NORTH ATLANTIC UNIVERSITY UNION

Editors
Marina V. Shitikova
Luige Vladareanu
Claudio Guarnaccia

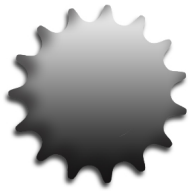
Recent Advances in Civil Engineering and Mechanics

- *Proceedings of the 5th European Conference of Civil Engineering (ECCIE '14)*
- *Proceedings of the 2nd International Conference on Computational and Experimental Mechanics (CEM '14)*
- *Proceedings of the 2nd International Conference on Optimization Techniques in Engineering (OTENG '14)*

Florence, Italy, November 22-24, 2014

Mathematics and Computers in Science and Engineering Series | 36

Recent Advances in Civil Engineering and Mechanics



RECENT ADVANCES in CIVIL ENGINEERING and MECHANICS

Proceedings of the 5th European Conference of Civil Engineering (ECCIE '14)

Proceedings of the 2nd International Conference on Computational and Experimental Mechanics (CEM '14)

Proceedings of the 2nd International Conference on Optimization Techniques in Engineering (OTENG '14)

Florence, Italy
November 22-24, 2014

Series: Mathematics and Computers in Science and Engineering Series | 36

ISSN: 2227-4588
ISBN: 978-960-474-403-9

RECENT ADVANCES in CIVIL ENGINEERING and MECHANICS

Proceedings of the 5th European Conference of Civil Engineering (ECCIE '14)

Proceedings of the 2nd International Conference on Computational and Experimental Mechanics (CEM '14)

Proceedings of the 2nd International Conference on Optimization Techniques in Engineering (OTENG '14)

Florence, Italy
November 22-24, 2014

Published by WSEAS Press
www.wseas.org

Copyright © 2014, by WSEAS Press

All the copyright of the present book belongs to the World Scientific and Engineering Academy and Society Press. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the Editor of World Scientific and Engineering Academy and Society Press.

All papers of the present volume were peer reviewed by no less that two independent reviewers. Acceptance was granted when both reviewers' recommendations were positive.

ISSN: 2227-4588
ISBN: 978-960-474-403-9

RECENT ADVANCES in CIVIL ENGINEERING and MECHANICS

Proceedings of the 5th European Conference of Civil Engineering (ECCIE '14)

Proceedings of the 2nd International Conference on Computational and Experimental Mechanics (CEM '14)

Proceedings of the 2nd International Conference on Optimization Techniques in Engineering (OTENG '14)

Florence, Italy
November 22-24, 2014

Editors:
Prof. M. V. Shitikova, Voronezh State University of Architecture, Russia
Prof. Luige Vladareanu, Romanian Academy, Institute of Solid Mechanics, Romania
Dr. Claudio Guarnaccia, University of Salerno, Italy

Committee Members-Reviewers:
Mihaela Toderas
Corneliu Bob
Adrian Ciutina
Valeriu Stoian
Luis Loures
Nabil Mohareb
Ahmet Arslan
Kemal Tutuncu
Humar Kahramanli
Saad Bakkali
Zohreh Salavatizadeh
Karim Shirazi
Ahadollah Azami
Ali Dashti Shafiei
Harry Coomar Shumsher Rughooputh
Ana Maria Tavares Martins
Calbureanu Popescu Madalina Xenia
Konstantinos Vogiatzis
Catarina Luísa Camarinhas
Reza Fathipour
Khaled Galal Ahmed
Sorin-Codrut Florut
Ali Salehipour
Oprita Razvan
José Nunes
Feridoun Nahidi Azar
Ayca Tokuc
Mehdi Seyyed Almasi
Jon Burley
Maria Bostenaru Dan
Walid Oueslati
Al Emran Ismail
Zengshi Chen
Hamed Ziaeipoor
Guoxiang Liu
Natasa Trisovic
Madalina Xenia
Claudio Guarnaccia
Elena Mereuta
Ibrahim Canak
Alina Adriana Minea
Konstantin Volkov
Luís Roseiro
M. M. Noor
Vasile Cojocaru
Jose Alberto Duarte Moller
Sorinel Oprisan
Gilbert-Rainer Gillich
Diana Cotoros
Roots Larissa
Chunwei
Valeriy Perminov
Marius Marcu
Eleazar Jimenez Serrano
Kevin Kam Fung Yuen
Huashui Zhan
Jiri Hrebicek
Hongjun Liu
Mahdi Faraji
Diego Pinto Roa
Amjad Mahmood
David Nicoleta
Claudia-Georgeta Carstea
Snezhana Georgieva Gocheva-Ilieva
Elena Scutelnicu
Dana Anderson
Muhammet Koksal
Md. Shamim Akhter
Sk. Sarif Hassan
Emmanuel Lopez-Neri
Vassos Vassiliou
Yuqing Zhou
Gabriella Bognar
Zanariah Abdul Majid
U. C. Jha
Anca Croitoru
Hamideh Eskandari
Bhagwati Prasad
Agoujil Said
Arun Goel
Athanasios Galanis
Ayman Mohamed El Ansary
Bahar Razavi
Chao Wang
Chunwei Lu Wini
Hugo Rodrigues
Ioana Adrian
Iures Liana
Majid Mohammed Ali
Naveen G. Ramunigari
Oguz Arslan
Rosli Abu Bakar
Sorin Dan
Anna Maria Pellegrino
Chiranth Srinivasan
Kai Xu
Noor Fadiya Mohd Noor
Quangen Du
Valeriu Dragan
Zaini Ahmad
Cledson Akio Sakurai
Mihaela Neamtu

Table of Contents

Plenary Lecture 1: Dynamics of Suspension Bridges: Nonlinear Free and Forced Vibrations with Internal Resonances 10
Marina V. Shitikova

Theoretical Framework and Engineering Applications of Hamiltonian Structural Analysis Method 11
Marcello Arici, Michele Fabio Granata

Comparison Among MUSCL, ENO, and WENO Procedures as Applied to Reentry Flows in 2D – Short Report 25
Edisson Sávio De Góes Maciel, Amilcar Porto Pimenta, Nikos E. Mastorakis

Numerical Analysis in Swirling Flames 35
Teresa Parra-Santos, Miguel A. Rodriguez-Beneite, J. Ruben Perez-Dominguez, Francisco Castro-Ruiz

A Flexible Multi-Body Model for the Dynamics and Aeroelastic Stability of Cable-Supported Bridge Cross-Sections 39
Marco Lepidi, Vincenzo Gattulli, Giuseppe Piccardo

Influence of Crash Box on Automotive Crashworthiness 49
Mihail Daniel Iozsa, Dan Alexandru Micu, Gheorghe Frătilă, Florin-Cristian Antonache

Rocking and Overturning Prevention for Non-Structural Monolithic Objects Under Seismic Excitations Through Base Isolation: A Case Study in Ferrara (ITALY) 55
A. Chiozzi, M. Simoni, A. Tralli

Correlation between EIS Measurements and Relative Humidity Distribution in Aerated Concrete Masonry Constructions 67
Sanita Rubene, Martins Vilnitis

Frequency Analysis of Annual Maximum Earthquakes for Askale, Erzurum (Turkey) Province 72
Serkan Senocak, Oğuz Akin Düzgün, Selđm Sengül

Optimal Boundary Control in Thermal Fluid Dynamics Problems with Different Smoothness Control 79
Daniele Cerroni, Sandro Manservisi, Filippo Menghini

Robustness against Time Delay and Control Force Capacity for Torsionally Irregular Active Controlled Structures 88
Sinan Melih Nigdeli, M. Hasan Boduroğlu

Maintenance Optimization Using Fuzzy Logic Controlled Genetic Algorithm 95
Imane Maatouk, Nazir Chebbo, Iman Jarkass, Eric Chatelet

The Effect of Moisture Content of Insulation Boards on the Adhesion Strength of ETICS 103
Eneli Liisma, Lembi-Merike Raado, Silver Lumi, Irene Lill, Virgo Sulakatko

Dynamic Shaking and Control Strategies for Mitigating Induced Structural Vibrations 109
Alessandro Baratta, Ileana Corbi, Ottavia Corbi

Multiple Response Optimization of Tuned Mass Dampers 115
Sinan Melih Nigdeli, Gebrail Bekdaş

The Expertise in the Real Estate Appraisal in Italy 120
Marina Ciuna, Marco Simonotti, Francesca Salvo

Safety of Critical Facilities 130
Dana Prochazkova

Investigating the Behavior of the Truss Structures with Unilateral Boundary Conditions 140
Rasim Temür, Gebrail Bekdaş, Yusuf Sait Türkan, Yusuf Cengiz Toklu

A New Moving Mesh Technique for Monolithic Multigrid Fluid-Structure Interaction Solver 146
Daniele Cerroni, Sandro Manservisi, Filippo Menghini

Automotive Engine Air Cleaners – Maintenance Investigations 153
Marius Toma

Methods for the Assessment of Historical Masonry Arches 160
Lucio Nobile, Veronica Bartolomeo

The Study of Single Cavitation Bubble Generated with LIB Technique and its Force Impact on the Solid Wall 168
D. Jasikova, M. Muller, M. Kotek, V. Kopecky

Calibration of Speed-Density Relationships for Freeways in Aimsun 176
Raffaele Mauro, Orazio Giuffrè, Anna Granà, Sandro Chiappone

Metaheuristic Optimization for theDesign of Reinforced Concrete Beams under Flexure Moments 184
Gebrail Bekdaş, Sinan Melih Nigdeli, Xin-She Yang

Validation of Fire Dynamics Simulator (FDS) for Natural Convection in a Differentially Heated Square Cavity 189
Matteo Pachera, Pierfrancesco Brunello, Marco Raciti Castelli

Analytical Estimation of the Hood Behaviour during an Impact with a Pedestrian Head 195
Mihail Daniel Iozsa, Dan Alexandru Micu, Stan Cornelia, Ionescu Angel Ionu

Gap Acceptance Analysis in an Urban Intersection through a Video Acquired by an UAV 199
Giuseppe Salvo, Luigi Caruso, Alessandro Scordo

Cost Optimization of Reinforced Concrete Cylindrical Wallsfor Different Material Properties 206
Gebrail Bekdaş

Analysis of Embodied Energy and CO2 in Buildings Structures under Seismic Action: Wood, Reinforced Concrete, Steel 211
Gianpaolo Rosati, Barbara Zasso, Elda Altomare

Managing Project Activities System using Genetic Algorithm 218
Milena Karova, Gergana Todorova, Ivaylo Penev, Mariana Todorova

Structural Design and Environmental Impact of Infrastructures 225
Monica Pasca

Analyses of Truss Structures under Thermal Effects 235
Gebrail Bekdaş, Rasim Temür, Yusuf Cengiz Toklu

Size-Dependent Failure Strength of Silicon Nanofilms 240
Xiao Ru Zhuo, Hyeon Gyu Beom

Loading Tests of Selected Details of Temporary Modular Steel Truss Footbridge for Pedestrians and Cyclists 244
Michal Štrba, Marcela Karmazínová, Pavel Simon

Delay in Government Project Delivery in Kedah, Malaysia 248
Azlan Othman, Syuhaida Ismail

Colour Removal from Textile Industry Wastewater Using Lemna Minuta Lin 255
Sivakumar Durairaj

An Overview on the New Recommendations and Requirements on Radon Protection (2013/59/Euratom) and the Actual State of Art : The Case-Study of the Campania Region, Southern Italy 262
Simona Mancini, Michele Guida, Domenico Guida, Albina Cuomo

Traceability of AC High Voltage Measurements Up to 100 kV at NIS 272
Ali M. El-Rifaie, Hala M. Abdel Mageed, Omar M. Aladdin

Activities Modelling by Means of Process Ontologies 276
Armando Trento, Antonio Fioravanti

Authors Index 283

Plenary Lecture 1

Dynamics of Suspension Bridges: Nonlinear Free and Forced Vibrations with Internal Resonances

Professor Marina V. Shitikova
co-author: Yuriy A. Rossikhin
Research Center on Dynamics of Solids and Structures
Voronezh State University of Architecture and Civil Engineering
Russia
E-mail: shitikova@vmail.ru

Abstract: This survey paper is devoted to the analysis of dynamic behavior of suspension bridges subjected to the different conditions of the internal resonances.
First we consider nonlinear free damped vibrations of a suspension bridge with a bisymmetric stiffening girder under the conditions of the internal resonance one-to-one, i.e., when natural frequencies of two dominating modes - a certain mode of vertical vibrations and a certain mode of torsional vibrations - are approximately equal to each other, or two-to-one, when one frequency is twice larger than the other. Damping features of the system are defined by fractional derivatives with fractional parameters (the orders of the fractional derivatives) changing from zero to one. It is assumed that the amplitudes of vibrations are small but finite values, and the method of multiple scales is used as a method of solution. The influence of uncertainty in choosing the fractional parameters on the character of nonlinear damped vibrations of suspension bridges is investigated.
Then nonlinear forced vibrations of suspension bridges, when the frequency of an external force is approaching one of the natural frequencies of the suspension system, which, in its turn, undergoes the conditions of the one-to-one internal resonance, are investigated via the method of multiple time scales. The damping features are described by the fractional derivative, which is interpreted as the fractional power of the differentiation operator. The influence of the fractional parameters (orders of fractional derivatives) on the motion of the suspension bridge model is investigated.

Brief Biography of the Speaker: Marina V. Shitikova is a Soros Professor of the Department of Structural Mechanics and a leading Researcher of the Research Center of Dynamics of Solids and Structures at Voronezh State University of Architecture and Civil Engineering in Russia. She received her MEng in Civil Engineering in 1982, a PhD degree in Structural Mechanics in 1987 from Voronezh Civil Engineering Institute, a DSc degree in Solid Mechanics in 1995 from the Institute for Problems in Mechanics, Russian Academy of Sciences and a Professorship in 1995 from Voronezh State University of Architecture and Civil Engineering. Since 1994, she has been an Associate Member of the Acoustical Society of America, since 1995 she has been a Member of the EUROMECH, GAMM, the ASME International, and Russian Association “Women in Science and Education”. She has published more than 200 papers dealing with structural mechanics, vibrations, wave dynamics, and acoustics. Her biography has been included in Who's Who in the World, Who's Who in Science and Technology, 2000 Outstanding Scientists of the 20th Century. She received a Commemorative Medal "1997 Woman of the Year" from the American Biographical Institute. In 1998 she was awarded the Russian President Fellowship for Outstanding Young Doctors of Sciences. Since 2009 she is the Head of the Department of International Education and Cooperation at Voronezh State University of Architecture and Civil Engineering. She was a Fulbright Fellow at Rice University, Houston, Texas in 2007-2008 and a Visiting Professor in different universities.