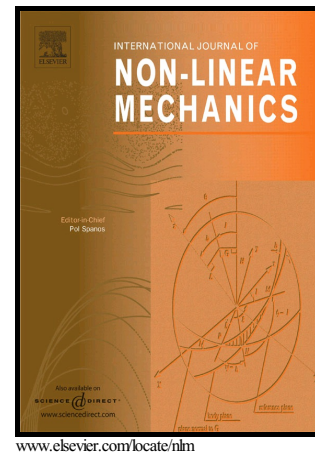


Author's Accepted Manuscript

Crack identification in elastically restrained vibrating rods

José Fernández-Sáez, Antonino Morassi, Lourdes Rubio



PII: S0020-7462(17)30236-6

DOI: <http://dx.doi.org/10.1016/j.ijnonlinmec.2017.03.018>

Reference: NLM2816

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

Received date: 30 June 2016

Revised date: 17 December 2016

Accepted date: 28 March 2017

Cite this article as: José Fernández-Sáez, Antonino Morassi and Lourdes Rubio Crack identification in elastically restrained vibrating rods, *International Journal of Non-Linear Mechanics*, <http://dx.doi.org/10.1016/j.ijnonlinmec.2017.03.018>

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 a 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

Crack identification in elastically restrained vibrating rods

José Fernández-Sáez

Department of Continuum Mechanics and Structural Analysis, University Carlos III of Madrid, Avda. de la Universidad 30, 28911 Leganés, Madrid, Spain. E-mail: ppfer@ing.uc3m.es

Antonino Morassi

Corresponding author. Polytechnic Department of Engineering and Architecture, University of Udine, via Cotonificio 114, 33100 Udine, Italy. Tel.: +39 0432 558739; fax: +39 0432 558700. E-mail: antonino.morassi@uniud.it

Lourdes Rubio

Department of Mechanical Engineering, University Carlos III of Madrid, Avda. de la Universidad 30, 28911 Leganés, Madrid, Spain. E-mail: lrubio@ing.uc3m.es

Abstract

In this paper we consider the problem of identifying an open crack in a longitudinally vibrating rod with smooth variable profile by minimal eigenfrequency data. The crack is assumed to be open during vibration and it is modelled by an elastic spring acting along the beam axis. Most, if not all, the results available in the literature for this inverse problem refer to ideal end conditions, that is the rod is either under free or supported end conditions. As an example of almost optimal result, it is known that the knowledge of the fundamental (positive) natural frequency of the rod under free-free and cantilever end conditions allows for the unique determination of the crack, without any restriction on the damage severity. In this paper we show that the analysis of the analogous crack identification problem for rods under elastically restrained end conditions leads to different results and that, in general, the knowledge of the fundamental frequency belonging to two spectra associated to different end conditions is not sufficient for the uniqueness of the solution. The method we used to solve the inverse problem is of constructive type and it is based on general properties of

Download English Version:

<https://daneshyari.com/en/article/5016448>

Download Persian Version:

<https://daneshyari.com/article/5016448>

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