

27th Conference and Exposition on Structural Dynamics 2009

(IMAC XXVII)

**Orlando, Florida, USA
9-12 February 2009**

Volume 1 of 4

ISBN: 978-1-60560-961-4

Printed from e-media with permission by:

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

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

Copyright© (2009) by the Society for Experimental Mechanics
All rights reserved.

Printed by Curran Associates, Inc. (2009)

For permission requests, please contact the Society for Experimental Mechanics
at the address below.

Society for Experimental Mechanics
7 School Street
Bethel, Connecticut 06801

Phone: 203 790 6373
Fax: 203 790 4472

www.sem.org

TABLE OF CONTENTS

Volume 1

On the Role of Modal Coupling in Model Updating	1
<i>J.L. du Bois, N.A.J. Lieven, S. Adhikari</i>	
Expansion of Transient Operating Data	15
<i>C. Chipman, P. Avitabile</i>	
Localisation and Curve Veering: A Different Perspective on Modal Interactions.....	29
<i>J.L. du Bois, N.A.J. Lieven, S. Adhikari</i>	
Measuring Acoustic Source Impedance Using Wave Decomposition.....	40
<i>J. Liu, D.W. Herrin</i>	
Noise Reduction in Truck Cabin by Design Change of Floor Panel.....	47
<i>N. Okubo, T. Okumura, T. Toi</i>	
Improved Low Frequency Accelerometer Calibration.....	54
<i>M.I. Schiefer, R.W. Bono, R.D. Sill</i>	
Estimating the Uncertainty in Modal Parameters Using SMAC	63
<i>T.W. Simmermacher, R.L. Mayes</i>	
Influence of the Measurement Mesh on the Spread of the Modal Parameters of a Stadium Grandstand, Identified via Operational Modal Analysis Techniques	74
<i>A. Caprioli, M. Redaelli, M. Vanali</i>	
Modeling and Detection of Delamination Damage in Composite Structures.....	84
<i>K.D. Murphy, J.M. Nichols</i>	
Transportable Vibration Calibration System Employing E-trace Scheme.....	93
<i>T. Usuda, A.O. Oota, H. Nozato, Y. Hino, H. Aoyama</i>	
Effect of Functionally Graded Materials on Parametric Resonances of Shafts.....	100
<i>A.J. Mazzei, Jr., R.A. Scott</i>	
An Introduction to the Receptance Method in Active Vibration Control.....	108
<i>J.E. Mottershead, M.G. Tehrani, Y.M. Ram</i>	
Integrated On-line Structural Health Monitoring Architecture of the Donghai Bridge	118
<i>K. Veggeberg, N. Zhang</i>	
Impedance-based Health Monitoring and Mechanical Testing of Structures	125
<i>L.V. Palomino, J.R.V. de Moura, Jr., K.M. Tsuruta, D.A. Rade, V. Steffen, Jr.</i>	
Towards a Wireless Powering and Interrogation Strategy for Rotorcraft Health Monitoring	132
<i>J.L. du Bois, N.A.J. Lieven, M.D. Todd</i>	
Location and Identification of Damping Parameters.....	146
<i>M. Prandina, J.E. Mottershead, E. Bonisoli</i>	
Identification of Dynamic Young's Modulus and Damping of Isotropic Plastic Materials	155
<i>P.G. Blaschke, B. Mueller-Held</i>	
Constrained Layer Damping Treatment Design for Aircraft Landing Gear	162
<i>C. Gallimore, K. Kochersberger, R. DeVita</i>	
Experimental Evaluation of the Damping Properties of Beams and Thin-walled Structures Made of Polymeric Materials	172
<i>G. Catania, S. Sorrentino</i>	
Heat Exchanger Tube Failure Analysis via Modal and Operational Tests.....	184
<i>M.P. Proulx, T.F. Dowd</i>	

Operational Modal Analysis on a Wind Turbine Gearbox	192
<i>S. Gade, R. Schlombs, C. Hundek, C. Fenselau</i>	
Vibration Site Survey Measurements and Combined System Modal Analysis	203
<i>T.J. Copeland</i>	
A Simplified Dynamic Model for a Surface Mining Excavator Using Design and Experimental Data	214
<i>T.Gh. Cioara, I. Nicolae, I. Cires, D. Cristea, D. Cires</i>	
Optical Non-contacting Vibration Measurement of Rotating Turbine Blades	222
<i>M.N. Helfrick, P. Pingle, C. Niezrecki, P. Avitabile</i>	
Shaker/Stinger Effects on Measured Frequency Response Functions	227
<i>D. Cloutier, P. Avitabile, R.W. Bono, M. Peres</i>	
Solutions-based Approach for Noise Reduction in Washing Machines	234
<i>D. Barpanda, J.M. Tudor</i>	
Optimal Actuator and Sensor Placement for Active Sensing	247
<i>E.B. Flynn, M.D. Todd</i>	
Wireless Sensor Network Developments for Physical Prototype Testing	260
<i>B. Peeters, T. Torfs, E. Moya, H. Van der Auweraer</i>	
Assessment of Ground-borne Vibration Impacts on Sensitive Facilities	271
<i>B. Pridham</i>	
Acoustical Relevance of Vibrating Structures	282
<i>R. Sottek</i>	
Three Dimensional Experimental Modal Analysis on a Water Filled Cylindrical Shell	292
<i>W.K. Bonness, J.B. Fahnlne, D.E. Capone</i>	
Application of the Vincent Circle to Vibro-acoustic Systems	298
<i>D.W. Herrin, G. Sampath, J. Liu, H. Song</i>	
Reducing Sound Radiation From a Plate Through Tuning/Modifying Boundary Supports	308
<i>X.F. Zhang, W.L. Li</i>	
Sound Field Reconstruction Using Inverse Boundary Element Method	317
<i>J. Liu, J. Han, D.W. Herrin, S. Cheah, D.G. Kato</i>	
Propagation of Acoustic Waves in Random Media	325
<i>M. Khenafou, M. Daïri, A. Brezini, M. Sebbani</i>	
Vibro-acoustic Simulations of Ships by Coupled Fast BE-FE Approaches	331
<i>D. Brunner, M. Junge, M. Wilken, C. Cabos, L. Gaul</i>	
Modal Testing Results of a Nuclear Fuel Rod and Its Model Updating	341
<i>N.G. Park, H. Rhee, J.M. Suh, S.Y. Jeon, K.T. Kim, K.L. Jeon</i>	
Model Validation and Response Prediction of a Flexible Rotor With Magnetic Bearing	348
<i>Q. Guo, Z. Xie, B. Zhang, L. Zhang</i>	
ISS Stage 12A Post-flight Modal Analysis, Model Validation and Correlation	356
<i>K.L. Fitzpatrick, M.S. Grygier, T.J. Bartkiewicz</i>	
Verification and Validation for Induction Heating	387
<i>K. Lam, T.B. Tippetts, D.W. Allen</i>	
Damping Identification From Measurements on an Industrial Structure	409
<i>B. Faverjon, P. Ladevèze, D. Néron, J.F. Durand</i>	
Acoustic-structure Interaction in Rocket Engines: Validation Testing	418
<i>R.B. Davis, S.S. Joji, R.A. Parks, A.M. Brown</i>	
Interactions of Modal Analysis and Wave Propagation Using Timoshenko Beam Model	427
<i>A.M. Iglesias, A.L. Wicks, T. Schwartz</i>	

Active/Passive Vibration Control of Continuous Systems by Zero Assignment	436
<i>D.A. Holt, K.V. Singh</i>	
Modal Analysis of a Nonlinear Structure With Cyclic Symmetry	444
<i>M. Peeters, R. Vigi��, G. Kerschen, J.-C. Golinval</i>	
Model-based Impact Monitoring by Inverse Methods Using Particle Swarm Optimization	460
<i>I. M��ller, F.K. Chang</i>	
Estimating the Degree of Nonlinearity in Transient Responses With Zeroed Early-time Fast Fourier Transforms	475
<i>M.S. Allen, R.L. Mayes</i>	
Spur Gear Vibration Mitigation by Means of Energy Pumping	493
<i>G. Scaglierini, R. Vigi��, G. Kerschen, F. Pellicano</i>	
Efficient Computation of Joint Interface Modes	503
<i>W. Witteveen, H. Irschik</i>	
Variation of Modal Parameter Estimates of a Prestressed Concrete Bridge	511
<i>D. Siegert, L. Mevel, E. Reynders, M. Goursat, G. De Roeck</i>	
Multi-Transducer System for Energy Harvesting	520
<i>J.E. MacDonald, N.A. Miller, W. Sifuentes, K.M. Farinholt</i>	
Finite Element Model-based Feature Generation for Structural Health Monitoring	530
<i>R.J. Barthorpe, G. Manson, K. Worden</i>	
Real-time Dynamic Measurements of a Wind Turbine Rotor Blade Using Modal Filtering	540
<i>M. Garcia, A. Reich, Y.J. Zhu, J. White</i>	
Computer Vision and Sensor Fusion for Structural Health Monitoring Framework With Emphasis on Unit Influence Line Analysis	552
<i>R. Zaurin, F.N. Catbas</i>	
Use of a Collocated Sensor/Actuator for Dynamic Control and Structural Health Monitoring	561
<i>M. Nelis, K. Ogorzalek, A. V��zquez Ramos, G. Park</i>	
Wireless Hull Monitoring Systems for Modal Analysis of Operational Naval Vessels	581
<i>R.A. Swartz, A.T. Zimmerman, J.P. Lynch, T.F. Brady, J. Rosario, L.W. Salvino, K.H. Law</i>	
Frequency-veering and Mode Hybridization in Arch Bridges	591
<i>F. Benedettini, D. Zulli, R. Alaggio</i>	
Merging Strategies for Multi-setup Operational Modal Analysis: Application to the Luiz I Steel Arch Bridge	600
<i>E. Reynders, F. Magalh��es, G. De Roeck, �. Cunha</i>	

Volume 2

Uncertainty Analysis of Voigt Bridge Modal Parameters Due to Changing Environmental Conditions	615
<i>B. Moaveni, X. He, J.P. Conte, M.S. Fraser, A. Elgamal</i>	
Assessment of the Effectiveness of Retrofitting Actions to a Reinforced Concrete Bridge Using Full-scale Vibration Testing	625
<i>P. Moyo, B. Sibanda, P.D. Ronn��</i>	
Assessment of the Integrity of Shear Connectors in Composite Concrete Bridges	632
<i>P. Moyo, B. Sibanda, P.D. Ronn��</i>	
Modal Testing of the Deteriorated Railway Plate Girder Bridge	644
<i>J.-W. Kim, H.-Y. Jung, M.-K. Hwang</i>	
Finite Element Model Efficiency for Modal Analysis of Slab-on-Girder Bridges	652
<i>J.A. Warren, E.D. Sotelino, T.E. Cousins</i>	

Damage Identification for Bridges Using Frequency and Time Domain Data	662
<i>A.A. Mosavi, T. Wang, H. Wang, R. Seracino, S. Rizkalla</i>	
Damage Prognosis for Delamination of a Composite Plate	672
<i>C. Surace, K. Worden</i>	
Nonlinear Model Updating in Concrete Structures Based on Ambient Response Data	679
<i>W. Song, S.J. Dyke, T.G. Harmon, M. So</i>	
Model Updating Methods – A Comparative Study	690
<i>V. Zabel, M. Brehm</i>	
Vibration Mode Shape Recognition Using the Zernike Moment Descriptor	701
<i>W. Wang, J.E. Mottershead, C. Mares</i>	
Dynamic Flight Characteristic Data Capture for Small Unmanned Aircraft	712
<i>W.H. Semke, K. Stuckel, K. Anderson, R. Spitsberg, B. Kubat, A. Mkrchyan, R.R. Schultz</i>	
Dynamic Characterization of Carbon Foils for Space Flight Applications	721
<i>T. Collins, R. Hodge, J. Lee, A. Puckett</i>	
Review of Spatial Domain Modal Parameter Estimation Procedures and Testing Methods	733
<i>D.L. Brown, R.J. Allemang</i>	
Continuous-scanning LDV Full-field Measurement of Vibration Deflection Shapes for Modal Analysis	756
<i>D.J. Ewins, A.B. Stanbridge, D. DiMaio</i>	
Limited Modal Information and Noise Effect on Damage Detection Without Baseline Modal Parameters	766
<i>R. Rodriguez-Rocha, F.J. Rivero-Angeles, E. Gomez-Ramirez</i>	
Damage Assessment of Caisson Foundations in a Port Facility Using Ambient Vibration Measurements	776
<i>J.C. Carvajal, C.E. Ventura, H. Juarez</i>	
Structural Damage Detection Using Matching Pursuit	783
<i>R.J. Link, D.C. Zimmerman</i>	
Experimental Investigation of the Effect of Speckle Noise on Continuous Scan Laser Doppler Vibrometer Measurements	806
<i>M.W. Sracic, M.S. Allen</i>	
New Laser Vibrometer for Single- and Multiple-point Measurements With Compact-sized Optical Head	823
<i>G. Giuliani, S. Donati</i>	
Measurement and Comparison of Operational Deflection Shapes (ODSs) Using a Scanning LDV System in Step or Continuous Scanning Mode	829
<i>D. Di Maio, D.J. Ewins</i>	
Scanning Laser Doppler Vibrometry for the Characterization of the Damping Loss Factor in Honeycomb Panels	840
<i>M. Martarelli, C. Santolini, A. Sassaroli</i>	
Comparison of 3D Laser Vibrometer and Accelerometer Frequency Measurements	849
<i>P. Pingle, J. Sailhamer, P. Avitabile</i>	
Effect of Tip Mass on Atomic Force Microscope Calibration by Thermal Method	862
<i>M.S. Allen, H. Sumali, P.C. Penegor</i>	
Fully Automated Robot-based 3-dimensional Vibration Measurement System for Modal Analysis and Structural Health Monitoring	871
<i>D.E. Oliver, M. Schuessler</i>	
Efficient Substructuring Techniques for the Investigation of Fluid-filled Piping Systems	882
<i>J. Herrmann, M. Maess, L. Gaul</i>	

Dual Craig-Bampton With Enrichment to Avoid Spurious Modes	891
<i>D.J. Rixen</i>	
Vibration and Power Flow Analyses of Built-up Structures in a Broad Frequency Range	905
<i>H. Xu, W.L. Li</i>	
Model Order Reduction for Thermomechanically Coupled Problems	914
<i>A.M. Steenhoek, D.J. Rixen, P. Nachtergaele</i>	
On Fast Computation of Effective Independence Through QR Downdating for Sensor Placement	933
<i>D.S. Li, H.N. Li, C.P. Fritzen</i>	
Efficient Topology Optimization for Large and Dynamically Loaded FE Models	948
<i>W. Witteveen, K. Puchner, K. Sherif, H. Irschik</i>	
Extracting Fixed Base Modal Models From Vibration Tests on Flexible Tables	957
<i>R.L. Mayes, L.D. Bridgers</i>	
Introduction to Model Validation	971
<i>T.L. Paez</i>	
Developing Adequacy Criterion for Model Validation Based on Requirements	982
<i>R.L. Mayes</i>	
Probabilistic Methods in Model Validation	990
<i>T.L. Paez, L.P. Swiler</i>	
Epistemic Uncertainty Quantification Tutorial	1005
<i>L.P. Swiler, T.L. Paez, R.L. Mayes</i>	
Model Correlation and Calibration	1022
<i>R.L. Mayes</i>	
A Structural Dynamics Model Validation Example With Actual Hardware	1032
<i>R.L. Mayes, A.K. Miller, W.A. Holzmann, D.G. Tipton, C.R. Adams</i>	
Verification and Validation Under Uncertainty Applied to Finite Element Models of Historic Masonry Monuments	1041
<i>S. Atamturktur</i>	
Sensor Location for Real Time Modal Identification	1065
<i>A. Girard, E. Cavro, F. Rodriguez</i>	
Clustering Approaches to Automatic Modal Parameter Estimation	1072
<i>S. Chauhan, D. Tcherniak</i>	
Application of Operational Modal Analysis and Blind Source Separation/Independent Component Analysis Techniques to Wind Turbines	1086
<i>S. Chauhan, M.H. Hansen, D. Tcherniak</i>	
Fundamental Study of Accelerometer for Diagnosis of High-voltage Circuit Breaker	1098
<i>T. Nagata, K. Iwamoto, S. Kawachi, S. Ohtsuka, M. Hikita, H. Ikeda</i>	
Identification of Surface Waves in a Stiff Soil Deposit Using a Grid of Microtremor Measurements	1105
<i>J.C. Carvajal, C.E. Ventura</i>	
Parameter Identification and Optimization for Cantilevered Piezoelectric Energy Harvesters Based on the Coupled Distributed Parameter Solution	1112
<i>A. Erturk, D.J. Inman</i>	
Automated Estimation of an Aircraft's Center of Gravity Using Static and Dynamic Measurements	1132
<i>J. Cummins, A. Bering, D.E. Adams, R. Sterkenburg</i>	
Active Control Position Using Shape Memory Alloys	1142
<i>C.T. de Faria, H.G. Borduqui, A.A. Cavalini, Júnior, V. Lopes, Júnior</i>	

A Possible Hybrid Approach for Modal Testing of Airplanes	1150
<i>C.R. Pickrel</i>	
Nonlinear Damping Estimation of Self-excited System Using Wavelet Transform	1159
<i>R. Porwal, N.S. Vyas</i>	
Identification of MDOF Nonlinear System Using Genetic Algorithm Optimization	1168
<i>A.C. Gondhalekar, E.P. Petrov, M. Imregun</i>	
Design Procedure of a Nonlinear Vibration Absorber Using Bifurcation Analysis	1178
<i>R. Vigié, G. Kerschen</i>	
Comparison of Order Reduction Methodologies and Identification of NNMs in Structural Dynamic Systems With Isolated Nonlinearities	1190
<i>M.A. Al-Shudeifat, E.A. Butcher, T.D. Burton</i>	
Wide-area Damage Detection in Military Composite Helicopter Structures Using Vibration-based Reciprocity Measurements	1200
<i>B.R. Zwink, D.E. Adams, R.D. Evans, D.J. Koester</i>	
Wind-induced Vibrations of Tall Buildings: The Role of Full-scale Observations in Better Quantifying Habitability	1211
<i>A.C. Bentz, T.L. Kijewski-Correa</i>	
Comparisons of Measured and Predicted Modal Properties for Steel Framed Floors	1219
<i>B. Davis, T.M. Murray</i>	

Volume 3

Vibration Testing and Active Control of an Office Floor	1228
<i>P. Reynolds, I.M. Díaz, D.S. Nyawako</i>	
Efficient Modelling of High Frequency Floors	1237
<i>C.J. Middleton, J.M.W. Brownjohn</i>	
Review of Generic and Manufacturer Design Criteria for Vibration-sensitive Equipment	1246
<i>K.A. Salyards, R.J. Firman, III</i>	
Measurement and Modeling of Footfall Vibrations in a Sensitive Laboratory Facility	1254
<i>B. Pridham, A. Bell, S. Meszaros</i>	
Mode Selection for Footfall Analysis of Floors	1266
<i>M. Gendreau, N. Tang, H. Amick, C.-K. Wu</i>	
Active Control in Rotating Machinery Using Magnetic Actuators with Linear Matrix Inequalities (LMI) Approach	1273
<i>E.A. Perini, E.H. Koroishi, D.D. Bueno, V. Lopes, Júnior, L.P. Nascimento</i>	
Identification of Torsional Vibration Features in Electrical Powered Rotating Equipment	1281
<i>M.W. Trethewey, M.S. Lebold</i>	
Paper Machine Rereeler Vibration Testing: Insights into Demanding Rotating Machinery Diagnostics	1290
<i>A.B. Menon</i>	
Using Operating Deflection Shapes to Detect Unbalance in Rotating Equipment	1299
<i>S.N. Ganeriwala, B. Schwarz, M.H. Richardson</i>	
Decoupling Procedures in the General Framework of Frequency Based Substructuring	1303
<i>W. D'Ambrogio, A. Fregolent</i>	
Structural Modifications With Additional DOF - Applications to Real Structures	1318
<i>G. Canbaloglu, H.N. Özgüven</i>	
Determining the Significant Number of Singular Values in Experimental Dynamic Substructuring	1330
<i>D. de Klerk</i>	

Robustness of Structural Reliability Analyses to Epistemic Uncertainties	1336
<i>M. Guedri, S. Cogan, N. Bouhaddi</i>	
Defining Predictive Maturity for Validated Numerical Simulations	1344
<i>F.M. Hemez, H.S. Atamturktur, C. Unal</i>	
Coupling Polynomial Chaos Expansions With Gaussian Process Emulators: An Introduction	1362
<i>F.A. DiazDelaO, S. Adhikari</i>	
Sparse Grid Meta-Models for Model Updating	1371
<i>A. Klimke, C.J. Pye</i>	
Tutorial Guideline VDI 3830: Damping of Materials and Members	1379
<i>L. Gaul</i>	
An Overview of UERDTools Capabilities: A Multi-purpose Data Analysis Package	1385
<i>P.A. Mantz, F.A. Costanzo</i>	
The Shock Response Spectrum – A Primer	1400
<i>J.E. Alexander</i>	
Pseudo Velocity Shock Spectrum Analysis Data Editing	1423
<i>H.A. Gaberson</i>	
Introduction to Shock and Vibration Isolation and Damping Systems	1440
<i>A.R. Klembczyk</i>	
Dynamic Response Monitoring and Correlation to Crowd Movement at a Football Stadium	1448
<i>F.N. Catbas, M. Gul</i>	
Finite Element Modelling and Updating of a Stadium Structure Using In-service Data	1456
<i>C.A. Jones, P. Reynolds</i>	
Aspects of Prediction Accuracy in Human-structure Interaction	1465
<i>L. Pedersen</i>	
Vibration Perception and Comfort Levels for an Audience Occupying a Grandstand With Perceivable Motion	1473
<i>S.P. Nhleko, M.S. Williams, A. Blakeborough</i>	
Ground Reaction Forces on Vibrating Structures	1485
<i>S.P. Nhleko, A. Blakeborough, M.S. Williams</i>	
Effect of Soil-structure Interaction on Dynamics of a Large Shaker	1494
<i>E. Haag, P. Blelloch, K. Otten, V. Suarez, M. McNelis</i>	
Identification by Direct Impulse Response Fitting	1505
<i>P. Vacher, A. Bucharles, B. Jacquier</i>	
Identification of System Nonlinearity Structure by Harmonic Probing	1513
<i>A. Chatterjee</i>	
Investigations of Possibilities of Improvement of a Finite Element Model of an Active Boring Bar	1520
<i>T. Smirnova, H. Åkesson, L. Håkansson, I. Claesson, T. Lagö</i>	
Frequency Domain Model Reduction Based on Principal Component Analysis	1529
<i>S. Nimityongsukul, D.C. Kammer</i>	
Analytical Sensitivities for Principal Components Analysis of Dynamical Systems	1543
<i>D.T. Griffith</i>	
Modal Analysis of a Railway Braking Resistor	1558
<i>F. Braghin, G. Galli, E. Sabbioni</i>	
Virtual Shaker Testing for Predicting and Improving Vibration Test Performance	1568
<i>S. Ricci, B. Peeters, R. Fetter, D. Boland, J. Debillé</i>	

Aeroservoelastic Design and Verification of a Combat Aircraft	1584
<i>W.G. Lubber</i>	
A Top-down Approach to the Calibration of Computer Simulations	1604
<i>J.M. McFarland, A. Urbina, S. Mahadevan</i>	
Predictive Maturity of Computer Models Using Functional and Multivariate Output	1618
<i>S. Atamturktur, F.M. Hemez, C. Unal, B.J. Williams</i>	
Modal Analysis Updating With an Uncertain Computational Dynamical Model and With Experiments	1635
<i>E. Capiez-Lernout, C. Soize, R. Ohayon</i>	
Optimization of the Dynamic Response of a Complete Exhaust System	1643
<i>T. Lauwagie, J. Strobbe, E. Dascotte, J. Clavier, M. Monteagudo</i>	
Finite Element Model Updating Using Frequency Band Averaging of Spectral Densities	1651
<i>D.C. Kammer, S. Nimityongskul</i>	
Identifying Models of Numerical Solution Error Using Time Series Analysis	1670
<i>F.M. Hemez, M. Marcilhac</i>	
Who is That Carne Guy Anyway?	1682
<i>D.S. Epp, T.W. Simmermacher</i>	
Comparison of Different Serviceability Assessment Measures for Different Events Held in the G. Meazza Stadium in Milano	1685
<i>A. Caprioli, M. Vanali</i>	
One Year of Structural Health Monitoring of the Meazza Stadium in Milan: Analysis of the Collected Data	1695
<i>A. Caprioli, M. Vanali, A. Cigada</i>	
Novel Experimental Characterisation of Human-induced Loading	1704
<i>V. Racic, J.M.W. Brownjohn, A. Pavic</i>	
Dynamic Analysis of a Super-long-suspension Bridge Based on Ambient Vibration Test and SHMS	1711
<i>Z. Li, A. Li</i>	
Design Spectra for Single Person Loading Scenario on Footbridges	1718
<i>K. Wan, S. Živanovic, A. Pavic</i>	
Modal Testing and Modeling of a Simplified Elevator System	1726
<i>B.H. Emory, W.D. Zhu, S. Kaczmarczyk</i>	
Multiple Sine Sweep Excitation for Ground Vibration Tests	1753
<i>K.L. Napolitano, D. Linehan</i>	
Determining the Rigid-body Inertia Properties of a Knee Prosthesis by FRF Measurements	1769
<i>E. Mucchi, G. Bottoni, R. Di Gregorio</i>	
Initial Mechanical Stability of Cementless Highly-porous Titanium Tibial Components	1778
<i>L. Amer, T.B. Stone, C.P. Warren, P. Cornwell, R.M. Meneghini</i>	
Structural Health Monitoring to Detect Spinal Damage States	1788
<i>G. Kawchuk, C. Decker, R. Dolan, J. Carey</i>	
The Role of Soft Tissue Damping in Spinal Vibration Analysis	1794
<i>C. Decker, G. Kawchuk</i>	
Finite Element Modelling of Shaken Baby Syndrome: A Frequency Response Approach	1801
<i>D.C. Batterbee, N.D. Sims, J. Rowson</i>	
Original Statistical Approach for the Reliability in Modal Parameters Estimation	1811
<i>J. Morlier, B. Chermain, Y. Gourinat</i>	
Computer Vision Method for Displacement Measurements of Large-scale Civil Structures	1821
<i>G. Wieger, J.M. Caicedo</i>	

Long-term Observation of Old RC Structures Using Dynamic Response	1828
<i>M. Pirner, O. Fischer, Sh. Urushadze</i>	
Crack Detection in a Cantilever Beam Using Harmonic Probing and Free Vibration Decay	1834
<i>A. Chatterjee</i>	

Volume 4

ARX and Open Loop Residuals in Damage Detection	1841
<i>D. Bernal, D. Zonta, M. Pozzi</i>	
Identification of Elastic Support Properties on a Bernoulli-Euler Beam	1848
<i>T.A.N. Silva, N.M.M. Maia, A.A. Roque, J.M.C. Travassos</i>	
Random Response Analysis Based Model Validation and Structural Optimization of a Vibration Fixture	1861
<i>Q.T. Guo, J. Chen, L.M. Zhang, X.Q. Zhang, Y. Zhu</i>	
Determining the Rigid-body Inertia Properties of Cumbersome Systems: Comparison of Techniques in Time and Frequency Domain	1871
<i>E. Mucchi, S. Fiorati, R. Di Gregorio, G. Dalpiaz</i>	
Wideband Characterization of the Shock and Vibration Response of Impact-Loaded Structures	1881
<i>J.R. Foley, J.C. Dodson, M. Schmidt, P. Gillespie, A.J. Dick, A. Idesman, D.J. Inman</i>	
A New Non-oscillatory Numerical Approach for Structural Dynamics and Wave Propagation in Solids	1891
<i>A. Idesman, M. Schmidt, J.R. Foley, Y. Tu, R.L. Sierakowski</i>	
Demodulation Based on Harmonic Wavelet and its Application	1899
<i>S.R. Qin, Y.F. Mao, Y. Qin</i>	
Investigation of the Dynamic Properties of a Milling Structure; Using a Tool Holder With Moderate Overhang	1906
<i>H. Åkesson, T. Smirnova, L. Håkansson, I. Claesson, T. Lagö</i>	
Accelerated Testing and Damping	1916
<i>M.K. Bada Ghar Wala, A. Gupta</i>	
Uncertainty Analysis of Identified Damping Ratios in Nonlinear Dynamic Systems	1928
<i>B. Moaveni, A.R. Barbosa, M. Panagiotou, J.P. Conte, J.I. Restrepo</i>	
Nonlinear Friction Damping Measurements Over a Wide Range of Amplitudes	1942
<i>C.W. Schwingshackl, F. Zolfi, D.J. Ewins, A. Coro, R. Alonso</i>	
Free Vibration Stability of SDoF Systems Undergoing Variable Mass-induced Damping	1951
<i>S.P. Nhleko</i>	
Air Suspension Coupled With Rotary Damper	1966
<i>T. Koizumi, N. Tsujiuchi, S. Shinozaki, T. Shibayama</i>	
Influence of Walking and Standing Crowds on Structural Dynamic Properties	1973
<i>S. Živanovic, I.M. Díaz, A. Pavic</i>	
Remote Monitoring of Wind Turbine Dynamics by Laser Interferometry: Phase 1	1983
<i>M. Ozbek, D.J. Rixen, T.W. Verbruggen</i>	
Fully Automated OMA: An Opportunity for Smart SHM Systems	1991
<i>C. Rainieri, G. Fabbrocino, E. Cosenza</i>	
Conditioning of FRF Measurements for use With Frequency Based Substructuring	2000
<i>D. Nicgorski, P. Avitabile</i>	
Component Mode Synthesis Using Reduced Order, Test Verified Components	2015
<i>A. Butland, P. Avitabile</i>	

Effect of Model Order Ambiguity in Experimental Modal Analysis on Substructuring Predictions	2029
<i>M.S. Allen, S.A. Miller</i>	
Minimum Relative Entropy Criterion for Damage Detection and Location	2042
<i>C. Mares, A. Kyprianou</i>	
Substructure Decoupling Techniques - A Review and Uncertainty Propagation Analysis	2049
<i>S.N. Voormeeren, D.J. Rixen</i>	
Dynamic Error Correction of Force Sensor	2059
<i>Y. Fujii</i>	
Position Optimization of Deadeners in Vehicle Roof Using Embedded Sensitivity	2069
<i>D.B. Reis, R. Nicoletti</i>	
Application of Transmissibility Matrix Method to NVH Source Contribution Analysis	2076
<i>D. Tcherniak, A.P. Schuhmacher</i>	
Experimental Modal Analysis and Numerical Modelling of Agricultural Vehicles	2086
<i>F. Braghin, F. Cheli, A. Genoese, E. Sabbioni, C. Bisaglia, M. Cutini</i>	
Feasibility of Using Four-Post Road Simulator for Modal Analysis of a Truck Frame	2094
<i>B. Sharma, B. Swaminathan, R.J. Allemang, S. Chauhan</i>	
Simulation and Experimental Validation of Automotive Components	2120
<i>D. Mariappan, M. Bhavani Shankar, A. Pratap, A.S. Phani</i>	
Study of Dynamic Behaviour of Aluminum Automotive Parts	2130
<i>M.J. Richard, L. Khadir, M. Bouazara</i>	
Uncertainty Quantification in Model Validation of a Complex Aerospace Structure	2138
<i>A.E. Rice, M. Arviso, T.L. Paez, T.G. Carne, P.S. Hunter</i>	
Variability in Composite Structure Vibration Measurement and Numerical Model Updating	2158
<i>M. Luczak, A. Vecchio, L. Gielen, E. Mucchi, B. Peeters</i>	
Uncertainty Quantification in Vibration-based Damage Assessment by Means of Model Updating	2173
<i>G. Lombaert, B. Moaveni, E. Reynders, M. Schevenels, J.P. Conte, G. De Roeck</i>	
Error Bounds on Master Curves From Least-squares Estimation	2183
<i>D. Hickey, J. Rongong, A. Spencer, K. Worden</i>	
System Identification via Orthogonal Arrays Sampled Genetic Algorithms	2194
<i>Z. Zhang, C.G. Koh, J. Zhang</i>	
Stochastic Model Updating Using Perturbation Methods Combined With Neural Network Estimations	2203
<i>M. Brehm, V. Zabel, J.F. Unger</i>	
Online Crack Detection Method for a Rotating Shaft	2214
<i>F.A. Bejarano, J. Yi, F. Just</i>	
Detection of a Fatigue Crack by Vibration Tests	2222
<i>V. Zabel, W. Rücker</i>	
Transmissibility Based Damage Detection	2232
<i>G. Canales, L. Mevel, M. Basseville</i>	
Using Full-field Vibration Measurement Techniques for Damage Detection	2239
<i>M.N. Helfrick, P.S. Pingle, C. Niezrecki, P. Avitabile</i>	
A Modified Time Series Analysis for Identification, Localization and Quantification of Damage	2250
<i>M. Gul, F.N. Catbas</i>	
Damage Detection in Beam-like Structures Using Deflections Obtained by Modal Flexibility Matrices	2259
<i>K.Y. Koo, J.J. Lee, C.B. Yun, J.M.W. Brownjohn</i>	

Using Dynamic Characteristics of Bridges for Practical Analysis With Distribution Factors	2265
<i>F.N. Catbas, H.B. Gokce</i>	
Padé Approximants as a Modal Identification Technique	2277
<i>L.A.B. Coelho, L.A. Baccalá</i>	
Ambient Vibration Testing of Multi-span Bridges With Integral Deck-abutments	2284
<i>J.C. Carvajal, C.E. Ventura, S. Huffman</i>	
Multiple Solutions in Finite Element Model Updating	2293
<i>B.A. Zárate, J.M. Caicedo</i>	
Damage Identification of a Seven-story Reinforced Concrete Shear Wall Building Using Bayesian Model Updating	2301
<i>G. Lombaert, B. Moaveni, X. He, J.P. Conte</i>	
Bayesian Evidence for Finite Element Model Updating	2313
<i>L. Mthembu, T. Marwala, M.I. Friswell, S. Adhikari</i>	
Model Verification and Validation of a Suspension Bridge Based on Field Survey and Measurement	2323
<i>H.K. Kim, N.S. Kim, J.H. Lee, W.S. Park, Y.H. Kim</i>	
Improving a Turning Process Using Piezoelectric Actuators	2330
<i>P.P. Radecki, W.A. Kruse, A.J. Welsh, E.A. Moro, G. Park, M.T. Bement</i>	
Algorithms for Covariance Subspace Identification: A Choice of Effective Implementations	2345
<i>M. Goursat, L. Mevel</i>	
Narrow-band, Select-band vs Broadband Modal Identification: their Features and Comparisons	2354
<i>L.-M. Zhang, X.-H Sun, T. Wang, Y. Tamura</i>	
A Hybrid Solution to Modal Estimation of Heavy Damping	2365
<i>T. Wang, L.-M. Zhang, Z.-Y. Xie, Q.-T. Guo</i>	
High Spatial Density Mode Shape Identification Using a Mobile Sensor	2374
<i>J. Marulanda, J.M. Caicedo</i>	
The Comparative Analysis of the Fractional Derivative Models of VED	2383
<i>W.B. Hu, L.F. Qiu</i>	
Comparative Study of RFM and Model Updating Method Using Base Excitation Test Data	2399
<i>E.J. Jamshidi, M.R. Ashory</i>	
Determination of Scaled Mode Shapes in Response Only Modal Analysis	2410
<i>M.M. Khatibi, M.R. Ashory, A.R. Albooyeh</i>	
Generation of Transfer Functions of Subsystems Using the Test Results of the Whole System	2420
<i>M. Saadat Foumani, A.R. Albooyeh, M.R. Ashory, M.M. Khatibi</i>	
Optimum Configuration for Vibration Absorbers of a SDOF System Using Genetic Algorithm	2437
<i>M. Najafi, M.R. Ashory, E. Jamshidi</i>	
Optimal Design of Beam Vibration Absorbers Under Point Harmonic Excitation	2447
<i>M. Najafi, M.R. Ashory, E. Jamshidi</i>	

Author Index