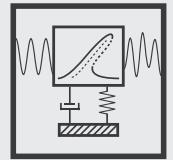


Mechanical Engineering

Multidisciplinary Engineering

Materials Science and Technology

Vibroengineering Procedia



Editor in Chief

Minvydas Ragulskis

Kaunas University of Technology, (Lithuania)

minvydas.ragulskis@ktu.lt

Editorial Board

Mahmoud Bayat

The University of Texas at Arlington, (United States)

ranjan@rowan.edu

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

Technische Universität Braunschweig, (Germany)

ersoy@marmara.edu.tr

Chen Lu

Beihang University, (China)

luchen@buaa.edu.cn

Nicola Nisticò

Sapienza University of Rome, (Italy)

nicola.nistico@uniroma1.it

Subhash Rakheja

Concordia University, (Canada)

subhash.rakheja@concordia.ca

Vinayak Ranjan

Rowan University, (United States)

vinayak.ranjan@bennett.edu.in

Miguel A. F. Sanjuan

University Rey Juan Carlos, (Spain)

miguel.sanjuan@urjc.es

Gangbing Song

University of Houston, (United States)

gsong@uh.edu

Vincentas Veikutis

Lithuanian University of Health Sciences, (Lithuania)

vincentas.veikutis@ismuni.lt

Xiao-Jun Yang

China University of Mining and Technology, (China)

xjyang@cumt.edu.cn

VP Vibroengineering PROCEEDIA

Vibroengineering PROCEEDIA Volume 55 contains papers presented at the 69th International Conference on Vibroengineering in Lviv, Ukraine, September 26-29, 2024. The main theme of the Conference is “Vibration Processes and Systems in Engineering”.

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.

ResearchGate: <https://www.researchgate.net>

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://cnlinker.cnpeak.com>

WanFang Data: <https://www.wanfangdata.com.cn>

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

Publisher: Extrica

69th International Conference on VIBROENGINEERING

September 26-29, 2024, in Lviv, Ukraine

The main theme of the conference: **Vibration Processes and Systems in Engineering**

General Topics of the Conference:

- Mechanical vibrations and applications
- Fault diagnosis based on vibration signal analysis
- Seismic engineering and applications
- Vibrations in transport engineering
- Vibration control, generation and harvesting
- Acoustics, noise control and engineering applications
- Flow induced structural vibrations
- Modal analysis and applications
- System dynamics in manufacturing system modelling
- Materials and measurements in engineering
- Mathematical models in engineering
- Vibration Engineering
- Robotics and Mechatronics
- Vibration problems in smart Transportation Systems and Logistics
- Energy (topics related to vibroengineering)
- Artificial Intelligence and Machine Learning in vibroengineering
- Signal Processing and electronic circuits (topics related to vibroengineering)
- Electronics and power Systems (topics related to vibroengineering)
- Data analysis and visualization (topics related to vibroengineering)

Chair:

Vitaliy Korendiy Lviv Polytechnic National University, Ukraine

Scientific Organizing Committee Members

Oleksii Lanets	Lviv Polytechnic National University
Gennadiy Filimonikhin	Central Ukrainian National Technical University
Mykola Yaroshevych	Lutsk National Technical University
Volodymyr Gurskyi	Lviv Polytechnic National University
Volodymyr Gurey	Lviv Polytechnic National University
Pavlo V. Krot	Wroclaw University of Science and Technology
Olena Lanets	Kingston University
Oleksandr Kachur	Lviv Polytechnic National University
Yurii Biletskyi	Lviv Polytechnic National University
Vasyl Trush	Karpenko Physico-Mechanical Institute of the NAS of Ukraine

Local Organizing Committee Members

Marian Bartoszek	Opole University of Technology
Andrzej Kawalec	Rzeszow University of Technology
Ivan Nazarenko	Kyiv National University of Construction and Architecture
Dmytro Kolosov	Dnipro University of Technology
Oleg Dedov	Kyiv National University of Construction and Architecture
Volodymyr Shatokhin	O. M. Beketov National University of Urban Economy in Kharkiv
Anatoliy Hordieiev	Khmelnyskyi National University
Ihor Sydorenko	Odesa Polytechnic National University
Ivan Aftanaziv	Lviv Polytechnic National University
Volodymyr Malashchenko	Lviv Polytechnic National University
Viacheslav Pasika	Lviv Polytechnic National University
Oleksandr Chernob	Admiral Makarov National University of Shipbuilding
Volodymyr Dzyura	Ternopil Ivan Puluj National Technical University
Vitalii Kovalchuk	Lviv Polytechnic National University
Roman Fedoryshyn	Lviv Polytechnic National University

Oleksandr Grytsenko	Lviv Polytechnic National University
Ihor Hurey	Lviv Polytechnic National University
Heorhiy Shynkarenko	Ivan Franko National University of Lviv
Roman Obertyukh	Vinnytsia National Technical University
Andrii Slabkyi	Vinnytsia National Technical University
Oleksandr Petrov	Vice-Rector for Scientific and Pedagogical Work and Management of the Educational Process
Ruslana Guminilovych	Lviv Polytechnic National University
Oksana Lytvyniak	Lviv Polytechnic National University
Marta Martynyak-Andrushko	Lviv Polytechnic National University
Andrii Kuzyshyn	Lviv Polytechnic National University
Rostyslav Predko	Lviv Polytechnic National University
Volodymyr Heletiy	Lviv Polytechnic National University
Lyudmyla Dziubyk	Lviv Polytechnic National University
Andy Augousti	Kingston University

VP Vibroengineering PROCEDIA

SEPTEMBER 2024. VOLUME 55, PAGES (1-278), ISSN PRINT 2345-0533, ISSN ONLINE 2538-8479

Contents

MECHANICAL VIBRATIONS AND APPLICATIONS

- ANALYSIS OF THE FORCE AND POWER CHARACTERISTICS OF A TWIN CRANK-TYPE MECHANISM OF AN ENHANCED VIBRATION EXCITER** 1
VITALIY KORENDIY, ROSTYSLAV PREDKO, YAROSLAV DANYLO,
OLEKSANDR YANIV
- DESIGN OF TREATMENT SCHEME AND IDENTIFICATION METHOD OF TREATMENT EFFECT FOR SOFT SOIL SUBGRADE** 8
WEN ZHANG, CHONG FAN, MING LEI, ZHIBIN LI
- PERFORMANCE IMPROVEMENT TECHNOLOGY OF SLUDGE ROADBED BASED ON VIBRATION SLOW RELEASE** 14
SAI TANG, YOUCHAO XIE, XIAOLIN LONG
- VIBRATION TECHNOLOGY TO PRODUCE HIGHLY ACTIVE HYDRATED LIME** 20
YAROSLAV YAKYMECHKO, ZENON BOROVETS, IRYNA LUTSYUK,
BOHDAN SOLOHUB, YAROSLAV DANYLO
- SELF-SYNCHRONISATION OF VIBRATION EXCITERS OF A BIHARMONIC VIBRATION DRIVE** 27
NIKOLAY YAROSHEVICH, VITALII PUTS, TETYANA YAROSHEVYCH,
VIKTOR MARTYNIUK
- CONSTRUCTING THE SCHEMATIC AND MATHEMATICAL MODEL OF THE DYNAMICS OF A VIBRATORY DRUM SEPARATOR** 33
DARIIA REBOT, VOLODYMYR TOPILNYTSKYI, INGA SVIDRAK,
ROSTYSLAV STOTSKO, ANZHELA SHEVCHUK
- SIMULATION OF LOCOMOTION CONDITIONS OF AN ENHANCED VIBRATION-DRIVEN IN-PIPE ROBOT** 40
VITALIY KORENDIY, OLEKSANDR KACHUR, ROMAN LITVIN, OLEH KOTSIUMBAS,
OLEH HRYTSUN

MATHEMATICAL MODELING OF THE POSSIBILITY OF CREATING INTERRESONANCE DISCRETE-CONTINUOUS VIBRATION TECHNOLOGICAL EQUIPMENT WITHOUT A SPRING OLEKSII LANETS, IRYNA DEREVENKO	47
BENDING OF A PIECEWISE HOMOGENEOUS PLATE WITH A CIRCULAR INTERFACIAL MATERIALS SEPARATION ZONE AND RADIAL CRACK CONSIDERING THE STRIP CONTACT OF ITS EDGES MYKOLA SLOBODIAN, IVAN ZVIZLO, OKSANA BILASH, MYKOLA SOROKATYI, OKSANA PETRUCHENKO, LUKIIAN MARKEVYCH	54
FAULT DIAGNOSIS BASED ON VIBRATION SIGNAL ANALYSIS	
DEVELOPMENT OF GEAR FAULT IDENTIFICATION OF WIND TURBINE'S TRANSMISSION SYSTEM BASED ON VMD AND FNN LI CAO, WENLEI SUN	60
VIBRATION CONTROL, GENERATION AND HARVESTING	
A BROADBAND VARIABLE FLUID DAMPER WITH FREQUENCY SELECTIVE VALVES FOR SPACECRAFT MICRO-VIBRATION ISOLATION WENLIN WANG, YONG LIU, RUXING CHEN, YANG DING, HAOYU LI	67
STUDY ON VIBRATION ISOLATION DESIGN USING ELASTOMERIC PADS AND ITS APPLICATION WEI XIA	73
DYNAMIC PERFORMANCE OF COMPOUND VIBRATION DAMPING DEVICE FOR SPORT FITNESS EQUIPMENT JINKUN LIU, YU SUN, QIANRU LI	79
MODAL ANALYSIS AND APPLICATIONS	
NUMERICAL STUDY ON SLOSHING IN COAXIAL SHELLS NEELAM CHOUDHARY, SAURABH RANA, KIRILL DEGTYAREV, DENYS KRIUTCHENKO, ELENA STRELNKOVA	86
APPLICATION OF MODAL ANALYSIS TO MULTI-OBJECTIVE OPTIMIZATION OF GEAR BOX SEN ZHANG	91
ANALYSIS AND OPTIMIZATION OF VIBRATING SCREEN STRUCTURE BASED ON MODAL SIMULATION YING LI, RAN YANG	97
MODAL CHARACTERISTICS ANALYSIS OF AGRICULTURAL VEHICLE SUPPORT FRAME XIAO SHI	104
PRESTRESSED MODAL AND FATIGUE CHARACTERISTIC ANALYSIS OF PEDAL MACHINE SUPPORT YU SUN, QIANRU LI, JINKUN LIU	111

VIBRATION IN TRANSPORTATION ENGINEERING

EFFECT OF PIER BEARING CONSTRUCTION ON NEARBY HIGH-SPEED RAIL LINE BRIDGES	118
TIAN HAO GONG, YUN LONG YAO	
ASSESSMENT OF THE IMPACT OF TE33A DIESEL LOCOMOTIVE WHEELSETS ON THE RAILWAY TRACK IN A STRAIGHT SECTION OF THE TRACK	125
SEIDULLA ABDULLAYEV, GABIT BAKYT, ASELE ABDULLAYEVA, ALIYA TOKTAMYSSOVA, KURMANGAZY SANSANBEKOV, ALDABERGEN BEKTILEV	
INVESTIGATION OF THE PROPAGATION CHARACTERISTICS OF TRAIN-INDUCED VIBRATION AT GUANGZHOU BAIYUN RAILWAY STATION	132
WEI XIA	
DETERMINATION OF KINEMATIC AND DYNAMIC CHARACTERISTICS OF A REVERSIBLE VIBRATORY CONVEYOR WITH AN ELECTROMAGNETIC DRIVE	138
VOLODYMYR GURSKYI, VITALIY KORENDIY, PAVLO KROT, OLEKSANDR DYSHEV	

FLOW INDUCED STRUCTURAL VIBRATIONS

GAS PARAMETER CHARACTERISTICS IN REFLUX FLOTATION CELL	145
BO GAO, JIANGUO LI, XUE YUAN, PENG CHEN	

ACOUSTICS, NOISE CONTROL AND ENGINEERING APPLICATIONS

NUMERICAL ANALYSIS OF THE INFLUENCE OF AIR FLOW CHANNEL ON EAR PRESSURE DURING DOOR CLOSURE	150
LEI REN, TAO ZHANG, YONGWEI TANG, ZHOU CAI, JIANWEN ZHOU, JINGCHANG CHEN	
NOISE CONTROL OF AUDIO RECOGNITION EQUIPMENT FOR MULTIMEDIA SYSTEM	156
QIANRU LI, JINKUN LIU, YU SUN	
ULTRASONIC MULTI-FREQUENCY PIEZOELECTRIC TRANSDUCER FOR GENERATION OF DIFFERENT SOUND PRESSURE FIELD PATTERNS	162
ANDRIUS ČEPONIS, DARIUS VAINORIUS, KRISTINA KILIKIČIENĖ, ARTŪRAS KILIKIČIUS	

MATERIALS AND MEASUREMENTS IN ENGINEERING

DEVELOPMENT OF A ROTATION AND SWING TORQUE DETECTION SYSTEM AFTER BEARING INSTALLATION	169
QINGGUO MENG, ZELIANG WANG, JINYAO MU, LINGCHUN KONG	
PROBLEMS OF RUTTING ON ASPHALT PAVEMENTS	175
BAGDAT TELTAYEV, YERBOL AITBAYEV, AZAMAT ZHAISANBAYEV	
MODELING OF UNSTEADY-STATE CREEP OF ASPHALT CONCRETE	181
ALIBAY ISKAKBAYEV, BAGDAT TELTAYEV, YERBOL AITBAYEV, AZAMAT ZHAISANBAYEV	

EFFECT OF WELDING AXIAL STRESSES ON THE STRENGTH OF A WELDED PIPE JOINT WITH A DEFECT	187
ANDRIY DZYUBYK, LIUDMYLA DZYUBYK, OLEH SOLOVIOV	
PREDICTION OF CONCRETE SULFURIC ACID CORROSION EVALUATION INDEX MODEL BASED ON GREY SYSTEM THEORY	194
MINGQIANG LIN, QINGLONG ZENG, FENGJUAN DAI, RAN ZHANG	
INFLUENCE OF THE WELDING CYCLE ON THE PARAMETERS OF MATERIAL DAMAGEABILITY OF THE HIGH-STRENGTH STEEL CONNECTION WITH AN AUSTENITIC SEAM	201
ANDRIY DZYUBYK, YAROSLAV KUSYI, LIUDMYLA DZYUBYK, IHOR NAZAR, VITALII IVANOV	
MATHEMATICAL MODELS IN ENGINEERING	
SIMULATION ANALYSIS OF HELICOPTER ROTOR BLADE BASED ON FLUID-STRUCTURE COUPLING	208
KAI ZHU, HONGYUE LIU	
STATISTICAL REVIEW OF LITERATURE SOURCES ON CARBON EMISSIONS DURING THE CSPB BASED ON KNOWLEDGE GRAPHS	214
GANG YAO, RUI LI, YANG YANG, XIAODONG CAI, YAN ZHOU, XINLONG MA, DAWU WANG, HAO QU	
INVESTIGATION OF THE LOAD'S VARIATION RATE EFFECT ON THE EFFORTS AND MOMENT INTENSITY FACTORS VALUES IN A CYLINDRICAL SHELL WITH A LONGITUDINAL CRACK	220
MYKOLA MAKHORKIN, TETIANA MAKHORKINA, IHOR DEMKIV, ANDRII KUNYNETS	
DESIGN METHODOLOGY OF PERMANENT MAGNET EDDY CURRENT BRAKE AND OPTIMIZATION BASED ON THE STACKELBERG GAME THEORY	226
YUMENG FAN, GUOLAI YANG	
MATHEMATICAL MODELING OF PIEZOCERAMIC SPHERICAL SHELL ACTUATOR FOR VIBRATION GENERATING DEVICES	233
CONSTANTINE BAZILO, VICTOR ANTONYUK, MAKSYM BONDARENKO, SERGII VYSLOUKH, OKSANA VOLOSHKO, ROMAN LITVIN	
A ZHU-WANG-TANG DAMAGE CONSTITUTIVE MODEL FOR SINTERED NdFeB CONSIDERING CRACK SPACING	241
YUWEI YAO, GUOLAI YANG, LEI LI, LIQUN WANG	
SYSTEM DYNAMICS IN MANUFACTURING SYSTEM MODELING	
RESEARCH ON THE LAUNCH DYNAMICS CHARACTERISTICS OF GATLING GUNS	247
KUN PENG HAO, LEI LI, GUO LAI YANG	
METHOD OF EXPERIMENTAL DETERMINATION OF THE EFFECTIVE AREA OF A PNEUMATIC SPRING OF HIGH-SPEED ROLLING STOCK	254
ANDRII KUZYSYHN, VITALII KOVALCHUK, IVAN KRAVETS, VITALII KORENDIY, YURIY ROYKO	
RESEARCH ON DYNAMIC CHARACTERISTICS OF WIND TURBINE'S TRANSMISSION SYSTEM CONSIDERING GEAR TOOTH LUBRICATION	261
LI CAO, WENLEI SUN, TAO GOU	

AN IMPROVED WAVELET THRESHOLD FUNCTION DENOISING METHOD BASED ON IGA OPTIMIZATION	267
MENGQI ZHANG, HAITAO MA, YIFAN WU, WEIBO CUI	
DYNAMICS OF SMART AND FUNCTIONALLY GRADED MATERIALS	
EXPERIMENTAL AND PERFORMANCE ANALYSIS OF CARBON/CARBON BOLT	273
JINGYI ZHOU, JIALE SHI	

SHORT DESCRIPTION ABOUT THIS CATEGORY

Vibroengineering is an abbreviation of two words: vibration and engineering. Vibration phenomena play an important role in a wide range of mechanical, structural, electromechanical systems. Vibration engineering covers such topics as mechanical vibrations and applications, fault diagnosis based on vibration signal analysis, seismic engineering, acoustics and noise control, energy harvesting and vibration generation.

Every consecutive Volume of Vibroengineering Procedia is dedicated to a separate conference in the series of International Conferences on Vibroengineering.