

Modern Practice in Stress and Vibration Analysis 2012

(MPSVA 2012)

Journal of Physics: Conference Series Volume 382

**Glasgow, Scotland
29-31 August 2012**

**ISBN: 978-1-62276-849-3
ISSN: 1742-6588**

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2012) by the Institute of Physics
All rights reserved.

Printed by Curran Associates, Inc. (2013)

For permission requests, please contact the Institute of Physics
at the address below.

Institute of Physics
Dirac House, Temple Back
Bristol BS1 6BE UK

Phone: 44 1 17 929 7481
Fax: 44 1 17 920 0979

techtracking@iop.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2634
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

KEYNOTE SPEAKERS

012001 Nonlinear Dynamics Enabled Systems Design and Control	1
<i>W Lacarbonara</i>	
012002 Frictional Systems Under Periodic Loads — History-dependence, Non-uniqueness and Energy Dissipation	9
<i>J R Barber</i>	
012003 Structural Health Monitoring by Means of Elastic Wave Propagation	22
<i>W Ostachowicz, M Radzienski</i>	
012004 Nonlinear Phenomena in Mechanical System Dynamics	30
<i>J Warminski, K Kecik, A Mitura, M Bochenski</i>	

CONTRIBUTED PAPERS

VIBRATION IN STRUCTURAL ELEMENTS

012005 Numerical Study of a Jeffcott Rotor Model with a Snubber Ring	38
<i>J P Chávez, M Wiercigroch, H Demrdash</i>	
012006 Linear Modal Analysis of L-shaped Beam Structures – Parametric Studies	44
<i>F Georgiades, J Warminski, M P Cartmell</i>	
012007 An Analysis of the Effects of the Orientation Angle of a Surface Crack on the Vibration of an Isotropic Plate	50
<i>R Ismail, M P Cartmell</i>	
012008 The Dynamic Response of an Euler-Bernoulli Beam on an Elastic Foundation by Finite Element Analysis using the Exact Stiffness Matrix	56
<i>J S Kim, M K Kim</i>	
012009 Crush Can Behaviour as an Energy Absorber in a Frontal Impact	62
<i>A Bhuyan, O Gamilova</i>	
012010 Vibration Analysis of a Trimorph Plate As a Precursor Model for Smart Automotive Bodywork	69
<i>A Big-Alabo, M P Cartmell</i>	
012011 Free Vibration of a Rod Undergoing Finite Strain	75
<i>S M Mousavi, S J Fariborz</i>	

MANUFACTURING APPLICATIONS

012012 Chatter Control in the Milling Process of Composite Materials	83
<i>K Kecik, R Rusinek, J Warminski, A Weremczuk</i>	
012013 A Study of Weld Quality in Ultrasonic Spot Welding of Similar and Dissimilar Metals	89
<i>Z Al-Sarraf, M Lucas</i>	
012014 Finite Element Analysis of Drilling in Carbon Fiber Reinforced Polymer Composites	95
<i>V A Phadnis, A Roy, V V Silberschmidt</i>	
012015 Damage in Woven CFRP Laminates Subjected to Low Velocity Impacts	102
<i>H Ullah, A A Abdel-Wahab, A R Harland, V V Silberschmidt</i>	
012016 Ultrasonically Assisted Turning of Ti-6Al-2Sn-4Zr-6Mo	108
<i>R Muhammad, A Maurotto, A Roy, V V Silberschmidt</i>	
012017 Application of Smooth-Particle Hydrodynamics in Metal Machining	115
<i>A Zahedi, S Li, A Roy, V Babitsky, V V Silberschmidt</i>	
012018 Strength of Fibres in Low-density Thermally Bonded Nonwovens: An Experimental Investigation	120
<i>F Farukh, E Demirci, M Acar, B Pourdeyhimi, V V Silberschmidt</i>	
012019 Cutting Forces in Ultrasonically Assisted Drilling of Carbon Fibre-reinforced Plastics	127
<i>F Makhdam, L T Jennings, A Roy, V V Silberschmidt</i>	

STRUCTURAL MECHANICS

012020 Vibration Analysis of Frame Structures Using Wavelet Finite Elements	133
<i>M Musuva, C Mares</i>	
012021 Rational Placement of a Macro Fibre Composite Actuator in Composite Rotating Beams	139
<i>J Latalski, F Georgiades, J Warminski</i>	
012022 Nonlinear Stress Analysis of Plates Under Thermo-mechanical Loads	145
<i>P Khazaeinejad, A S Usmani, O Laghrouche</i>	

ENERGY HARVESTING

012023 Energy Harvesting from Human Motion: An Evaluation of Current Nonlinear Energy Harvesting Solutions	151
<i>P L Green, E Papatheou, N D Sims</i>	
012024 An Experimental Study of Stochastic Resonance in a Bistable Mechanical System	157
<i>H Hu, K Nakano, M P Cartmell, R Zheng, M Ogori</i>	
012025 Energy Harvesting for Aerospace Structural Health Monitoring Systems	163
<i>M R Pearson, M J Eaton, R Pullin, C A Featherston, K M Holford</i>	

MICROMECHANICS AND MATERIALS

012026 Amplitude Dependent Damping from Granular Viscoelastics	169
<i>B Darabi, J A Rongong</i>	
012027 Strength Knock-down Assessment of Porosity in Composites: Modelling, Characterising and Specimen Manufacture	175
<i>A J McMillan, E Archer, A McIlhagger, G Lelong</i>	
012028 Efficient Parametric Optimisation of Support Loss in MEMS Beam Resonators Via an Enhanced Rayleigh-Ritz Method	180
<i>H T D Grigg, B J Gallacher</i>	

NONLINEAR SYSTEM IDENTIFICATION

012029 Experimental Validation of the Orthogonalised Reverse Path Method Using a Nonlinear Beam	186
<i>P Muhamed, K Worden, N D Sims</i>	
012030 An Inverse Vibration-based Approach Towards Modelling and Damage Identification in Nonlinearly Vibrating Structures. Application for Delamination Detection in a Composite Beam	193
<i>I Trendafilova</i>	
012031 Analysis of Reciprocity Breakdown in Nonlinear Systems	199
<i>G Manson, K Worden, M Wood</i>	
012032 A Study of the Use of Artificial Neural Networks to Estimate Dynamic Displacements Due to Dynamic Loads in Bridges	206
<i>S Ok, W Son, Y M Lim</i>	
012033 A Simple Frequency-based Delamination Detection and Localization Method Without Baseline Model	212
<i>A Guechaichia, I Trendafilova</i>	

EXPERIMENTAL STRESS AND STRAIN ANALYSIS

012034 3D Digital Image Correlation (DIC) Analysis in Relation to Damage Development in Third Generation AA2050-T851 Aluminium Alloy	219
<i>M Lopez-Pedrosa, M Zanganeh, Y H Tai, C Pinna</i>	
012035 Calibration of a 3-D Digital Image Correlation System for Large Deformation Contact Problems	223
<i>X H Tan, Y L Kang, E A Patterson</i>	

CONTROL OF VIBRATION IN STRUCTURES

012036 Optimal Placement of Sensors and Actuators for Active Vibration Reduction of a Flexible Structure Using a Genetic Algorithm Based on Modified H_∞	230
<i>J M Hale, A H Daraji</i>	
012037 The Nonstationary, Nonlinear Dynamic Interactions in Slender Continua Deployed in High-rise Vertical Transportation Systems in the Modern Built Environment	236
<i>S Kaczmarczyk</i>	
012038 On-line Identification of Time-varying Systems Equipped with Adaptive Control	242
<i>R Ceravolo, E Matta, A Quattrone, C Surace, L Z Fragonara</i>	
012039 Active Vibration Reduction of a Flexible Structure Bonded with Optimised Piezoelectric Pairs Using Half and Quarter Chromosomes in Genetic Algorithms	248
<i>A H Daraji, J M Hale</i>	
012040 TMD-Based Structural Control of High Performance Steel Bridges	254
<i>T M Kim, G Kim, M K Kim</i>	
012041 Optimal Control Methods for Vertical and Horizontal Beam Dynamics	260
<i>A Mitura, J Warminski, M Bochenski</i>	

SPECIAL SESSION ON IMPACT

012042 The Design of Impact Absorbing Structures for Additive Manufacture	265
<i>J Brennan-Craddock, D Brackett, R Wildman, R Hague</i>	
012043 Finite Element Analysis of the High Strain Rate Testing of Polymeric Materials	272
<i>C V Gorwade, A S Alghamdi, I A Ashcroft, V V Silberschmidt, M Song</i>	

BIOMEDICAL APPLICATIONS AND BIOMECHANICS

012044 Inspiration from Victorian times in Ultrasonic Surgical Tool Design	278
<i>O A Ganilova, M Lucas, Z Pan, A Y Muir, H Simpson</i>	
012045 Variability and Anisotropy of Fracture Toughness of Cortical Bone Tissue	285
<i>A Abdel-Wahab, N Nordin, V Silberschmidt</i>	

STRUCTURAL HEALTH MONITORING

012046 Cointegration and Why it Works for SHM	291
<i>E J Cross, K Worden</i>	
012047 Novelty Detection Applied to Vibration Data from a CX-100 Wind Turbine Blade Under Fatigue Loading	297
<i>N Dervilis, M Choi, I Antoniadou, K M Farinholt, S G Taylor, R J Barthorpe, G Park, K Worden, C R Farrar</i>	
012048 Damping Estimation of a Loosely Supported Single U-bend Tube Used in a Steam Generator	303
<i>S Kaneko, R Kobayashi, T Watanabe, T Nakamura</i>	
012049 On the Development of a Damage Detection System using Macro-fibre Composite Sensors	309
<i>R Pullin, M J Eaton, M R Pearson, C Featherston, J Lees, J Naylon, A Kural, D J Simpson, K Holford</i>	
012050 Identification of the Onset of Cracking in Gear Teeth Using Acoustic Emission	315
<i>R Pullin, A Clarke, M J Eaton, M R Pearson, K M Holford</i>	
012051 Non-linear Characterisation of the Physical Model of an Ancient Masonry Bridge	321
<i>L Zanotti Fragonara, R Ceravolo, E Matta, A Quattrone, A De Stefano, M Pecorelli</i>	

MODELLING

012052 Nonlinear Normal Vibration Modes in the Dynamics of Nonlinear Elastic Systems	327
<i>Yu V Mikhlin, N V Perepelkin, A A Klimenko, E Harutyunyan</i>	
012053 Green's Function and Bloch Theory for the Analysis of the Dynamic Response of a Periodically Supported Beam to a Moving Load	333
<i>R Lassoued, M Lecheheb, G Bonnet</i>	
012054 Static and Dynamic Analysis of Isotropic Shell Structures by the Spectral Finite Element Method	340
<i>A Zak, M Krawczuk</i>	

012055 On the Oscillation Death Phenomenon in a Double Pendulum System with Autoparametric Interaction	346
<i>I Kovacic, M Zukovic, M P Cartmell</i>	
012056 The Fractional and Nonlinear Magneto-Flexible Rod	352
<i>S A David, J M Balthazar, B H S Julio, C Oliveira</i>	
012057 Aerofoil Flutter: Fluid-Mechanical Analysis and Wind Tunnel Testing	358
<i>A L Wenssuslaus, A J McMillan</i>	

NON-DESTRUCTIVE EVALUATION

012058 The Application of Thermoelastic Stress Analysis to Full-scale Aerospace Structures	364
<i>R K Fruehmann, J M Dulieu-Barton, S Quinn, J Peton-Walter, P A N Mousty</i>	
012059 Vibration Tests on Dismounted Bridge Beams and Effects of Deterioration	370
<i>A Quattrone, E Matta, L Z Fragonara, R Ceravolo, A De Stefano</i>	
012060 Time-Frequency Analysis of Long Range Ultrasonic Signals	376
<i>K Thornicroft, C Mares, P Mudge</i>	

HIGH POWER ULTRASONIC SYSTEMS

012061 An Analytical Model of a Longitudinal-torsional Ultrasonic Transducer	382
<i>H Al-Budairi, M Lucas</i>	
012062 Numerical Analysis and Noise Detection for Design Optimisation of an Ultrasonic Transducer	388
<i>F Makhdam, A Roy, V V Silberschmidt</i>	
012063 Vibration Characterisation of Cymbal Transducers for Power Ultrasonic Applications	394
<i>F Bejarano, A Feeney, M Lucas</i>	

Author Index