Editors

Jan Awrejcewicz

Department of Automation, Biomechanics and Mechatronics The Lodz University of Technology 1/15 Stefanowskiego Str., BLDG A22, 90-924 Lodz, Poland Email: jan.awrejcewicz@p.lodz.pl

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

Jinde Cao

School of Mathematics Southeast University Sipailou 2# Nanjing, 210096, China Email: jdcao@seu.edu.cn

Hamid R. Hamidzadeh

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

Zhi-Ke Peng

School of Mechanical Engineering Shanghai Jiao Tong University Shanghai, P. R. China 200240 Email: z.peng@sjtu.edu.cn

Baozhong Yang

Schlumberger Smith Bits 1310 Rankin Rd Houston, TX 77073, USA Email: bzyang@gmail.com

Editorial Board

Farbod Alijani

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

Yoshihiro Deguchi Department of Mechanical Engineering Tokushima University 2-1 Minamijyousanjima-cho Tokushima 770-8506, Japan Email: ydeguchi@me.tokushima-u.ac.jp

Jianzhe Huang

Department of Power and Energy Engineering Harbin Engineering University Harbin, 150001,China Email: jianzhe@hrbeu.edu.cn

Alexander P. Seyranian

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

Guirong (Grace) Yang

Department of Civil, Architectural and Environmental Engineering Missouri University of Science and Technology Rolla, MO 65409, USA Email: yang@mst.edu

Nyesunthi Apiwattanalunggarn

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

C. Steve Suh

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

Jiazhong Zhang

School of Energy and Power Engineering Xi'an Jiaotong University Xi'an, 710048, China Email: jzzhang@mail.xjtu.edu.cn

Yu Guo

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

Meng-Kun (Jason) Liu

Department of Mechanical Engineering National Taiwan University of Science and Technology Taipei, Taiwan Email: mkliu@mail.ntust.edu.tw

Dimitry Volchenkov

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

Shudong Yu

Department of Mechanical and Industrial Engineering Ryerson University Toronto, Ontario M5B 2K3 Canada Email: syu@ryerson.ca

Junqiang Bai

School of Aeronautics Northwestern Polytechnical University Xi'an, P. R. China Email: junqiang@nwpu.edu.cn

Journal of Vibration Testing and System Dynamics

Volume 2, Issue 1, March 2018

Editors Jan Awrejcewicz C. Steve Suh Xian-Guo Tuo Jiazhong Zhang



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, P.O. Box 99, 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, P.O. Box 99, 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 adverting or other commercial opportunities, please email via lhscientificpublishing@gmail.com and your enquiry will be handled as soon as possible.

© 2018 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 lhscientific publishing@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 a 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

Vibration Testing and System Dynamics is an interdisciplinary journal serving as the forum for promoting dialogues among engineering practitioners and research scholars. As the platform for facilitating the synergy of *system dynamics, testing, design, modeling, and education*, the journal publishes high-quality, original articles in the theory and applications of dynamical system testing. The aim of the journal is to stimulate more research interest in and attention for the interaction of theory, design, and application in dynamic testing. Manuscripts reporting novel methodology design for modelling and testing complex dynamical systems with nonlinearity are solicited. Papers on applying modern theory of dynamics to real-world issues in all areas of physical science and description of numerical investigation are equally encouraged. Progress made in the following topics are of interest, but not limited, to the journal:

- Vibration testing and design
- Dynamical systems and control
- Testing instrumentation and control
- Complex system dynamics in engineering
- Dynamic failure and fatigue theory
- Chemical dynamics and bio-systems
- Fluid dynamics and combustion
- Pattern dynamics
- Network dynamics
- Control signal synchronization and tracking
- Bio-mechanical systems and devices
- Structural and multi-body dynamics
- Flow or heat-induced vibration
- Mass and energy transfer dynamics
- Wave propagation and testing
- Acoustics

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

For manuscript submission, authors can directly contact Editors-in-Chief. Manuscript preparation can follow the sample papers and journal manuscript templates (word file and Latex files), which can be found from the website at 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

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 with US\$60 per page. The copyright is still held by the Publisher. Without any request of the open access publication, the accepted manuscripts are assumed to be published traditionally.

Continued from inside front cover

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

Frank Z. Feng

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

Krzysztof Kecik

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

Liansheng Li

College of Mechanical and Electrical Engineering Qingdao University of Science and Technology NO.99 Songling Road, Qingdao 266061, P.R. China Email: <u>lianshengli@126.com</u>

Yan Liu

School of Mechanical Engineering Northwestern Polytechnical University Xi'an, P. R. China Email: liuyan@nwpu.edu.cn

Jihong Wen

Institute of Mechatronical Engineering National University of Defense Technology Changsha, Hunan, P.R. China Email: wenjihong@nudt.edu.cn

Xingzhong Xiong

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

Zhaobo Chen

School of Mechatronics Engineering Harbin Institute of Technology Harbin 150001, P.R. China Email: chenzb@hit.edu.cn

Fotios Georgiadis

School of Engineering University of Lincoln Lincolnshire LN6 7TS United Kingdom Email: fgeorgiadis@lincoln.ac.uk

Ryoichi Kurose

Department of Mechanical Engineering and Science Kyoto University, Kyoto, Japan Email: kurose@mech.kyoto-u.ac.jp

Ke Li

Schlumberger Technology 200 Gillingham Lane Sugarland, TX 77478, USA Email: KLi2@slb.com

Diego Orlando

Department of Civil Engineering Universidade do Estado do Rio de Janeiro, Rio de Janeiro, Brazil Email: dgorlando@gmail.com

Lianhua Wang

College of Civil Engineering Hunan University Changsha, Hunan, P.R. China Email: Lhwang@hnu.edu.cn

Guozhi Yao

Modine Manufacturing Company Racine, WI 53403, USA Email: G.Yao@na.modine.com

Francesco Clementi

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

Lei Guo

School of Automation Science and Electrical Engineering Beihang University Beijing, P.R. China Email: lguo@buaa.edu.cn

Stefano Lenci

Dipartimento di Ingegneria Civile Edile e Architettura, Universita' Politecnica delle Marche via Brecce Bianche, 60131 ANCONA, Italy Email: lenci@univpm.it Xiaofeng Liao School of Electronic Information Engineering Southwest University Chongqing, P.R. China Email: xfliao@cqu.edu.cn

Laura Ruzziconi

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

Hiroaki Watanabe

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

Weinian Zhang

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