Inertial amplification of continuous structures: Large band gaps from small masses - DTU Orbit (08/11/2017)

Inertial amplification of continuous structures: Large band gaps from small masses

We investigate wave motion in a continuous elastic rod with a periodically attached inertial amplification mechanism. The mechanism has properties similar to an “inerter” typically used in vehicle suspensions, however here it is constructed and utilized in a manner that alters the intrinsic properties of a continuous structure. The elastodynamic band structure of the hybridrod-mechanism structure yields band gaps that are exceedingly wide and deep when compared to what can be obtained using standard local resonators, while still being low in frequency. With this concept, a large band gap may be realized with as much as twenty times less added mass compared to what is needed in a standard local resonator configuration. The emerging inertially enhanced continuous structure also exhibits unique qualitative features in its dispersion curves. These include the existence of a characteristic double-peak in the attenuation constant profile within gaps and the possibility of coalescence of two neighbouring gaps creating a large contiguous gap.

General information

State: Published
Organisations: Department of Mechanical Engineering, Solid Mechanics, Department of Electrical Engineering, Acoustic Technology, University of Colorado at Boulder
Authors: Frandsen, N. M. M. (Intern), Bilal, O. R. (Ekstern), Jensen, J. S. (Intern), Hussein, M. I. (Ekstern)
Number of pages: 15
Publication date: 2016
Main Research Area: Technical/natural sciences

Publication information

Journal: Journal of Applied Physics
Volume: 119
Issue number: 12
Article number: 124902
ISSN (Print): 0021-8979
Ratings:
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.72 SJR 0.632 SNIP 0.815
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.618 SNIP 0.84 CiteScore 1.57
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.005 SNIP 1.18 CiteScore 2.04
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.165 SNIP 1.317 CiteScore 2.24
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.305 SNIP 1.294 CiteScore 2.13
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.373 SNIP 1.318 CiteScore 2.24
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.47 SNIP 1.195
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 1.518 SNIP 1.238
Web of Science (2009): Indexed yes

BFI (2008): BFI-level 1
Scopus rating (2008): SJR 1.667 SNIP 1.338
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.708 SNIP 1.395
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.947 SNIP 1.649
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 2.034 SNIP 1.627
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 2.097 SNIP 1.602
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 2.019 SNIP 1.525
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 2.225 SNIP 1.674
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 2.079 SNIP 1.554
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 2.338 SNIP 1.543
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 2.071 SNIP 1.517
Original language: English
DOIs:
10.1063/1.4944429
Source: FindIt
Source-ID: 2303117540
Publication: Research - peer-review › Journal article – Annual report year: 2016