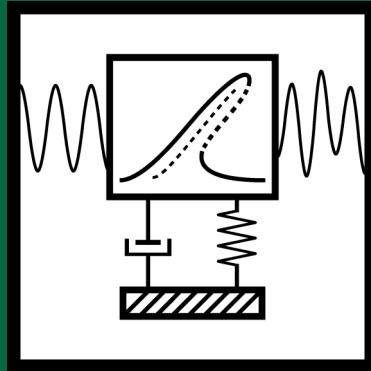


November 2022, Volume 46  
ISSN Print 2345-0533  
ISSN Online 2538-8479

# Vibroengineering PROCEDIA



**Editor in Chief**

Minvydas Ragulskis

Kaunas University of Technology, (Lithuania)

minvydas.ragulskis@ktu.lt

**Editorial Board**

Mahmoud Bayat

Roudehen Branch, Islamic Azad University, (Iran)

mbayat14@yahoo.com

Rafał Burdzik

Silesian University of Technology, (Poland)

rafal.burdzik@polsl.pl

Jinde Cao

Southeast University, (China)

jdcao@seu.edu.cn

Maosen Cao

Hohai University, (China)

cmszhy@hhu.edu.cn

Sezgin Ersoy

Marmara University, (Turkey)

ersoy@marmara.edu.tr

W. H. Hsieh

National Formosa University, (Taiwan)

allen@nfu.edu.tw

Vassilis Kappatos

Center for Research and Technology Hellas, (Greece)

vkappatos@certh.gr

Chen Lu

Beihang University, (China)

luchen@buaa.edu.cn

Luis E. Muñoz

Universidad de los Andes, (Colombia)

lui-muno@uniandes.edu.co

Nicola Nisticò

Sapienza University of Rome, (Italy)

nicola.nistico@uniroma1.it

Vytautas Ostasevičius

Kaunas University of Technology, (Lithuania)

vytautas.ostasevicius@ktu.lt

Grigory Panovko

Mechanical Engineering Research Institute of the Russian Academy of Sciences, (Russia)

gpanovko@yandex.ru

Subhash Rakheja

Concordia University, (Canada)

subhash.rakheja@concordia.ca

Vinayak Ranjan

Bennett University, (India)

vinayak.ranjan@bennett.edu.in

G. Eduardo Sandoval-Romero

The National Autonomous University of Mexico, (Mexico)

eduardo.sandoval@ccadet.unam.mx

Miguel A. F. Sanjuan

University Rey Juan Carlos, (Spain)

miguel.sanjuan@urjc.es

Gangbing Song

University of Houston, (USA)

gsong@uh.edu

Shigeki Toyama

Tokyo A&amp;T University, (Japan)

toyama@cc.tuat.ac.jp

Piotr Vasiljev

Lithuanian University of Educational Sciences, (Lithuania)

piotr.vasiljev@leu.lt

Vincentas Veikutis

Lithuanian University of Health Sciences, (Lithuania)

vincentas.veikutis@lsmuni.lt

Jānis Vība

Riga Technical University, (Latvia)

janis.viba@rtu.lv

Xiao-Jun Yang

China University of Mining and Technology, (China)

dyangxiaojun@163.com

Krzysztof Kamil Żur

Bialystok University of Technology, (Poland)

k.zur@pb.edu.pl

# VP Vibroengineering PROCEEDIA

Vibroengineering PROCEEDIA Volume 46 contains papers presented at the 60th International Conference on VIBROENGINEERING held in, Resita, Romania, November 18, 2022. The main theme of the Conference is “The Use of Vibrations in Industrial Applications”.

## Aims and Scope

Journal publishes original papers presenting the state of the art in vibroengineering of dynamical systems.

The list of principal topics:

- Measurements in engineering
- Mathematical models in engineering
- Acoustics, noise control and engineering applications
- Mechanical vibrations and applications
- Fault diagnosis based on vibration signal analysis
- Vibration control, generation and harvesting
- Seismic engineering and applications
- Modal analysis and applications
- Vibration in transportation engineering
- Flow induced structural vibrations
- Oscillations in biomedical engineering
- Chaos, non-linear dynamics and applications
- Oscillations in electrical engineering
- Fractional dynamics and applications
- System dynamics in manufacturing system modeling
- Dynamics of smart and functionally graded materials

**All published papers are peer reviewed and crosschecked by plagiarism detection tools.**

More information is available online <https://www.extrica.com/journal/vp>

## Vibroengineering PROCEEDIA is referred in:

**Scopus:** ELSEVIER Bibliographic Database.

**EI Compendex:** ELSEVIER Bibliographic Database.

**EBSCO:** Academic Search Complete;  
Computers & Applied Sciences Complete;  
Central & Eastern European Academic Source;  
Current Abstracts;  
TOC Premier.

**Gale Cengage Learning:**  
Academic OneFile Custom Periodical;  
Science in Context.

**Inspec:** OCLC. The Database for Physics, Electronics and Computing.

**Scilit:** <https://www.scilit.net>

**Dimensions:** <https://www.dimensions.ai>

**Semantic Scholar:** <https://www.semanticscholar.org>

**Google Scholar:** <https://scholar.google.com>

**CORE:** <https://core.ac.uk>

**Ulrich's Periodicals Directory:** <https://ulrichsweb.serialssolutions.com>

**CNKI Scholar:** <http://eng.scholar.cnki.net>

**cnplINKer (CNPIEC):** <http://cnplinker.cnpeak.com>

**TDNet:** <https://www.tdnet.io>

**WorldCat Discovery Services:** <https://www.oclc.org/en/worldcat-discovery.html>

**MyScienceWork:** <https://www.mysciencework.com>

**Crossref:** <https://search.crossref.org>

Content is archived in **Martynas Mazvydas National Library of Lithuania**

**Internet:** <https://www.extrica.com>

**E-mail:** [publish@extrica.com](mailto:publish@extrica.com)

**Publisher:** JVE International Ltd., Geliu ratas 15A, LT-50282, Kaunas, Lithuania

## 60th International Conference on VIBROENGINEERING

November 18, 2022, in Resita, Romania

The main theme of the conference: **The Use of Vibrations in Industrial Applications**

### General Topics of the Conference:

- Materials and Measurements in Engineering
- Mathematical Models in Engineering
- Mechanical Vibrations and Applications
- Fault Diagnosis Based on Vibration Signal Analysis
- Vibration Generation and Control
- Seismic Engineering and Applications
- Modal Analysis and Applications
- Vibration in Transportation Engineering
- Flow-induced Structural Vibrations
- Biomechanics and Biomedical Engineering
- Dynamics and Oscillations in Electrical and Electronics Engineering
- System Dynamics in Manufacturing System Modelling
- Dynamics of Smart and Functionally Graded Materials
- Artificial Intelligence Methods Applied in Vibration Diagnostics

### Chairs:

Prof. Gilbert-Rainer Gillich Babes-Bolyai University of Cluj-Napoca, Romania  
Prof. Zoltan-Iosif Korka Babes-Bolyai University of Cluj-Napoca, Romania

### Organizing Committee Members

V. Babitsky Loughborough University, UK  
M. Bayat Islamic Azad University, Iran  
K. Bousson University of Beira Interior, Portugal  
M. Brennan University of Southampton, UK  
R. Burdzik Silesian University of Technology, Poland  
M. Cao Hohai University, China  
Z. Dabrowski Warsaw University of Technology, Poland  
J. Duhovnik University of Ljubljana, Slovenia  
A. El Sinawi The Petroleum Institute, United Arab Emirates  
W. H. Hsieh National Formosa University, Taiwan  
Chen Lu Beihang University, China  
Y. Mao Zhejiang Gongshang University, China  
R. Maskeliūnas Vilnius Gediminas Technical University, Lithuania  
L. E. Muñoz Universidad de los Andes, Colombia  
N. Perkins University of Michigan, USA  
Z.-I. Praisach Babes-Bolyai University of Cluj-Napoca, Romania  
L. Qiu Nanjing University of Aeronautics and Astronautics, China  
S. Rakheja Concordia University, Canada  
M. A. F. Sanjuan University Rey Juan Carlos, Spain  
G. Song University of Houston, USA  
S. Toyama Tokyo A&T University, Japan  
K. Uchino The Pennsylvania State University, USA  
P. Vasiljev Lithuanian University of Educational Sciences, Lithuania  
V. Veikutis Lithuanian University of Health Sciences, Lithuania  
J. Vība Riga Technical University, Latvia  
V. Volkovas Kaunas University of Technology, Lithuania  
J. Wallaschek Leibniz University Hannover, Germany



# VP Vibroengineering PROCEDIA

---

NOVEMBER 2022. VOLUME 46, PAGES (1-104), ISSN PRINT 2345-0533, ISSN ONLINE 2538-8479

---

## Contents

### MECHANICAL VIBRATIONS AND APPLICATIONS

**EXPERIMENTAL STUDY OF THE LAP MOTION TRAJECTORY OF VIBRATORY FINISHING MACHINE 1**

VITALIY KORENDIY, OLEKSANDR KACHUR, VIKTOR ZAKHAROV, IGOR KUZIO,  
IHOR HUREY, ROSTYSLAV PREDKO

### FAULT DIAGNOSIS BASED ON VIBRATION SIGNAL ANALYSIS

**DETECTION OF WEAK JOINTS AND DAMAGES FOR BEAMS USING MACHINE LEARNING 8**

CRISTIAN TUFİŞI, GILBERT-RAINER GILICH, DAVID LUPU,  
ALEXANDRA-TEODORA AMAN

**DETERMINING THE POSITION OF TWO CRACKS IN A CANTILEVER BEAM USING ARTIFICIAL NEURAL NETWORKS 14**

MARIUS-VASILE POP, CRISTIAN TUFISI, GILBERT-RAINER GILICH

**USING VIBRATION DATA TO CLASSIFY CONDITIONS IN DISK STACK SEPARATORS 21**

SILKE MERKELBACH, LAMEYA AFROZE, NILS JANSSEN,  
SEBASTIAN VON ENZBERG, ARNO KÜHN, ROMAN DUMITRESCU

### VIBRATION CONTROL, GENERATION AND HARVESTING

**MULTI-AXIS VIBRATION TEST TECHNOLOGY OF SATELLITE BASED ON VECTOR-FIXTURE'S DESIGN AND APPLICATIONS 27**

XIAOHUA LIANG, WEI ZHAO, MIN DONG, HANPING QIU

### SEISMIC ENGINEERING AND APPLICATIONS

**SIMULATION ANALYSIS ON SEISMIC DYNAMIC RESPONSE OF PILE SUPPORTED TUNNELS IN DEEP BACKFILL AREA OF SOIL-ROCK MIXTURE 33**

GUOSHUN SHEN, YUANHAO LOU, JIANGUO WU, XIAOGUANG JIN,  
YUNCHUAN XUE

MODAL ANALYSIS AND APPLICATIONS

<b>THE INFLUENCE OF THE TRUSS BAR ON THE DYNAMIC BEHAVIOR OF A WARREN TRUSS BY CHANGING THE MODULUS OF ELASTICITY</b>	<b>41</b>
ZENO-IOSIF PRAISACH, DAN ALEXANDRU PÎRȘAN	
<b>DAMAGE LOCALIZATION IN BEAMS BASED ON THE ANALYSIS OF MODAL PARAMETERS</b>	<b>48</b>
GANGGANG SHA, MAOSEN CAO, WEN XIAO, MACIEJ RADZIEŃSKI, HONGFU ZUO	
<b>MODAL ANALYSIS OF A MILLING DYNAMOMETER CONSIDERED AS 1DOF SYSTEM</b>	<b>54</b>
MUNYARADZI INNOCENT MUPONA, IOAN CĂLIN ROȘCA	

CHAOS, NONLINEAR DYNAMICS AND APPLICATIONS

<b>ON THE ISSUE OF THE MOTION OF BALLS IN A DOUBLE PENDULUM</b>	<b>61</b>
GUNTIS STRAUTMANIS, IGORS SCHUKIN, GENNADIY FILIMONIKHIN, MAREKS MEZITIS, KRISTINE CARJOVA	
<b>GENETIC ENGINEERING – CONSTRUCTION OF A NETWORK OF ARBITRARY DIMENSION WITH PERIODIC ATTRACTOR</b>	<b>67</b>
INNA SAMULIK, FELIX SADYRBAEV	

ACOUSTICS, NOISE CONTROL AND ENGINEERING APPLICATIONS

<b>STUDY ON EMPIRICAL MODEL AND CFD ABOUT PRESSURE RISING IN CAB DURING DOOR CLOSURE</b>	<b>73</b>
LILI SU, ZUOFENG PAN, WENJIE QIU, HONGLIANG LI, TAO PENG, ZHIGUO ZHANG	

MATERIALS AND MEASUREMENTS IN ENGINEERING

<b>STUDIES ON TENSILE AND TEAR FRACTURE OF THE S8210 TARPAULIN</b>	<b>80</b>
PÎRVULESCU LIVIU DANIEL, STOIA DAN IOAN, MARȘAVINA LIVIU	
<b>RECYCLING TECHNOLOGY OF OLD CEMENT CONCRETE PAVEMENT IN HIGHWAYS</b>	<b>86</b>
XIA PENG	

MATHEMATICAL MODELS IN ENGINEERING

<b>APPLICATION OF DISTANCE FIELD-BASED ALGORITHM TO ADJACENT SPLINE SURFACES FOR COMPOSITE STRUCTURES BOUNDARY MODELING</b>	<b>92</b>
XIAOJING FAN	
<b>VIBRATION AND INSTABILITY OF A FLUID-CONVEYING NANOTUBE RESTING ON ELASTIC FOUNDATION SUBJECTED TO A MAGNETIC FIELD</b>	<b>99</b>
MING LI, JUNRU ZHOU, QIAN DENG, LIUFEI LV	





