

Accepted Manuscript

Wave Propagation in Periodically Undulated Beams and Plates

G. Trainiti, J. Rimoli, M. Ruzzene

PII: S0020-7683(15)00373-X

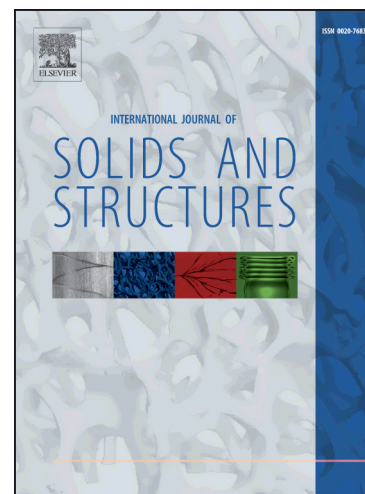
DOI: <http://dx.doi.org/10.1016/j.ijsolstr.2015.08.019>

Reference: SAS 8884

To appear in: *International Journal of Solids and Structures*

Received Date: 5 February 2015

Revised Date: 23 August 2015



Please cite this article as: Trainiti, G., Rimoli, J., Ruzzene, M., Wave Propagation in Periodically Undulated Beams and Plates, *International Journal of Solids and Structures* (2015), doi: <http://dx.doi.org/10.1016/j.ijsolstr.2015.08.019>

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.

Wave Propagation in Periodically Undulated Beams and Plates

G. Trainiti^a, J. Rimoli^a, M. Ruzzene^{a,b,*}

^a*Daniel Guggenheim School of Aerospace Engineering, Georgia Institute of Technology, 270 Ferst Dr, Atlanta, Georgia 30332, USA*

^b*George W. Woodruff School of Mechanical Engineering, Georgia Institute of Technology, 801 Ferst Dr, Atlanta, Georgia 30332, USA*

Abstract

This paper investigates the effects of periodic geometric undulations on the dispersion properties of 1D and 2D elastic structures. Periodic undulations result from the spatial modulation of the curvature of beams and plates, which leads to the coupling of transverse and in-plane motion. Such coupling affects the modal structure, and leads to interactions that produce complete, modal and partial frequency bandgaps along with directional wave motion. The effects of relevant geometrical parameters defining the undulation, such as spatial period and undulation amplitude, are investigated through the application of the Plane Wave Expansion Method and a Finite Element-based analysis of dispersion. Experimental illustration of the bandgap behavior of undulated beams, and numerical simulations of wave motion in plates serve as partial validations of the analytical predictions, and as demonstrations of the potential application of the concept for the design of structural components and elastic waveguides with tailored bandgap and directional properties.

*Corresponding author at: Daniel Guggenheim School of Aerospace Engineering, Georgia Institute of Technology, 270 Ferst Dr, Atlanta, Georgia 30332, USA. Email: ruzzene@gatech.edu - Tel.: +1 404 894 3078

Download English Version:

<https://daneshyari.com/en/article/6748680>

Download Persian Version:

<https://daneshyari.com/article/6748680>

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