPORATION



MIT LIBRARIES
JAN 12 1998
HARKER



THE SHOCK AND VIBRATION DIGEST

© Copyright 1997 Vibration Institute

Volume 29, No. 6
November/December 1997

EDITORIAL STAFF

EDITOR:
TECHNICAL EDITOR:
SUBSCRIPTIONS:
PRODUCTION:

Vicki M. Pate
Ronald L. Eshleman
Loretta G. Twohig
Barbara K. Solt
C.A. Brkljacic

BOARD OF EDITORS

I. Elishakoff
K.R. Guy
P.A.A. Laura
A. Longinow
R.J. Peppin

W.D. Pilkey
H.C. Pusey
C.B. Sharma
R.H. Volin

A publication of



VIBRATION INSTITUTE
Suite 212
6262 S. Kingery Hwy.
Willowbrook, IL 60514

Opinions expressed by authors are their own and do not reflect necessarily the policies of the Institute. Send correspondence regarding change of address to the Vibration Institute, Suite 212, 6262 S. Kingery Highway, Willowbrook, IL 60514. Telephone: 630-654-2254; fax 630-654-2271; Email: vibinst@anet-chi.com. Postmaster: please send address change to the Vibration Institute.

The Shock and Vibration Digest is a bi-monthly publication of the Vibration Institute. The goal of the **Digest** is to provide efficient transfer of shock and vibration technology among researchers and practicing engineers. Subjective and objective analyses of the literature are provided along with news and editorial material. News items and articles to be considered for publication should be submitted to:

Ms. V.M. Pate
Vibration Institute
Suite 212, 6262 S. Kingery Highway
Willowbrook, IL 60514
(630) 654-2254

This periodical is for sale by subscription at an annual rate of \$250.00 (\$275.00 Canada and Mexico, \$300.00 foreign). Subscriptions are accepted for the calendar year, beginning with the January issue. Orders may be forwarded at any time to the Vibration Institute, Suite 212, 6262 S. Kingery Highway, Willowbrook, IL 60514.

Authorization to photocopy items for internal or personal use, or the internal or personal use of specific clients, is granted by the Vibration Institute, provided that the base fee of US \$5.00 per copy is paid directly to Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, USA. For those organizations that have been granted a photocopy license by CCC, a separate system of payment has been arranged. The fee code for users of the Transactional Reporting Service is: 210637/0583-1024/\$5.00.

ISSN 0583-1024

KEYWORDS: Mechanical components, Bearings, Single-degree-of-freedom systems, Multi-degree-of-freedom systems

It is of great interest to be able to predict what conditions in a system may lead to failure. Unlike statics, the question is very difficult to answer. However, an approximate determination of conditions of safe motion in the space of control parameters can be obtained. The authors present a simple procedure, which if suitably placed in finite space can be an efficient instrument for the prediction of free boundaries.

97-1511
On the Effect of Temperature in Non-Linear Dynamics of an Electro-Plastic System with Magnetic Hysteresis

Yoshida, M., Takami, F.M.C.,
Univ. of Osaka, Osaka, Japan
Proc. 7th Intl Conf. Dynam. Problems in Mechanics, 1997, Brazil, Rio de Janeiro, Brazil, Mar 3-7, 1997, pp 187-190, 3 figs, 3 refs

KEYWORDS: Mechanical components, Bearings, Slips, Shock, Forced motion

The paper reports on a dynamic analysis of an electro-plastic system where the electromechanical coupling is considered. A model with internal variable is presented. Magnetic hysteresis is considered, and an explicit algorithm is used for the numerical solution. A numerical method is developed using an implicit integration scheme associated with the state mapping algorithm including the temperature. Some numerical simulations are presented for forced vibrations and show that the nonlinear hypothesis is inadequate to describe some situations where cyclic magnetic hysteresis are involved.

ROLLING ELEMENT BEARINGS

97-1512
On the Finite Element Representation of Hydrodynamic Bearings

Meggiolaro, M.A., Almeida, C.A.
Pontificia Univ. Católica, Rio de Janeiro, Brazil

Proc. 7th Intl Conf. Dynam. Problems in Mechanics, Spons. Brazilian Soc. Mech. Sci (ABCM), Rio de Janeiro, Brazil, Mar 3-7, 1997, pp 184-186, 3 figs, 3 refs

KEYWORDS: Mechanical components, Rolling element bearings, Shafts, Rotors, Rotating machinery

Presented is a numerical formulation for the representation of hydrodynamic bearings for finite element modeling of a shaft-rotor-bearing type rotating system. This system dynamic response is affected significantly by the reaction forces on the bearings, which are dependent on the shaft transverse displacements, transverse linear velocities and angular velocity. Hydrodynamic bearing relations are, thus, represented through the equation of Reynolds which, under the Ocvirk simplified conditions for short length bearings, provides a closed form solution for the oil pressure distribution. This pressure distribution is integrated over the bearing surface allowing for the calculation of nonlinear stiffness and damping matrices associated to the shaft finite element degrees of freedom, at the bearing nodal point.

97-1513
An Analytical Model for the Prediction of the Vibration Response of Rolling Element Bearings Due to a Localized Defect

Yip, H., Choudhury, A.
Indian Inst. of Tech., New Delhi, New Delhi, India
J. Sound Vib., 1997, Vol. 197, No. 2, pp 277-297, Aug 27, 1997, 21 figs, 2 refs

KEYWORDS: Mechanical components, Rolling element bearings, Vibration problems, Local loads, Dynamic response

An analytical model is presented for predicting the vibration responses of rolling bearings and the amplitude of significant frequency components due to a localized defect on the outer race, inner race or on one of the rolling elements under radial and axial loads. The model predicts a discrete spectrum having peaks at the characteristic defect frequencies and their harmonics. In the case of an inner race defect or a rolling element defect under a radial load, there are sidebands around each peak. The effect of load and pulse shape on the vibration amplitude has been considered in the model. Typical numerical results for a 6202 deep groove ball bearing have been obtained and plotted.