

# Journal of Vibration Testing and System Dynamics

---

## Editors

### **Pawel Olejnik**

Department of Automation, Biomechanics and Mechatronics  
Lodz University of Technology  
1/15 Stefanowski Str., BLDG A22  
90-924 Lodz, Poland  
Email: pawel.olejnik@p.lodz.pl

### **C. Steve Suh**

Department of Mechanical Engineering  
Texas A&M University  
College Station, TX 77843-3123, USA  
Email: ssuh@tamu.edu

### **Xian-Guo Tuo**

School of Automation & Information Engineering  
Sichuan University of Science and Engineering  
Zigong, Sichuan, 643000, China  
Email: tuoxianguo@suse.edu.cn

## Associate Editors

### **Farbod Alijani**

Department of Precision and  
Microsystems Engineering  
Delft University of Technology  
The Netherlands  
Email: F.Alijani@tudelft.nl

### **Mohamed Belhaq**

Laboratory of Mechanics  
University Hassan II-Casablanca  
Casablanca, Morocco  
Email: mbelhaq@yahoo.fr

### **Valentina E. Balas**

Automatics and Applied Software  
Department  
Aurel Vlaicu University of Arad  
Arad, Romania  
Email: balas@drbalas.ro

### **Biagio Carboni**

Department of Structural and  
Geotechnical Engineering  
Sapienza University of Rome, Italy  
Email: biagio.carboni@uniroma1.it

### **Francesco Clementi**

Department of Civil and Buildings  
Engineering and Architecture  
Polytechnic University of Marche  
Ancona, Italy  
Email: francesco.clementi@univpm.it

### **Frank Z. Feng**

Department of Mechanical and  
Aerospace Engineering  
University of Missouri  
Columbia, MO 65211, USA  
Email: FengF@missouri.edu

### **Vladimir N. Grebenev**

Institute of Computational Technologies  
Siberian Division of Russian Academy of  
Sciences (SDRAS)  
630090 Akademgorodok, Novosibirsk,  
Russia  
Email: vngrebenev@gmail.com

### **Yu Guo**

McCoy School of Engineering  
Midwestern University  
3410 Taft Boulevard  
Wichita Falls, TX 76310, USA  
Email: yu.guo@mwsu.edu

### **Hamid R. Hamidzadeh**

Department of Mechanical and  
Manufacturing Engineering  
Tennessee State University  
Nashville, TN 37209-1561, USA  
Email: hhamidzadeh@tnstate.edu

### **Jianzhe Huang**

School of Aeronautics and Astronautics  
Shanghai Jiao Tong University  
Shanghai, China 200240  
Email: hjianzhe@sjtu.edu.cn

### **Nizar Jaber**

Department of Mechanical Engineering  
College of Engineering Sciences and  
Applied Engineering  
King Fahd University of Petroleum and  
Minerals, Saudi Arabia  
Email: nizar.jaber@kfupm.edu.sa

### **Hossein Jafari**

Department of Mathematical Science  
University of South Africa  
Corner of Christiaan de Wet Road &  
Pioneer Avenue, Florida, 1709  
South Africa  
Email: jafarh@unisa.ac.za

### **Krzysztof Kecik**

Department of Applied Mechanics  
Lublin University of Technology  
Nadbystrzycka, Lublin, Poland  
Email: k.kecik@pollub.pl

### **Zhong Luo**

School of Mechanical Engineering &  
Automation  
Northeastern University, Liaoning, China  
Email: zhluo@mail.neu.edu.cn

### **Diego Orlando**

Department of Mechanics and Energy  
University of State of Rio de Janeiro,  
Resende, Brazil  
Email: dgorlando@gmail.com

# Journal of Vibration Testing and System Dynamics

Volume 8, Issue 3, September 2024

Editors

Pawel Olejnik

C. Steve Suh

Xian-Guo Tuo



L&H Scientific Publishing, LLC, USA

## **Publication Information**

*Journal of Vibration Testing and System Dynamics* (ISSN 2475-4811 (print), eISSN 2475-482X (online)) is published quarterly (March, June, September, and December) by L & H Scientific Publishing, LLC, PO Box 219, Glen Carbon, IL62034, USA. Subscription prices are available upon request from the publisher or from this journal website. Subscriptions are accepted on a prepaid basis only and entered on a calendar year basis. Issues are sent by standard mail (Surface in North America, air delivery outside North America). Priority rates are available upon request. Claims for missing issues should be made within six months of the date of dispatch.

## **Changes of Address**

Send address changes to L&H Scientific Publishing, LLC, PO Box 219, Glen Carbon, IL62034, USA. Changes of address must be received at L&H Scientific Publishing eight weeks before they are effective.

## **Authors Inquiries**

For inquiries relative to the submission including electronic submission where available, please visit journal website or contact journal Editors-in-Chief.

## **Advertising Information**

If you are interested in advertising or other commercial opportunities, please email via [lhscientificpublishing@gmail.com](mailto:lhscientificpublishing@gmail.com) and your enquiry will be handled as soon as possible.

## **© 2024 L&H Scientific Publishing, LLC. All rights reserved**

L&H Scientific Publishing, LLC requires the authors to sign a Journal Copyright Transfer Agreement for all articles published in L&H Scientific. The Copyright Transfer Agreement is an agreement under which the author retains copyright in the work but grants L & H Scientific Publishing LLC the sole and exclusive right and license to publish the full legal term of copyright.

Authors are responsible for obtaining permission from copyright holders for reproducing any illustrations, tables, figures or lengthy quotations published somewhere previously.

For authorization to photocopy materials for internal or personal use under those circumstances not falling within the fair use provisions of Copyright Act, requests for reprints and translations should be addressed to the permission office of L&H Scientific publishing, LLC via [lhscientificpublishing@gmail.com](mailto:lhscientificpublishing@gmail.com) or call: +1-618-402-2267. Permission of the Publisher and payment of a fee are required for all other photocopying, including multiple or systematic copying, copying for advertising or promotional purposes, resale, and forms of document delivery. Special rates are available for educational institutions to make photocopies for non-profit educational classroom use.

Subscribers may reproduce tables of contents or prepare lists of articles including abstracts for internal circulation within their institutions. Permission of the publisher is required for resale or distribution outside the institution.

Permission of the Publisher is required to store or use electronically any materials contained in this journal, including any entire or partial article, please contact the publisher for advice. Otherwise, no part of this publication can be reproduced, stored in retrieval systems or transmitted in any form or by means, electronic, mechanical, photocopying, recording or without prior written permission of the Publisher.

## **Disclaimer**

The authors, editors and publisher will not accept any legal responsibility for any errors or omissions that may be made in this publication. The publisher makes no warranty, express or implied, with respect to the material contained herein.

Printed in USA on acid-free paper.

## Aims and Scope

*Journal of Vibration Testing and System Dynamics* is an interdisciplinary journal as a platform for facilitating the synergy of *dynamics, experimentation, design, and education*. The journal publishes high-quality, original articles that explore the theory, modelling, and application of dynamical systems and data-driven dynamics for high-impact engineering solutions. Manuscripts exploring data science, machine learning, and artificial intelligence to the design and control of complex dynamical systems including cell and neuro networks are solicited. Articles on data mining, deep learning and big data applicable to physical sciences and large-scale dynamic systems are equally encouraged. Progress made in the following topics, but not limited to, are of interest to the journal:

### Data-Driven Dynamics and Control

- Artificial intelligence and machine learning
- Data and signal processing
- System identification
- Dynamical sensing and measurement
- Discrete dynamical systems

### Dynamics of Continuum

- Flow induced vibrations
- Combustion dynamics
- Sensing, measurement and devices
- Thermoacoustic vibrations

### Complex Networks and Systems

- Network dynamics and control
- Synchronization and collective behavior
- Networks of networks
- Consensus tracking

### Design for Dynamics

- Dynamical failures and fatigues
- Structural dynamics and reliability
- Vibration testing and validation
- Multi-body dynamics
- Wave propagation and acoustics

### Biological and Biomedical Physics

- Biological dynamics and biophysics
- Dynamics of bio-systems
- Neuro and brain dynamics
- Biomechanical systems and devices

### Chemical Dynamics

- Dynamic chemical networks
- Mechanism of chemical reaction
- Molecular dynamics
- Process modelling and design

No length limitations for contributions are set, but only concisely written manuscripts are published. Brief papers are published on the basis of Technical Notes. Discussions of previous published papers are welcome.

## Peer Review

*Journal of Vibration Testing and System Dynamics* adopts the traditional blind-review policy in which the reviewers' names are concealed for submission author(s) for free submission. Each submitted manuscript is reviewed at least two referees in appropriate fields. In addition, the editorial board members' recommendation or established experts' recommendation publication are welcome.

## Manuscript Submission Guidelines

Author(s) should submit manuscript(s) via the website: <https://www.editorialmanager.com/vtsd/Default.aspx>. For any questions, author(s) can directly contact one of Editors. Manuscript preparation can follow the sample papers and journal manuscript templates (word file and Latex files), which can be downloaded from the website: <https://lhscientificpublishing.com/Journals/JVTSD-Default.aspx>

## Proofs and Electronic Offprints

Authors will receive a PDF proof of their articles and, on publication, electronic offprints of the article.

## Open Access Options

After manuscripts were accepted, author(s) have a right to request the accepted manuscripts published by L&H Scientific publishing with open access, and the author(s) have a responsibility to paying the open access publication fee. The copyright is still held by the Publisher, but the open access permission is given to the author(s) as follows. Without any request of the open access publication, the accepted manuscripts are assumed to be published traditionally. This journal offers authors two choices to publish their research.

- *Open access:* Articles are freely available to both subscribers and the wider public with permitted reuse. An open access publication fee is payable by authors or their research funder.
- *Subscription:* Articles are made available to subscribers through our access programs. No open access publication fee.

L&H scientific does offer alternative open access publishing options in accordance with funding body requirements. Your publication choice will have no effect on the peer review process or acceptance of your submission.

## Open Access Articles

- User rights

All articles published gold open access will be immediately and permanently free for everyone to read and download. We offer authors a choice of user licenses, which define the permitted reuse of articles. We are continuously working with our author communities to select the best choice of license options, currently being defined for this journal as follows:

*Creative Commons Attribution (CC BY)*: lets others distribute and copy the article, to create extracts, abstracts, and other revised versions, adaptations or derivative works of or from an article (such as a translation), to include in a collective work (such as an anthology), to text or data mine the article, even for commercial purposes, as long as they credit the author(s), do not represent the author as endorsing their adaptation of the article, and do not modify the article in such a way as to damage the author's honor or reputation.

*Creative Commons Attribution-NonCommercial-NoDerivs (CC BY-NC-ND)*: for non-commercial purposes, lets others distribute and copy the article, and to include in a collective work (such as an anthology), as long as they credit the author(s) and provided they do not alter or modify the article.

- Open access publication fee

To provide open access, this journal has a publication fee which needs to be met by the authors or their research funders for each article published open access. The open access publication fee for this journal is USD 100 per page, excluding taxes.

## Self-archiving Policy

Authors can share their research in a variety of different ways. The author(s) can also self-archive their author manuscript immediately and enable public access from their institution's repository after an embargo period. This is the version that has been accepted for publication and which typically includes author-incorporated changes suggested during submission, peer review and in editor-author communications.

An author is entitled to post the accepted manuscript in their institution's repository and make this public after an embargo period (known as self-archiving). The embargo period for this journal can be found below.

Without the L&H permission, the published journal article cannot be shared publicly, such as, on ResearchGate or Academia.edu, to ensure the sustainability of peer-reviewed research in journal publications.

*Embargo period*: For subscription articles, an appropriate amount of time is needed for journals to deliver value to subscribing customers before a manuscript becomes available for free to the public. This is called an embargo period and it begins from the date the article is formally published online in its final and fully citable form.

This journal has an embargo period of 24 months and the embargo period for the USA is 12 months.

*Continued from inside front cover*

**Laura Ruzziconi**

Dipartimento di Architettura  
Costruzioni e Strutture  
Università Politecnica delle Marche  
Ancona, Italy  
Email: laura.ruzziconi@uniecampus.it

**Dimitry Volchenkov**

Department of Mathematics and Statistics  
Texas Tech University  
1108 Memorial Circle  
Lubbock, TX 79409, USA  
Email: dr.volchenk@gmail.com

**Yeyin Xu**

School of Aerospace Engineering  
Xi'an Jiaotong University  
Xi'an, 710048, China  
Email: xuyeyin@xjtu.edu.cn

**Editorial Board**

**Nyesunthi Apiwattanalungarn**

Department of Mechanical Engineering  
Faculty of Engineering  
Kasetsart University  
JatuJak Bangkok 10900, Thailand  
Email: fengpra@ku.ac.th

**Liming Dai**

Industrial Systems Engineering  
University of Regina  
Regina, Saskatchewan  
Canada, S4S 0A2  
Email: Liming.Dai@uregina.ca

**Xilin Fu**

School of Mathematical Science  
Shandong Normal University  
Jinan 250014, China  
Email: xilinfu@gmail.com

**Marine Mikilyan**

Institute of Mechanics  
National Academy of Sciences of Armenia  
24, Marshall Baghramian Ave. 0019  
Yerevan, Republic of Armenia  
Email: mikilyan@sci.am

**Weinian Zhang**

School of Mathematics  
Sichuan University  
Chengdu, Sichuan, P.R. China  
Email: wnzhang@scu.edu.cn

**Alexander P. Seyranian**

Institute of Mechanics  
Moscow State Lomonosov University,  
Michurinsky pr. 1, 119192  
Moscow, Russia  
Email: aseyranian@mail.ru

**Guo-Cheng Wu**

Data Recovery Key Laboratory of  
Sichuan Province  
Neijiang Normal University, Neijiang  
641100, China  
Email: wuguocheng@gmail.com

**Daniil Yurchenko**

University of Southampton  
Southampton, United Kingdom  
Email: d.yurchenko@soton.ac.uk

**Jose Manoel Balthazar**

School of Engineering  
Universidade Estadual Paulista  
Bauru Campus, Bauru, Brazil  
Email: jmbaltha@gmail.com

**Mark Edelman**

Yeshiva University  
245 Lexington Avenue  
New York, NY 10016, USA  
Email: edelman@cims.nyu.edu

**Lakshmi Narayan Guin**

Department of Mathematics  
Siksha Bhavana, Visva-Bharati,  
Santiniketan-731235  
West Bengal, India  
Email: guin\_ln@yahoo.com

**Hiroaki Watanabe**

Department of Mechanical Engineering  
Kyushu University  
Nishi-ku, Fukuoka 819-0395, Japan  
Email: whiroaki@mech.kyushu-u.ac.jp

**Xu Sun**

College of Mechanical and  
Transportation Engineering  
China University of Petroleum-Beijing  
Beijing, 102249, China  
Email: xsun@cup.edu.cn

**Xingzhong Xiong**

School of Automation & Information  
Engineering  
Sichuan University of Science and  
Engineering  
Zigong, Sichuan, 643000, China  
Email: xzxiong@suse.edu.cn

**Giuseppe Catania**

Department of Mechanics  
University of Bologna  
viale Risorgimento, 2, I-40136 Bologna,  
Italy  
Email: giuseppe.catania@unibo.it

**Peihua Feng**

School of Aerospace Engineering  
Xi'an Jiaotong University  
Xi'an, 710048, China  
Email: fphd2017@xjtu.edu.cn

**Yanfei Jin**

Department of Mechanics  
School of Aerospace Engineering  
Beijing Institute of Technology  
Beijing, China, 100086  
Email: jinyf@bit.edu.cn

**Jianming Yang**

Faculty of Engineering and Applied  
Science  
Memorial University of Newfoundland  
St. John's, Newfoundland, Canada  
Email: jyang@mun.ca