



## Quick Search

[View search history](#) | [Back to results](#) | [< Previous](#) **7 of 56** [Next >](#)
[Download PDF](#) [Export](#) [Print](#) [E-mail](#) [Create bibliography](#) [Add to My List](#)
**ASME 2010 10th Biennial Conference on Engineering Systems Design and Analysis, ESDA2010**

Volume 5, 2010, Pages 227-231

ISBN: 978-079184919-4  
 DOI: 10.1115/ESDA2010-24629  
 Document Type: Conference Paper  
 Source Type: Conference Proceeding  
 Sponsors: ASME Turkey Section

[View references \(20\)](#)

**ASME 2010 10th Biennial Conference on Engineering Systems Design and Analysis, ESDA2010; Istanbul; 12 July 2010 through 14 July 2010; Code 84828**

[View at publisher](#)

## Application of the nonlinear energy sink systems in vibration suppression of railway bridges

Younesian, D., Nankali, A., Motieyan, M.E.

School of Railway Engineering, Iran University of Science and Technology, Tehran 16846-13114, Iran

**Abstract**

Vibration suppression of railway bridges using nonlinear energy sink systems (NES) is studied in this paper. Train is modeled as a set of successive moving loads traveling on an Euler-Bernoulli beam. Energy sink as a new passive control strategy is employed as the suppression system. Galerkin method here is adopted as the solution technique. Within a parametric study, series of numerical simulations are carried out and performance of the passive control system is investigated. It is numerically found that an appropriately designed NES can passively reduce the displacement of the bridge up to 43%. © 2010 by ASME.

**Language of original document**

English

**Author keywords**

Critical velocity; High speed train bridge; Nonlinear energy sink (NES); Vibration isolator

**Index Keywords**

Critical velocities; Energy sinks; Euler Bernoulli beams; High speed trains; Moving load; Nonlinear energy sink; Numerical simulation; Parametric study; Passive control; Passive control system; Railway bridges; Solution techniques; Suppression systems; Vibration isolator; Vibration suppression  
**Engineering controlled terms:** Cable stayed bridges; Galerkin methods; Railroad bridges; Railroad transportation; Railroads; Systems analysis  
**Engineering main heading:** Vibration analysis

**References (20)** [View in table layout](#)
[Export](#) [Print](#) [E-mail](#) [Create bibliography](#)
☐ Select: ☐ Page

- 1 ☐ Frahm, H.  
*Device for Damping Vibrations of Bodies. Cited 90 times.*  
 U.S. 1911, Patent No. 989, 958  
[View on Web](#)
- 2 ☐ Den Hartog, J.P.  
 (1956) *Mechanical Vibrations. Cited 1076 times.*  
 fourth ed, McGraw-Hill Book Company, New York
- 3 ☐ Kerschen, G., Kowtko, J.J., McFarland, D.M., Bergman, L.A., Vakakis, A.F.  
**Theoretical and experimental study of multimodal targeted energy transfer in a system of coupled oscillators**  
 (2007) *Nonlinear Dynamics*, 47 (1-3), pp. 285-309. *Cited 15 times.*  
 doi: 10.1007/s11071-006-9073-5  
[View at publisher](#)
- 4 ☐ Roberson, R.E.  
**Synthesis of a nonlinear dynamic vibration absorber**  
 (1952) *Journal of the Franklin Institute*, 254 (3), pp. 205-220. *Cited 36 times.*  
[View at publisher](#)
- 5 ☐ Shaw, J., Shaw, S.W., Haddow, A.G.  
**On the response of the non-linear vibration absorber**  
 (1989) *International Journal of Non-Linear Mechanics*, 24 (4), pp. 281-293. *Cited 46 times.*  
[View at publisher](#)
- 6 ☐ Rice, H.J., McCraith, J.R.  
**PRACTICAL NON-LINEAR VIBRATION ABSORBER DESIGN.**

**Cited by since 1996**This article has been cited **0** times in Scopus.

Inform me when this document is cited in Scopus:

[Set alert](#) | [Set feed](#)
**Related documents**

Showing the 2 most relevant related documents by all shared references:

Starosvetsky, Y., Gendelman, O.V.  
**Bifurcations of attractors in forced system with nonlinear energy sink: The effect of mass asymmetry**  
 (2010) *Nonlinear Dynamics*

Gendelman, O.V.  
**Targeted energy transfer in systems with external and self-excitation**  
 (2011) *Proceedings of the Institution of Mechanical Engineers, Part C: Journal of Mechanical Engineering Science*

[View all related documents](#) based on all shared references or [select the shared references](#) to use

Find more related documents in Scopus based on:

[Authors](#) | [Keywords](#)
**My Applications**
[Add](#)

**More By These Authors**

The authors of this article have a total of **57 records** in Scopus:  
 (Showing 5 most recent)

Ansari, M., Esmailzadeh, E., Younesian, D.  
**Frequency analysis of finite beams on nonlinear KelvinVoight foundation under moving loads**  
 (2011) *Journal of Sound and Vibration*

Nadafi, K., Mesdaghinia, A., Nabizadeh, R., Younesian, M., Rad, M.J.  
**The combination and optimization study on RB29 dye removal from water by peroxy acid and single-**

[Hide Applications](#)

(1987) *Journal of Sound and Vibration*, 116 (3), pp. 545-559. Cited 22 times.

[View at publisher](#)

- 7  Jordanov, I.N., Cheshankov, B.I.

**Optimal design of linear and non-linear dynamic vibration absorbers**  
(1988) *Journal of Sound and Vibration*, 123 (1), pp. 157-170. Cited 27 times.

[View at publisher](#)

- 8  Natsiavas, S.

**Steady state oscillations and stability of non-linear dynamic vibration absorbers**  
(1992) *Journal of Sound and Vibration*, 156 (2), pp. 227-245. Cited 45 times.

[View at publisher](#)

- 9  Gendelman, O.V.

**Transition of energy to a nonlinear localized mode in a highly asymmetric system of two oscillators**  
(2001) *Nonlinear Dynamics*, 25 (1-3), pp. 237-253. Cited 84 times.  
doi: 10.1023/A:1012967003477

[View at publisher](#)

- 10  Gendelman, O., Manevitch, L.I., Vakakis, A.F., M'Closkey, R.

**Energy pumping in nonlinear mechanical oscillators: Part I - Dynamics of the underlying Hamiltonian systems**  
(2001) *Journal of Applied Mechanics, Transactions ASME*, 68 (1), pp. 34-41. Cited 114 times.

[View at publisher](#)

- 11  Vakakis, A.F., Gendelman, O.

**Energy pumping in nonlinear mechanical oscillators: Part II - Resonance capture**  
(2001) *Journal of Applied Mechanics, Transactions ASME*, 68 (1), pp. 42-48. Cited 138 times.

[View at publisher](#)

- 12  Gendelman, O.V., Gourdon, E., Lamarque, C.H.

**Quasiperiodic energy pumping in coupled oscillators under periodic forcing**  
(2006) *Journal of Sound and Vibration*, 294 (4), pp. 651-662. Cited 33 times.  
doi: 10.1016/j.jsv.2005.11.031

[View at publisher](#)

- 13  Lee, Y.S., Vakakis, A.F., Bergman, L.A., McFarland, D.M., Kerschen, G.

**Suppressing aeroelastic instability using broadband passive targeted energy transfers, part 1:Theory**  
(2007) *AIAA Journal*, 45 (3), pp. 693-711. Cited 26 times.  
doi: 10.2514/1.24062

[View at publisher](#)

- 14  Vakakis, A.F., Manevitch, L.I., Gendelman, O., Bergman, L.

**Dynamics of linear discrete systems connected to local, essentially non-linear attachments**  
(2003) *Journal of Sound and Vibration*, 264 (3), pp. 559-577. Cited 72 times.  
doi: 10.1016/S0022-460X(02)01207-5

[View at publisher](#)

- 15  Lee, Y.S., Vakakis, A.F., Bergman, L.A., McFarland, D.M.

**Suppression of limit cycle oscillations in the van der Pol oscillator by means of passive non-linear energy sinks**  
(2006) *Structural Control and Health Monitoring*, 13 (1), pp. 41-75. Cited 15 times.  
doi: 10.1002/stc.143

[View at publisher](#)

- 16  Lee, Y.S., Vakakis, A.F., Bergman, L.A., McFarland, D.M., Kerschen, G.

**Suppressing aeroelastic instability using broadband passive targeted energy transfers, part 1:Theory**  
(2007) *AIAA Journal*, 45 (3), pp. 693-711. Cited 26 times.  
doi: 10.2514/1.24062

[View at publisher](#)

- 17  Starosvetsky, Y., Gendelman, O.V.

**Vibration absorption in systems with a nonlinear energy sink: Nonlinear damping**  
(2009) *Journal of Sound and Vibration*, 324 (3-5), pp. 916-939. Cited 12 times.  
doi: 10.1016/j.jsv.2009.02.052

[View at publisher](#)

- 18  Michael McFarland, D., Bergman, L., Vakakis, A.F.

**Experimental study of nonlinear energy pumping**  
(2004) *ICTAM*, pp. 15-21.

- 19  Michael McFarland, D., Vakakis, A.F., Bergman, L.A.

**Experimental verification of the performance of A nonlinear energy sink**  
*15th ASCE Engineering Mechanics Conference*

- 20  Avramov, K.V., Gendelman, O.V.

**Forced oscillations of beam with essentially nonlinear absorber**  
(2009) *Strength of Materials*, 41 (3), pp. 310-317. Cited 2 times.  
doi: 10.1007/s11223-009-9125-4

[View at publisher](#)

 Younesian, D.; School of Railway Engineering, Iran University of Science and Technology, Tehran 16846-13114, Iran  
© Copyright 2011 Elsevier B.V., All rights reserved.

ASME 2010 10th Biennial Conference on Engineering Systems Design and Analysis, ESDA2010

Volume 5, 2010, Pages 227-231

[Search](#) [Sources](#) [Analytics](#) [My alerts](#) [My list](#) [My settings](#)[Live Chat](#) [Help](#)[About Scopus](#)  
[What is Scopus](#)  
[Content coverage](#)  
[What do users think](#)  
[Latest](#)  
[Tutorials](#)  
[Developers](#)[Contact and Support](#)  
[Contact and support](#)  
[Live Chat](#)[About Elsevier](#)  
[About Elsevier](#)  
[About SciVerse](#)  
[About SciVal](#)  
[Terms and Conditions](#)  
[Privacy Policy](#)

Copyright © 2011 [Elsevier B.V.](#) All rights reserved. SciVerse® is a registered trademark of Elsevier Properties S.A., used under license. Scopus® is a registered trademark of Elsevier B.V.