

IMAC 37 Technical Program

Monday, January 28, 2019

Modal Analysis/Dynamic Systems

01. Basics of Modal Analysis (BMA) I

Organizer(s): M. Mains—University of Cincinnati

Chair Person(s): M. Mains—University of Cincinnati; J. Blough—Michigan Technological University

- 09:00 A **#5781** **SDOF Theory**
J. Blough—Michigan Technological University
- 10:00 A **#5782** **MDOF Theory**
J. Blough—Michigan Technological University
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Modal Analysis/Dynamic Systems

02. Experimental Methods I

Organizer(s):

Chair Person(s): J. Hollkamp—AFRL

- 09:00 A **#4319** **Modal Excitation of Circular Rotating Structures using an Innovative Electromagnetic Device**
T. Hoffmann—Leibniz University Hannover; M. Jahn—Leibniz University Hannover; L. Panning-von Scheidt—Leibniz University Hannover; J. Wallaschek—Leibniz University Hannover
- 09:20 A **#4229** **Analytical and Experimental Verification of a Proposed Ambient-Vibration-Based Approach to Extract Pseudo-Free-Vibration Response**
A. Moghadam—Kansas State University; H. Melhem—Kansas State University
- 09:40 A **#4546** **A Novel Technique to Extract the Modal Damping Properties of a Thin Blade**
T. Mace—Imperial College London; C. Schwingshackl—Imperial College London; J. Taylor—Rolls-Royce
- 10:00 A **#4660** **Reproducible Modal Testing using a Flexure-based Impact Excitation System**
S. Shekhar—Carnegie Mellon University; B. Ozdoganlar—Carnegie Mellon University
- 10:20 A **#4436** **Imager-based Characterization of Viscoelastic Material Properties**
H. Brand—Clemson; T. Kauppila—Embry Riddle Aeronautical University; K. Wielgus—Michigan Tech; B. Martinez—Los Alamos National Laboratory; N. Miller—Los Alamos National Laboratory; T. Tippetts, Los Alamos National Laboratory; Y. Yang—Argonne National Laboratory; D. Mascarenas—Los Alamos National Laboratory
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Optical Methods and Computer Vision for Structural Dynamics

03. Optical Methods I

Organizer(s): J. Baqersad—Kettering University

Chair Person(s): J. Slavic—University of Ljubljana; P. Harvey—University of Oklahoma

- 09:00 A **#5768** **A Hands-on Tutorial on Image Based Identification of Structural Dynamics**
J. Slavič—University of Ljubljana; D. Gorjup—University of Ljubljana; A. Sarrafi—University of Massachusetts Lowell; Z. Mao—University of Massachusetts Lowell

- 10:00 A **#4620** **Full-Field Modal Identification of Vibrating Structures From Compressively Sampled Video**
B. Martinez—Los Alamos National Laboratory; Y. Yang—Argonne National Laboratory; A. Liao—Los Alamos National Laboratory; C. Farrar—Los Alamos National Laboratory; H. Mukundan—Los Alamos National Laboratory; P. Nath, Los Alamos National Laboratory; D. Mascareñas—Los Alamos National Laboratory
- 10:20 A **#4296** **Use of High-Speed Cameras and Optically-Based Measurement Techniques for Determining Frequency Response Function of Structures**
T. Dovenò—University of Massachusetts Lowell; Y. Chen—University of Massachusetts Lowell; A. Sabato—University of Massachusetts Lowell; P. Avitabile—University of Massachusetts Lowell

Monday, January 28, 2019

Emerging Technologies for Structural Dynamics

04. Emerging Technologies I: Novel Designs & Applications

Organizer(s):

Chair Person(s): S. Atamturktur—The Pennsylvania State University

- 09:00 A **#4642** **Study on Developing Micro-scale Artificial Hair Cells**
S. Davaria—Virginia Tech; V. Malladi—Virginia Tech; L. Avilovas—University of Glasgow; P. Dobson—University of Glasgow; A. Cammarano—University of Glasgow; P. Tarazaga, Virginia Tech
- 09:20 A **#4651** **Miniature Underwater Robot – An Experimental Case Study**
S. Davaria—Virginia Tech; M. Krishnan—Virginia Tech; V. Sriram Malladi—Virginia Tech; P. Tarazaga—Virginia Tech
- 09:40 A **#4315** **Adaptive Multi-modal Tuned Mass Dampers Based on Shape Memory Alloys: Design and Validation**
M. Berardengo—Università degli Studi di Parma; G. Della Porta—Politecnico di Milano; S. Manzoni—Politecnico di Milano; M. Vanali—Università degli Studi di Parma
- 10:00 A **#4497** **Control of Plate Vibrations with Artificial Neural Networks and Piezoelectricity**
O. Avci—Qatar University; O. Abdeljaber—Qatar University; S. Kiranyaz—Qatar University; D. Inman—University of Michigan
- 10:20 A **#4254** **A Neural Network Surrogate Model for Structural Health Monitoring of Miter Gates in Navigation Locks**
M. Vega—University of California at San Diego; R. Madarshahian—University of California at San Diego; M. Todd—University of California at San Diego

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Dynamics of Civil Structures

05. Bayesian Methods & Damage ID

Organizer(s): R. Madarshahian—University of California at San Diego

Chair Person(s): M. Todd—University of California San Diego; R. Madarshahian—University of California at San Diego

- 09:00 A **#4264** **Bayesian Damage Identification using Strain Data from Lock Gates**
Y. Yang—University of California San Diego; R. Madarshahian—University of California San Diego; M. Todd—University of California San Diego
- 09:20 A **#4539** **A Bayesian Inversion Approach for Site Characterization Using Surface Wave Measurements**
M. Akhlaghi—Tufts University; B. Moaveni—Tufts University; L. Baise—Tufts University

09:40 A #4570 **Computer Vision-based Structural Identification**
C. Dong—University of Central Florida; F. Catbas—University of Central Florida

Monday, January 28, 2019

Dynamic Substructures

06. Dynamic Substructures

Organizer(s):

Chair Person(s): A. Linderholt—Linnaeus University

- 09:00 A #5900 **Experimental Dynamic Substructuring – Tutorial and Live Demo!**
E. Pasma—VIBES.technology; M. van der Seijs—VIBES.technology
- 10:00 A #4339 **Overview of Free Interface Substructuring Approaches for Systems with Arbitrary Viscous Damping in Dynamic Substructuring**
F. Gruber—Technical University of Munich; D. Berninger—Technical University of Munich; D. Rixen—Technical University of Munich
- 10:20 A #4596 **Dynamic Substructuring of Discretized Models Coupled by Time Variant Interfaces**
J. Brunetti—Università dell’Aquila; W. D’Ambrogio—Università dell’Aquila; A. Fregolent—Università di Roma La Sapienza
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Monday, January 28, 2019

Nonlinear Structures & Systems

07. Nonlinear System Identification

Organizer(s): G. Kerschen—University of Liege

Chair Person(s): G. Kerschen—University of Liege

- 09:00 A #5851 **Nonlinear Oscillations: The Fundamentals**
D. Adams—Vanderbilt University
- 10:00 A #4349 **Techniques for Nonlinear Identification and Maximizing Modal Response**
D. Roettgen—Sandia National Laboratories; B. Pacini—Sandia National Laboratories; R. Mayes—Sandia National Laboratories
- 10:20 A #4445 **Spline-Based Nonlinearity Synthesis for Improved Dynamical Performance**
T. Detroux—University of Liège; J. Noël—University of Liège; G. Kerschen—University of Liège
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Monday, January 28, 2019

Scanning LDV Methods

08. Laser Vibrometry in Experimental Dynamics I

Organizer(s): D. Di Maio—University of Bristol

Chair Person(s): Y. Xu—University of Cincinnati; D. Di Maio—University of Bristol

- 09:00 A #4634 **Full Field Strain Measurements Using 3D Laser Vibrometry**
S. Tilmann—Air Force Research Laboratory
- 09:20 A #4181 **Full-Field Strain Shape Estimations from 3D SLDV**
B. Witt—Sandia National Laboratories; D. Rohe—Sandia National Laboratories; T. Schoenherr—Sandia National Laboratories

Monday, January 28, 2019

Modal Analysis/Dynamic Systems

09. Basics of Modal Analysis (BMA) II

Organizer(s): M. Mains—University of Cincinnati

Chair Person(s): M. Mains—University of Cincinnati; B. Dilworth—MIT Lincoln Laboratory

01:30 P #5803 **Modal Measurements**
B. Dilworth—MIT Lincoln Laboratory

02:30 P #5742 **Excitation Considerations**
T. Marinone—ATA Engineering, Inc.

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Modal Analysis/Dynamic Systems

10. Experimental Methods II

Organizer(s):

Chair Person(s): J. Tyson—Trillion Quality Systems; D. Epp—Sandia National Laboratories

01:30 P #4197 **Appropriate Excitation for the Extraction of Modes**
C. Beale—UMASS Lowell; D. Joffre—UMASS Lowell; P. Avitabile—UMASS Lowell

01:50 P #4652 **Experimental Study on Tire Vibrations and Induced Noise**
S. McBride—Virginia Tech; S. Motaharibidgoli—Virginia Tech; M. Albakri—Virginia Tech; R. Burdisso—Virginia Tech; P. Tarazaga—Virginia Tech; C. Sandu, Virginia Tech

02:10 P #4587 **Modal Analysis of Rotating Tires in Stationary and Rotating Frames of Reference**
M. Albakri—Virginia Tech; P. Tarazaga—Virginia Tech

02:30 P #4581 **Validation of Automatic Modal Parameters Estimator on a Car Body-In-White**
N. Gioia—Vrije Universiteit Brussel; P. Daems—Vrije Universiteit Brussel; J. Helsen—Vrije Universiteit Brussel

02:50 P #4350 **How Linear is a Linear System?**
D. Roettgen—Sandia National Labs; B. Pacini—Sandia National Labs; B. Moldenhauer—University of Wisconsin - Madison

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Optical Methods and Computer Vision for Structural Dynamics

11. Optical Methods II

Organizer(s): J. Baqersad—Kettering University

Chair Person(s): J. Baqersad—Kettering University; J. Pickworth—

01:30 P #4125 **Photogrammetry and Digital Image Correlation - State of the Art Technique for Vibration Measurements (Tutorial)**
J. Baqersad—Kettering University

- 02:30 P #4119 **Single High-Speed Camera Based 3D Deflection Reconstruction in Frequency Domain**
D. Gorjup—University of Ljubljana; J. Slavič—University of Ljubljana; M. Boltežar—University of Ljubljana
- 02:50 P #4626 **Experimental Modal Analysis of Tumorigenesis and Cancer Metastasis**
B. Martinez—Los Alamos National Laboratory; Y. Yang—Argonne National Laboratory; C. Farrar—Los Alamos National Laboratory; H. Mukundan—Los Alamos National Laboratory; P. Nath—Los Alamos National Laboratory; D. Mascareñas, Los Alamos National Laboratory
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Monday, January 28, 2019

Model Validation & Uncertainty Quantification

12. Bayesian Type Filters for Real Time Identification I

Organizer(s): E. Chatzi—ETH Zürich; S. Azam—University of Nebraska Lincoln; V. Dertimanis—ETH Zurich

Chair Person(s): E. Chatzi—ETH Zürich; V. Dertimanis—ETH Zurich

- 01:30 P #4547 **Augmented Sequential Bayesian Filtering for Parameter and Modeling Error Estimation of Linear Dynamic Systems**
M. Song—Tufts University; H. Ebrahimian—SC Solutions Inc.; B. Moaveni—Tufts University
- 01:50 P #4562 **Bayesian Identification of a Nonlinear Energy Sink Device: Method Comparison**
A. Lund—Purdue University; S. Dyke—Purdue University; W. Song—University of Alabama; I. Bilonis—Purdue University
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Monday, January 28, 2019

Dynamics of Civil Structures

13. SHM & Smart Structures

Organizer(s): R. Madarshahian—University of California at San Diego

Chair Person(s): M. Nazari—California State University, Fresno

- 01:30 P #4126 **Application of Electro-active Materials Toward Health Monitoring of Structures: Electrical Properties of Smart Aggregates**
P. Manghera—California State University, Fresno; F. Rahman—California State University, Fresno; S. Banerjee—California State University, Fresno; M. Nazari—California State University, Fresno
- 01:50 P #4606 **Detection and Analysis of Loosening in Jointed Structures using Acoustic Emission Sensors and Smart Bolts**
G. Chevallier—Univ. Bourgogne Franche-Comté; E. Ramasso—Univ. Bourgogne Franche-Comté; P. Butaud—Univ. Bourgogne Franche-Comté
- 02:10 P #5722 **Parameter Study of Statistics of Modal Parameter Estimates Using Automated Operational Modal Analysis**
S. Christensen—University of Southern Denmark; A. Brandt—University of Southern Denmark
- 02:30 P #4574 **System Identification of a Five-story Building using Seismic Strong-motion Data**
R. Astroza—Universidad de los Andes; F. Hernandez—Universidad de Chile; P. Diaz—Universidad de Chile; G. Gutierrez—Universidad de los Andes
- 02:50 P #4509 **An Experimental Investigation into the Acoustic Attenuation across the Boundaries of Laboratory-Scale Cavity Structures**
C. Beale—University of Massachusetts Lowell; M. Inalpolat—University of Massachusetts Lowell; C. Niezrecki—University of Massachusetts Lowell

Monday, January 28, 2019

Dynamic Substructures

14. Transfer Path Analysis & System Dynamics

Organizer(s):

Chair Person(s): M. Van Der Seijs–VIBES.technology

01:30 P #4486 **A Comparison of Popular Source Characterisation Techniques in Light of Emerging Industry Standards**

M. van der Seijs–VIBES.technology; D. van den Bosch–VIBES.technology; E. Pasma–VIBES.technology

01:50 P #4552 **Dynamic Substructuring of Agricultural Tractors and Mounted, Semi-mounted and Trailed Machinery**

J. Brunetti–Università dell'Aquila; W. D'Ambrogio–Università dell'Aquila; A. Fregolent–Università di Roma La Sapienza

Monday, January 28, 2019

Nonlinear Structures & Systems

15. Nonlinear Modal Interactions I

Organizer(s): L. Renson–University of Bristol; S. Shaw–Florida Institute of Technology

Chair Person(s):

01:30 P #5847 **Nonlinear Modal Interactions: A Tutorial**

S. Shaw–Florida Institute of Technology

02:30 P #5729 **Mode Coupling in Nonlinear Systems with Non-Proportional Damping**

A. Mathis–The University of Akron; D. Quinn–The University of Akron

02:50 P #4248 **Local Nonlinear Attachments Induce Global Effects in Airplane Dynamics**

K. Moore–University of Nebraska-Lincoln; A. Mojahed–University of Illinois; L. Bergman–University of Illinois; A. Vakakis–University of Illinois

Monday, January 28, 2019

Scanning LDV Methods

16. Laser Vibrometry in Experimental Dynamics II

Organizer(s): D. Di Maio–University of Bristol

Chair Person(s): Y. Xu–University of Cincinnati; D. Di Maio–University of Bristol

01:30 P #5766 **Output-only Modal Parameter Estimation Using a Continuously Scanning Laser Doppler Vibrometer System with Application to Structural Damage Detection**

Y. Xu–University of Cincinnati; D. Chen–University of Maryland, Baltimore County; W. Zhu–University of Maryland, Baltimore County

01:50 P #5808 **Inspection of Painted Steel Specimen using Short-Pulsed Laser**

J. Joh–Korea Advanced Institute of Science and Technology (KAIST); J. Lee–Korea Advanced Institute of Science and Technology (KAIST)

- 02:10 P #4088 **Detection of Sources of Nonlinearity in Multiple Bolted Joints by use of Laser Vibrometer**
A. delli Carri—University of Coventry; S. Campanelli—Universita' Politecnica delle Marche; D. Di Maio—University of Twente
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Monday, January 28, 2019

Modal Analysis/Dynamic Systems

17. Basics of Modal Analysis (BMA) III

Organizer(s): M. Mains—University of Cincinnati

Chair Person(s): M. Mains—University of Cincinnati; T. Marinone—ATA Engineering, Inc.

- 04:10 P #5767 **Modal Parameter Estimation**
M. Mains—University of Cincinnati
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Modal Analysis/Dynamic Systems

18. Modal Applications

Organizer(s):

Chair Person(s): B. Joyce—Naval Surface Warfare Center

- 03:30 P #4330 **Modal Analysis of a 7 DoF Sweet Pepper Harvesting Robot**
T. Berninger—Technical University of Munich; S. Fuderer—Technical University of Munich; D. Rixen—Technical University of Munich
- 03:50 P #4176 **Self-Noise Reduction in Bragg Wavenumber Regions**
D. Joffre—UMass Lowell; C. Niezrecki—UMass-Lowell; P. Avitabile—UMass-Lowell; J. Leang—UMass-Lowell
- 04:10 P #4102 **Vibration Testing of Laparoscopic Surgical Instruments Under Varying Grip Pressures**
A. Hutchins—Duke University; S. Zani, Jr.—Duke University Medical Center; R. Manson—Duke University Medical Center; B. Mann—Duke University
- 04:30 P #5807 **Estimating Rotor Suspension Parameters from Runout Data**
B. Damiano—Oak Ridge National Laboratory
- 04:50 P #4298 **Vehicle Escape Dynamics on an Arbitrarily Curved Surface**
L. Manning—Duke University; B. Mann—Duke University
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Monday, January 28, 2019

Optical Methods and Computer Vision for Structural Dynamics

19. Optical Methods III

Organizer(s): J. Baqersad—Kettering University

Chair Person(s): D. Mascarenas—Los Alamos National Laboratory; J. Sirohi—University of Texas at Austin

- 03:30 P #4485 **Building Vibration Monitoring and Damage Assessment using Surveillance Cameras**
A. Hosseinzadeh—University of Oklahoma; P. Harvey Jr.—University of Oklahoma
- 03:50 P #4572 **A Robust Vision-based Displacement Measurement Method for Civil Structures**
C. Dong—University of Central Florida; O. Celik—University of Central Florida; F. Catbas—University of Central Florida

- 04:10 P **#4138** **Operational Modal Analysis of a Thin-Walled Rocket Nozzle using Phase-Based Image Processing and Complexity Pursuit**
M. Eitner—The University of Texas at Austin; B. Miller—The University of Texas at Austin; J. Sirohi—The University of Texas at Austin; C. Tinney—The University of Texas at Austin
- 04:30 P **#4352** **Mapping Motion-Magnified Videos to Operating Deflection Shape Vectors Using Particle Filters**
A. Sarrafi—University of Massachusetts Lowell; Z. Mao—University of Massachusetts Lowell
- 04:50 P **#4529** **Structural Health Monitoring of Wind Turbines using a Digital Image Correlation System on a UAV**
J. Baqersad—Kettering University; A. Khadka—Kettering University; Y. Dong—Kettering University

Monday, January 28, 2019

Model Validation & Uncertainty Quantification

20. Uncertainty Quantification & Propagation in Structural Dynamics I

Organizer(s): B. Moaveni—Tufts University; C. Papadimitriou—University of Thessaly

Chair Person(s): C. Papadimitriou—University of Thessaly; B. Moaveni—Tufts University

- 03:30 P **#6437** **Keynote: Applications of Reduced Order and Surrogate Modeling in Structural Dynamics (40-min)**
A. Taflanidis—University of Notre Dame; J. Zhang—University of Notre Dame; D. Patsialis—University of Notre Dame
- 04:10 P **#4586** **Deep Unsupervised Learning For Condition Monitoring and Prediction of High Dimensional Data with Application on Windfarm SCADA Data**
C. Mylonas—ETH Zurich; I. Abdallah—ETH Zurich; E. Chatzi—ETH Zurich
- 04:30 P **#4649** **Finite Element Model Updating Accounting for Modeling Uncertainty**
R. Astroza—Universidad de los Andes; A. Alessandri—Universidad de los Andes; J. Conte—University of California San Diego
- 04:50 P **#4681** **Optimal Sensor Placement for Response Predictions Using Local and Global Methods**
C. Argyris—KU Leuven; C. Papadimitriou—University of Thessaly; G. Lombaert—KU Leuven
- 05:10 P **#4382** **Verification of a Mathematical Model and Optimization of the Design of a Rolling Isolation System**
H. Gavin—Duke University; A. Sridhar—Duke University

Monday, January 28, 2019

Dynamics of Civil Structures

21. Estimation for SHM

Organizer(s): R. Madarshahian—University of California at San Diego

Chair Person(s): N. Catbas—University of Central Florida; R. Sarlo—Virginia Tech

- 03:30 P **#4203** **Identification and Monitoring of the Material Properties of a Complex Shaped Part using a FEMU-3DVF Method: Application to Wooden Rhombicuboctahedron**
R. Viala—Université Bourgogne Franche-Comté; V. Placet—Université Bourgogne Franche-Comté; S. Cogan—Université Bourgogne Franche-Comté
- 03:50 P **#4152** **Output-Only Estimation of Amplitude Dependent Friction-Induced Damping**
K. Vesterholm—University of Southern Denmark; T. Friis—Technical University of Denmark; E. Katsanos—Technical University of Denmark; R. Brincker—Technical University of Denmark; A. Brandt—University of Southern Denmark

- 04:10 P #5730 **Damping Ratios of Reinforced Concrete Structures under Actual Ground Motion Excitations**
D. Lu—Sichuan University; J. Meng—Tongji University; S. Zhang—Sichuan University; Y. Shi—Sichuan University; K. Dai—Tongji University/Sichuan University; Z. Huang, University of North Texas
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Monday, January 28, 2019

Dynamic Substructures

22. Experimental Dynamic Substructuring

Organizer(s):

Chair Person(s): R. Mayes—Sandia National Laboratories

- 03:30 P #4331 **Using SEMM to Identify the Joint Dynamics in Multiple Degrees of Freedom without Measuring Interfaces.**
S. Klaassen—Technische Universität München; D. Rixen—Technische Universität München
- 03:50 P #3071 **Comparison of Different Approaches to Include Rubber Bushings into Frequency Based Substructuring Coupling Process**
A. El Mahmoudi—Technical University Munich; C. Meyer—Technical University Munich; D. Rixen—Technical University Munich
- 04:10 P #3078 **Using Laser Vibrometry for Precise FRF Measurements in Experimental Substructuring**
F. Trainotti—Technical University of Munich; T. Berninger—Technical University of Munich; D. Rixen—Technical University of Munich
- 04:30 P #4327 **Development of a low Cost Automatic Modal Hammer for Applications in Substructuring**
J. Maierhofer—Technical University of Munich; A. Mahmoudi—Technical University of Munich; D. Rixen—Technical University of Munich
- 04:50 P #4625 **Planning of a Black-box Benchmark Structure for Dynamic Substructuring**
D. Roettgen—Sandia National Laboratories; A. Linderholt—Linnaeus University
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Monday, January 28, 2019

Nonlinear Structures & Systems

23. Nonlinear Modal Interactions II

Organizer(s): L. Renson—University of Bristol; S. Shaw—Florida Institute of Technology

Chair Person(s): S. Shaw—Florida Institute of Technology

- 03:30 P #4348 **Investigating Nonlinearity in a Bolted Structure Using Force Appropriation Techniques**
B. Pacini—Sandia National Laboratories; D. Roettgen—Sandia National Laboratories; D. Rohe—Sandia National Laboratories
- 03:50 P #4355 **Influences of Modal Coupling on Experimentally Extracted Nonlinear Modal Models**
B. Moldenhauer—University of Wisconsin - Madison; A. Singh—University Of Wisconsin - Madison; P. Thoenen—University of Southern California; D. Roettgen—Sandia National Laboratories; B. Pacini—Sandia National Laboratories; R. Kuether, Sandia National Laboratories; M. Allen—University of Wisconsin - Madison
- 04:10 P #4673 **The Relevance of Conservative Backbone Curves for the Forced-Damped Response of Nonlinear Mechanical Systems**
T. Breunung—ETH Zürich; G. Haller—ETH Zürich
- 04:30 P #5698 **Detection of Isolated Forced Response Curves using Non-Autonomous Spectral Submanifolds**
S. Ponsioen—ETH Zurich; T. Pedergnana—ETH Zurich; G. Haller—ETH Zurich

04:50 P #3063 **Nonsmooth Modal Analysis of a Non-internally Resonant Finite Bar Subject to a Unilateral Contact Constraint**

C. Yoong—McGill University; M. Legrand—McGill University

05:10 P #4151 **Forced Response of Nonlinear Systems under Combined Harmonic and Random Excitation**

A. Förster—Leibniz University Hannover; L. Panning-von Scheidt—Leibniz University Hannover; J. Wallaschek—Leibniz University Hannover

Monday, January 28, 2019

Highlights

24. The NASA Building Block Approach

Organizer(s): J. Sills—NASA

Chair Person(s): J. Sills—NASA; J. Akers—

03:30 P #3085 **Historical Review of “Building Block Approach” in Validation for Human Space Flight**

J. Sills, Jr.—NASA Johnson Space Center; M. Allen—University of Wisconsin

03:50 P #4226 **Test-Based Uncertainty Quantification and Propagation using Hurty/Craig-Bampton Substructure Representations**

D. Kammer—ATA Engineering, Inc./University of Wisconsin-Madison; P. Blelloch—ATA Engineering, Inc.; J. Sills—NASA Johnson Space Center

04:10 P #4488 **European Service Module - Structural Test Article (E-STA) Building Block Test Approach and Model Correlation Observations**

J. Winkel—NASA Glenn Research Center; S. Bittinger—NASA Glenn Research Center; V. Suarez—NASA Glenn Research Center; J. Akers—NASA Glenn Research Center

04:30 P #4580 **JWST SCE Modal Test Correlation for Northrup Grumman**

R. Lawson—Quartus Engineering Incorporated; N. O'Grady—Quartus Engineering Incorporated; R. Hejal—Northrop Grumman Corporation

04:50 P #4610 **Experimental Mode Verification (EMV) using Left-Hand Eigenvectors**

R. Coppolino—Measurement Analysis Corporation

05:10 P #4614 **Modal Test-Analysis Correlation using Left-Hand Eigenvectors**

R. Coppolino—Measurement Analysis Corporation

05:30 P #4096 **Modern Modal Testing: A Cautionary Tale**

J. Akers—NASA Glenn Research Center; K. Otten—NASA Glenn Research Center; J. Sills—NASA Johnson Space Center; C. Larsen—Texas Christian University

Tuesday, January 29, 2019

Predictive Modeling for Engineering Design and Decision Making

25. Predictive Modeling I

Organizer(s):

Chair Person(s): J. Akers—

09:00 A #5703 **Dynamics of Extreme-scale Wind Turbines**

D. Griffith—University of Texas at Dallas; M. Chetan—University of Texas at Dallas; S. Yao—University of Texas at Dallas

- 09:20 A #4394 **Torque-based Control Dynamic Model for Flexible Rotors Going through Critical Speeds at High Regime and Non-constant Speed**
E. Sghaier—Lamcos Lyon/Supméca Paris; J. Dion—Supméca Paris; D. Remond—University of Lyon; N. Peyret—Supméca Paris; A. Bourdon—University of Lyon
- 09:40 A #4278 **Mechanical Characterization and Numerical Modeling of High Density Polyethylene Pipes**
M. Taherzadehboroujeni—Virginia Tech; S. Case—Virginia Tech
- 10:00 A #4577 **Rapid Seismic Risk Assessment of Structures with Gaussian Process Regression**
M. Sheibani—University of Utah; G. Ou—University of Utah; S. Zhe—University of Utah
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Tuesday, January 29, 2019

Modal Analysis/Dynamic Systems

26. Boundary Condition Correction Techniques in Modal Testing

Organizer(s): K. Napolitano—ATA Engineering, Inc.

Chair Person(s): K. Napolitano—ATA Engineering, Inc.

- 09:00 A #4173 **Fixing Degrees of Freedom of an Aluminum Beam by using Accelerometers as References**
K. Napolitano—ATA Engineering, Inc.
- 09:20 A #4157 **Combined Qualification Vibration Testing and Fixed Base Modal Testing Utilizing a Fixed Based Correction Method**
J. Winkel—NASA Glenn Research Center; V. Suárez—NASA Glenn Research Center; J. Akers—NASA Glenn Research Center
- 09:40 A #4172 **Pretest Analysis for Modal Survey Tests Using Fixed Base Correction Method**
P. Kerrian—ATA Engineering, Inc.; K. Napolitano—ATA Engineering, Inc.
- 10:00 A #4221 **Maximizing the Quality of Shape Extractions from Base Shake Modal Tests**
K. Napolitano—ATA Engineering, Inc.
- 10:20 A #4532 **Vibration Reduction for Camera Systems Onboard Small Unmanned Aircraft**
W. Semke—University of North Dakota
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Tuesday, January 29, 2019

Emerging Technologies for Structural Dynamics

27. Emerging Technologies II: Geometry, Sensors, Cameras

Organizer(s):

Chair Person(s): G. Tipton—Sandia National Laboratories

- 09:00 A #4141 **Augmented Reality for Interactive Robot Control**
L. Manring—Duke University; J. Pederson—Columbia University; D. Potts—Brigham Young University; B. Boardman—Los Alamos National Laboratory; D. Mascarenas—Los Alamos National Laboratory; T. Harden, Los Alamos National Laboratory; A. Cattaneo—Los Alamos National Laboratory
- 09:20 A #4437 **Imager-based Techniques for Analyzing Metallic Melt Pools for Additive Manufacturing**
C. Hayes—New Mexico Tech; C. Schelle—Los Alamos National Laboratory; G. Taylor—New Mexico State University; B. Martinez—Los Alamos National Laboratory; G. Kenyon—Los Alamos National Laboratory; T. Lienert, Los Alamos National Laboratory; D. Mascarenas—Los Alamos National Laboratory

- 09:40 A **#4438** **Full-field Mode Shape Analysis, Alignment and Averaging Across Measurements**
W. Scott—Los Alamos National Laboratory; M. Adams—Los Alamos National Laboratory; Y. Yang—Argonne National Laboratory; D. Mascarenas—Los Alamos National Laboratory
- 10:00 A **#4473** **Multi-Input Multi-Output Swept Sine Control: A Steepest Descent Solution for a Challenging Problem**
U. Musella—Vrije Universiteit Brussel/Siemens Industry Software NV; B. Peeters—Siemens Industry Software NV; F. Marulo—University of Naples "Federico II"; P. Guillaume—Vrije Universiteit Brussel
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Tuesday, January 29, 2019

Model Validation & Uncertainty Quantification

28. Fusion of Test & Analysis

Organizer(s): I. Sever—Rolls-Royce

Chair Person(s): I. Sever—Rolls-Royce

- 09:00 A **#4089** **Failure Behaviour of Composites under both Vibration and Environmental Temperature Loading Conditions**
G. Voudouris—University of Bristol; D. Di Maio—University of Bristol; I. Sever—Rolls-Royce plc
- 09:20 A **#4147** **Investigating Nonlinearities in a Demo Aircraft Structure under Sine Excitation**
S. Cooper—Siemens PLM Software/University of Bristol; S. Manzato—Siemens PLM Software; A. Borzacchiello—Siemens PLM Software/Università degli Studi di Trieste; L. Bregant—Università degli Studi di Trieste; B. Peeters—Siemens PLM Software
- 09:40 A **#4166** **Optimization of Shaker Locations for Multiple Shaker Environmental Testing**
R. Mayes—Sandia National Laboratories; L. Ankers—Atomic Weapons Establishment; T. Moulder—Atomic Weapons Establishment; P. Daborn—Atomic Weapons Establishment; P. Ind—Atomic Weapons Establishment
- 10:00 A **#4185** **Predicting System Response at Unmeasured Locations**
R. Mayes—Sandia National Laboratories; L. Ankers—Atomic Weapons Establishment; P. Daborn—Atomic Weapons Establishment
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Tuesday, January 29, 2019

Dynamics of Civil Structures

29. Vibrations I

Organizer(s): A. Pavic—University of Exeter; S. Zivanovic—University of Warwick; V. Racic—Politecnico di Milano

Chair Person(s): A. Pavic—University of Exeter; S. Zivanovic—University of Warwick

- 09:00 A **#4312** **Vibration Serviceability Performance of an as-Built Floor under Crowd Pedestrian Walking**
J. Wang—Tongji University; J. Chen—Tongji University
- 09:20 A **#4583** **Why is my Coffee Cup Rattling: A Reassessment of the Office Vibration Criterion**
M. Wong—Swallow Acoustic Consultants Ltd./Thornton Tomasetti; M. Wesolowsky—Swallow Acoustic Consultants Ltd./Thornton Tomasetti
- 09:40 A **#4295** **Assessment and Control of Structural Vibration in Gyms and Sports Facilities**
A. Fischer—Ove Arup & Partners USA; R. Harrison—Ove Arup & Partners UK; M. Nelson—Ove Arup & Partners USA; F. Lancelot—Ove Arup & Partners USA; J. Hargreaves—Ove Arup & Partners UK
- 10:00 A **#4463** **Vibration Performance of a Lightweight FRP Footbridge under Human Dynamic Excitation**
S. Zivanovic—University of Exeter; J. Russell—University Of Warwick; V. Racic—Politecnico di Milano

Tuesday, January 29, 2019

Dynamic Substructures

30. Industrial Applications of Dynamic Substructuring

Organizer(s):

Chair Person(s): D. Roettgen–Sandia National Laboratories

- 09:00 A **#4265** **Workpiece Coupling in Machine Tools using Experimental-analytical Dynamic Substructuring**
P. Chavan–RWTH Aachen University; C. Brecher–RWTH Aachen University; M. Fey–RWTH Aachen University; M. Loba–RWTH Aachen University
- 09:20 A **#4105** **A Priori Interface Reduction for Substructuring of Multistage Bladed Disks**
L. Schwerdt–Leibniz University Hannover; L. Panning-von Scheidt–Leibniz University Hannover; J. Wallaschek–Leibniz University Hannover
- 09:40 A **#4541** **A Proposal of Dynamic Behaviour Design Based on Mode Shape Tracing: Numerical Application to a Motorbike Frame**
E. Bonisoli–Politecnico di Torino; D. Lisitano–Politecnico di Torino; L. Dimauro–Politecnico di Torino; L. Peroni–Politecnico di Torino
- 10:00 A **#4604** **Modeling Rail-vehicle Coupled Dynamics by a Time-varying Substructuring Scheme**
L. Carassale–University of Genova; P. Silvestri–University of Genova; R. Lengu–Ansaldo STS; P. Mazzaron–Ansaldo STS
- 10:20 A **#4302** **Study on Dynamic Stiffness Characteristic of Primary Suspension for High-speed EMU**
X. Wang–CRRC Qingdao Sifang Co., Ltd.; X. Cao–CRRC Qingdao Sifang Co., Ltd.; A. Tian–CRRC Qingdao Sifang Co., Ltd.; S. Liu–CRRC Qingdao Sifang Co., Ltd.; J. Su–Jilin University; C. Huang, CRRC Qingdao Sifang Co., Ltd.
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Nonlinear Structures & Systems

31. Nonlinear Reduced Order Models I

Organizer(s): R. Kuether–Sandia National Laboratories; P. Tiso–

Chair Person(s): P. Tiso–; R. Kuether–Sandia National Laboratories

- 09:00 A **#4597** **Nonlinear Reduced Order Modeling for the Dynamic Response of a Built-up Structure with Strong Asymmetry through Thickness**
B. Wainwright–Arizona State University; X. Wang–Arizona State University; M. Mignolet–Arizona State University
- 09:20 A **#4224** **Nonlinear Model Updating Applied to Reduced Order Models of Curved Beams**
C. Van Damme–University of Wisconsin - Madison; M. Kwarta–University of Wisconsin - Madison; M. Allen–University of Wisconsin - Madison; J. Hollkamp–Air Force Research Laboratory
- 09:40 A **#4362** **Some Investigations of Nonlinear Time Response Using Linear Modal Approximations**
D. Fowler–University of Massachusetts Lowell; P. Avitabile–University of Massachusetts Lowell
- 10:00 A **#4261** **Nonlinear Model Reduction of Nonlinear Structures Exhibiting Snapping Dynamics**
L. Renson–University of Bristol; P. Tiso–ETH Zurich
- 10:20 A **#4599** **Nonlinear Reduced Order Modeling of a Cylindrical Shell Exhibiting Mode Veering and Symmetry Breaking**
J. Lin–Arizona State University; X. Wang–Arizona State University; M. Mignolet–Arizona State University

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Highlights

32. Technology Applications I

Organizer(s):

Chair Person(s): S. Seidlitz–Cummins - Power Systems

- 02:20 P **#4158** **Modal Test Advancements and Implementation**
T. Marinone–ATA Engineering, Inc.; R. Brillhart–ATA Engineering, Inc.; D. Osterholt–ATA Engineering, Inc.
- 02:35 P **#4168** **Modal Analysis in the Age of Digital Twins**
E. Dascotte–Dynamic Design Solutions (DDS) NV
- 02:50 P **#4159** **Analysis of Push-Push Slip Table under MISO vs MIMO Random Control Using Spectral Dynamics Jaguar and STAR Modal Software**
M. Lamparelli–Spectral Dynamics, Inc.
- 03:05 P **#4128** **Estimation of Modal Parameters and Their Uncertainties using ARTeMIS Modal**
P. Andersen–Structural Vibration Solutions A/S; S. Gres–Structural Vibration Solutions A/S
- 03:20 P **#4149** **High-Fidelity Simulations of the Next Generation of Engineering Structures**
T. Detroux–NOLISYS; J. Noel–University of Liege; G. Kerschen–University of Liege
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Modal Analysis/Dynamic Systems

33. Mode Shape Expansion

Organizer(s):

Chair Person(s): M. Richardson–Vibrant Technology, Inc.

- 02:20 P **#4186** **All Vibration is a Summation of Mode Shapes**
M. Richardson–Vibrant Technology, Inc.; B. Schwarz–Vibrant Technology, Inc.; J. Tyler–Vibrant Technology, Inc.; P. McHargue–Vibrant Technology, Inc.
- 02:40 P **#4530** **Chebyshev Polynomial Shape Expansion Point Distribution: Selection Sensitivity**
Y. Chen–University of Massachusetts Lowell; P. Avitabile–University of Massachusetts Lowell
- 03:00 P **#4538** **Dynamic Transient Time Response Expansion: Chebyshev Polynomial Approaches and Polynomial Contribution**
Y. Chen–University of Massachusetts Lowell; P. Avitabile–University of Massachusetts Lowell
- 03:20 P **#4545** **A Chebyshev Polynomial Approach for Data Quality Validation and Dynamic Time Response Expansion**
Y. Chen–University of Massachusetts Lowell; P. Avitabile–University of Massachusetts Lowell
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Tuesday, January 29, 2019

Emerging Technologies for Structural Dynamics

34. Emerging Technologies III: Real-time, SHM, Neural Networks

Organizer(s):

Chair Person(s): B. Pacini–Sandia National Laboratories

- 02:20 P **#4104** **A Step Towards Testing of Foot Prostheses Using Real-Time Substructuring (RTS)**
C. Insam—Technical University of Munich; A. Bartl—Technical University of Munich; D. Rixen—Technical University of Munich
- 02:40 P **#4287** **Identification System for Structural Health Monitoring in Buildings**
J. Morales-Valdez—Instituto de Ingeniería, UNAM; L. Alvarez-Icaza—Instituto de Ingeniería, UNAM; J. Escobar—Instituto de Ingeniería, UNAM; H. Guerrero—Instituto de Ingeniería, UNAM
- 03:00 P **#4447** **Investigating Engineering Data by Probabilistic Measures**
L. Bull—University of Sheffield; K. Worden—University of Sheffield; N. Dervilis—University of Sheffield; T. Rogers—University of Sheffield; E. Cross—University of Sheffield
- 03:20 P **#5826** **On the Application of Domain Adaptation in SHM**
X. Liu—University of Sheffield; K. Worden—University of Sheffield
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Tuesday, January 29, 2019

Model Validation & Uncertainty Quantification

35. MVUQ & Decision Making

Organizer(s): B. Schroeder—

Chair Person(s): B. Schroeder—Sandia National Laboratories

- 02:20 P **#3084** **The Need for Credibility Guidance for Analyses Quantifying Margin and Uncertainty**
B. Schroeder—Sandia National Laboratories; L. Hund—Sandia National Laboratories; R. Kittinger—Sandia National Laboratories
- 02:40 P **#4160** **Sensor Placement for Multi-fidelity Dynamics Model Calibration**
G. Absi—Vanderbilt University; S. Mahadevan—Vanderbilt University
- 03:00 P **#4161** **Application of Cumulative Prospect Theory to Optimal Inspection Decision-making for Ship Structures**
C. Gong—Lehigh University; D. Frangopol—Lehigh university
- 03:20 P **#4435** **Uncertainty Analysis of Bolt Connection Structure Based on Multi-response**
M. Zhan—Nanjing University of Aeronautics and Astronautics; Q. Guo—Nanjing University of Aeronautics and Astronautics; L. Yue—Nanjing University of Aeronautics and Astronautics; B. Zhang—Xiamen University
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Tuesday, January 29, 2019

Dynamics of Civil Structures

36. Vibrations II

Organizer(s): A. Pavic—University of Exeter; S. Zivanovic—University of Warwick; V. Racic—Politecnico di Milano

Chair Person(s): H. Noh—Carnegie Mellon University

- 02:20 P **#4082** **Vibration Serviceability Assessment of Footbridges: An Extended Approach**
K. Van Nimmen—KU Leuven; F. Tubino—University of Genoa
- 02:40 P **#4083** **Vertical Human-Structure Interaction: A Simplified Approach**
K. Van Nimmen—KU Leuven; A. Pavic—University of Exeter; P. Van den Broeck—KU Leuven
- 03:00 P **#4183** **Modeling Human-structure Interaction using Control Models When Bobbing on a Flexible Structure**
A. Alzubaidi—University of South Carolina; J. Caicedo—University of South Carolina

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Dynamic Substructures

37. Hybrid & Real-time Substructuring

Organizer(s):

Chair Person(s): R. Christenson—University of Connecticut

- 02:20 P **#4207** **Hybrid Substructure Assembly Techniques for Efficient and Robust Optimization of Additional Structures in Late Phase NVH Design: A Comparison**
B. Kammermeier—BMW/Technische Universität München; J. Mayet—BMW; D. Rixen—Technische Universität München
- 02:40 P **#4326** **Test-based Modeling, Source Characterization and Dynamic Substructuring of a Modular Industrial Demonstrator**
A. Steenhoek—ASML; M. van der Kooij—VIBES.technology; T. Verhees—ASML; D. van den Bosch—VIBES.technology; J. Harvie—VIBES.technology
- 03:00 P **#4199** **Using Hybrid Modal Substructuring with a Complex Transmission Simulator to Model an Electrodynamic Shaker**
B. Moldenhauer—University of Wisconsin - Madison; M. Allen—University of Wisconsin - Madison; W. DeLima—Kansas City Nuclear Security Campus; E. Dodgen—Kansas City Nuclear Security Campus
- 03:20 P **#4677** **Real-Time Hybrid Substructuring Results of the Mars Pathfinder Parachute Deployment**
R. Christenson—University of Connecticut; M. Harris—University of Connecticut
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Nonlinear Structures & Systems

38. Nonlinear Reduced Order Models II

Organizer(s): R. Kuether—Sandia National Laboratories; P. Tiso—

Chair Person(s): P. Tiso—; R. Kuether—Sandia National Laboratories

- 02:20 P **#4680** **Model Reduction for Nonlinear Thermo-mechanical Systems: A Multiple Scales Approach**
S. Jain—ETH Zürich; P. Tiso—ETH Zürich
- 02:40 P **#4165** **Simultaneous Regression and Selection in Nonlinear Modal Model Identification**
C. Van Damme—University of Wisconsin - Madison; A. Madrid—University of Wisconsin - Madison; M. Allen—University of Wisconsin - Madison; J. Hollkamp—Air Force Research Laboratory
- 03:00 P **#4590** **Multiple Level Identification of Stiffness Coefficients in Nonlinear Reduced Order Modeling**
X. Wang—Arizona State University; J. Lin—Arizona State University; B. Wainwright—Arizona State University; M. Mignolet—Arizona State University
- 03:20 P **#4467** **Dynamics of Geometrically-nonlinear Beam Structures, Part 1: Numerical Modeling**
D. Anastasio—Politecnico di Torino; J. Dietrich—Leibniz Universität Hannover; J. Noël—University of Liège; G. Kerschen—University of Liège; S. Marchesiello—Politecnico di Torino; J. Häfele, Leibniz Universität Hannover; C. Gebhardt—Leibniz Universität Hannover; R. Rolfes—Leibniz Universität Hannover

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Highlights

39. Technology Applications II

Organizer(s):

Chair Person(s): S. Seidlitz–Cummins - Power Systems

- 04:40 P **#4156** **Low Variance PSD Estimates for Short Duration Tests**
T. Roberts–Vibration Research
- 04:55 P **#5757** **Introduction to General Data Acquisition for Repetitive Testing**
J. Gracia–Bruel and Kjaer North America; B. Franz–Bruel and Kjaer North America; D. Lovelace–Bruel and Kjaer North America
- 05:10 P **#5760** **Digital ICP®: The Next Step for Sound & Vibration Sensors**
B. Lachey–The Modal Shop
- 05:25 P **#5911** **Monitor the State of Your Machine from Anywhere in the World with CAN-MD®**
D. Change–Dytran Instruments Inc.
- 05:40 P **#5963** **OptoMET SWIR Laser Doppler Vibrometer Technology & Applications**
T. Ban–Vibrations Inc.
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Tuesday, January 29, 2019

Modal Analysis/Dynamic Systems

40. Applications

Organizer(s):

Chair Person(s): R. Brillhart–ATA Engineering, Inc.

- 04:40 P **#4187** **Modal Testing Using the Slinky Method**
M. Richardson–Vibrant Technology, Inc.; B. Schwarz–Vibrant Technology, Inc.; J. Tyler–Vibrant Technology, Inc.; P. McHargue–Vibrant Technology, Inc.
- 05:00 P **#4659** **Evaluation of the Human-Structure-Soil Interaction on a Two-Wheel Tractor Using Modal Analysis Techniques**
E. Velazquez-Miranda–Instituto Politecnico Nacional; G. Silva-Navarro–Centro de Investigacion y de Estudios Avanzados del I.P.N.; J. Bory-Reyes–Instituto Politecnico Nacional; O. Garcia-Perez–Centro de Investigacion y de Estudios Avanzados del I.P.N.; L. Trujillo-Franco–Centro de Investigacion y de Estudios Avanzados del I.P.N.
- 05:20 P **#4213** **How to Design Modal Test Plan Based on FEM Result**
C. Yan–Tsinghua University; J. Liu–China Orient Institute of Noise & Vibration
- 05:40 P **#4431** **Analysis of Coupling Relationship between Car-body and Flexible Hanging Equipment**
X. Cao–CRRC Qingdao Sifang Co., Ltd.; X. Wang–CRRC Qingdao Sifang Co., Ltd.; Q. Guo–Nanjing University of Aeronautics and Astronautics; A. Tian–CRRC Qingdao Sifang Co., Ltd.; S. Liu–CRRC Qingdao Sifang Co., Ltd.; S. Zhan, CRRC Qingdao Sifang Co., Ltd.; J. Zou–CRRC Qingdao Sifang Co., Ltd.

Tuesday, January 29, 2019

Emerging Technologies for Structural Dynamics

41. Emerging Technologies IV: Metamaterial, Piezoelectric, Vibration Control

Organizer(s):

Chair Person(s): D. Roettgen—Sandia National Laboratories

- 04:40 P **#4258** **Combining Electromagnetic Shakers and Piezoelectric Actuators for Control of High Frequency Random Vibration**
A. Singh—University of Wisconsin - Madison; M. Allen—University of Wisconsin - Madison; W. DeLima—Honeywell
- 05:00 P **#4269** **A Simplified Current Blocking Piezoelectric Shunt Circuit for Multimodal Vibration Mitigation**
G. Raze—University of Liège; A. Jadoul—Haute Ecole de la province de Liège; V. Broun—Haute Ecole de la province de Liège; G. Kerschen—University of Liège
- 05:20 P **#4399** **Three-Dimensional Mechanical Metamaterial for Vibration Suppression**
B. Essink—University of Michigan; D. Inman—University of Michigan
- 05:40 P **#4428** **Model Reduction of Self-repeating Structures and Applications to Metamaterial Modeling**
R. Romeo—Sandia National Laboratories; R. Schultz—Sandia National Laboratories
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Tuesday, January 29, 2019

Model Validation & Uncertainty Quantification

42. MVUQ Best Paper Award

Organizer(s): K. van Buren—Los Alamos National Laboratory

Chair Person(s): K. van Buren—Los Alamos National Laboratory

- 04:40 P **#4544** **Uncertainty Quantification in Thermal Battery Performance Using a Roll-up Methodology**
K. Neal—Vanderbilt University; B. Schroeder—Sandia National Laboratories; J. Mullins—Sandia National Laboratories; S. Mahadevan—Vanderbilt University
- 05:00 P **#4414** **Bayesian Estimation of Acoustic Emission Arrival Times for Source Localization**
R. Madarshahian—University of California at San Diego; P. Ziehl—University of South Carolina; M. Todd—University of California at San Diego
- 05:20 P **#5740** **Non-unique Estimates in Material Parameter Identification of Nonlinear FE Models Governed by Multiaxial Material Models Using Unscented Kalman Filter**
M. Ramanacha—University of California, San Diego; R. Madarshahian—University of California, San Diego; R. Astroza—Universidad de los Andes; J. Conte—University of California, San Diego
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Tuesday, January 29, 2019

Dynamics of Civil Structures

43. SHM of Civil Structures

Organizer(s): R. Madarshahian—University of California at San Diego

Chair Person(s): B. Moaveni—Tufts University; R. Fuentes—The University of Sheffield

- 04:40 P **#4554** **Estimating Fatigue in the Main Bearings of Wind Turbines Using Experimental Data**
G. Fava—Tufts University; S. Liberatore—Tufts University; B. Moaveni—Tufts University

- 05:00 P **#4555** **Cointegration for Detecting Structural Blade Damage in an Operating Wind Turbine: An Experimental Study**
B. Qadri–Aalborg University; M. Ulriksen–Aalborg University; L. Damkilde–Aalborg University; D. Tcherniak–Brüel & Kjær Sound & Vibration
- 05:20 P **#4608** **In Situ Seismic Testing for High Frequency Identification of Civil Structures**
R. Sarlo–Virginia Tech; P. Tarazaga–Virginia Tech
- 05:40 P **#5728** **Dynamic Bridge Foundation Identification**
N. Davis–Tufts University; M. Sanayei–Tufts University
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Tuesday, January 29, 2019

Rotating Machinery

44. Rotating Machinery

Organizer(s):

Chair Person(s): M. Inapolat –University of Massachusetts Lowell

- 04:40 P **#4240** **Remote Detection of Abnormal Behavior in Mechanical Systems**
G. Colford–Michigan Technological University; E. Jacobson–Michigan Technological University; K. Plewe–University of Utah; E. Flynn–Los Alamos National Laboratory; A. Wachtor–Los Alamos National Laboratory
- 05:00 P **#4297** **Modal Analysis of a High-speed Turbomachinery for Reliable Prediction of RD Properties throughout Operating Speed Range**
Y. Shindo–Chubu University; K. Adachi–Chubu University; S. Kawasaki–Japan Aerospace Exploration Agency; M. Shimagaki–Japan Aerospace Exploration Agency
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Tuesday, January 29, 2019

Nonlinear Structures & Systems

45. Nonlinear Reduced Order Models III

Organizer(s): R. Kuether–Sandia National Laboratories; P. Tiso–

Chair Person(s): P. Tiso–; R. Kuether–Sandia National Laboratories

- 04:40 P **#4190** **Frequency-Adaptive Bi-linear Reduced Order Model for Structures with Nonlinear Intermittent Contact**
A. Odofin–University of Michigan–Ann Arbor; B. Epureanu–University of Michigan–Ann Arbor
- 05:00 P **#4556** **Experimental-numerical Comparison of Contact Nonlinear Dynamics through Multi-level Linear Mode Shapes**
E. Bonisoli–Politecnico di Torino; D. Lisitano–Politecnico di Torino; C. Conigliaro–Politecnico di Torino
- 05:20 P **#4491** **Comparison of Linear and Nonlinear Modal Reduction Approaches**
E. Ferhatoglu–Middle East Technical University; T. Dreher–University of Stuttgart; E. Cigeroglu–Middle East Technical University; M. Krack–University of Stuttgart; H. Özgüven–Middle East Technical University
- 05:40 P **#4468** **Dynamics of Geometrically-nonlinear Beam Structures, Part 2: Experimental Analysis**
D. Anastasio–Politecnico di Torino; J. Dietrich–Leibniz Universität Hannover; J. Noël–University of Liège; G. Kerschen–University of Liège; S. Marchesiello–Politecnico di Torino; J. Häfele, Leibniz Universität Hannover; C. Gebhardt–Leibniz Universität Hannover; R. Rolfes–Leibniz Universität Hannover

Wednesday, January 30, 2019

Predictive Modeling for Engineering Design and Decision Making

46. Predictive Modeling II

Organizer(s):

Chair Person(s): V. Suarez–NASA Glenn Research Center

- 09:00 A **#4537** **Vehicle Driveline Benchmarking to Support Predictive CAE Modeling Development**
J. Furlich–Michigan Technological University; J. Blough–Michigan Technological University; D. Robinette–Michigan Technological University
- 09:20 A **#4386** **Joint Parameter Identification for Airplane Piping Systems and its Optimisation**
S. Rajbamshi–Nanjing University; Q. Guo–Nanjing University; M. Zhan–Nanjing University
- 09:40 A **#4654** **Study on The Technology of Reliable Life Prediction of Plate Heat Exchanger for Ship**
L. Longbo–Naval Academy of Armament; N. Han–Beihang University; L. Fu–Beihang University; J. Yao–Beihang University
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Wednesday, January 30, 2019

Modal Analysis/Dynamic Systems

47. Bridge Sensing Network & Additive Manufacturing

Organizer(s):

Chair Person(s): J. Blough–Michigan Technological University

- 09:00 A **#4175** **Signal Reconstruction from Mobile Sensors Network using Matrix Completion Approach**
S. Sadeghi Eshkevari–Lehigh University; S. Pakzad–Lehigh University
- 09:20 A **#4347** **Characterizing Dynamics of Additively Manufactured Parts**
G. Adkins–Iowa State University; C. Little–Rice University; P. Meyerhofer–Case Western Reserve University; G. Flynn–Los Alamos National Laboratory; K. Hammond–Los Alamos National Laboratory
- 09:40 A **#4361** **An Interpolation Algorithm to Speed up Nonlinear Modal Testing using Force Appropriation**
M. Kwarta–University of Wisconsin - Madison; M. Allen–University of Wisconsin - Madison; J. Hollkamp–U.S. Air Force Research Laboratory
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Wednesday, January 30, 2019

Experimental Techniques

48. Experimental Techniques

Organizer(s):

Chair Person(s): D. Rohe–Sandia National Laboratories

- 09:00 A **#4171** **Optimizing Logarithmic Decrement Damping Estimation via Uncertainty Analysis**
J. Little–Duke University; B. Mann–Duke University
- 09:20 A **#4345** **Experimental and Numerical Study of the Second Order Moment of the First Passage Time of a Steel Strip Subjected to Forced and Parametric Excitations**
E. Delhez–University of Liège; H. Vanvinckenroye–University of Liège; V. Denoël–University of Liège; J. Golinval–University of Liège

09:40 A #5779 **Dynamic Characteristic Identification**

C. Jordan—Oak Ridge National Laboratory; T. Hazelwood—Oak Ridge National Laboratory

10:00 A #5791 **One Year Monitoring of a Wind Turbine Foundations**

M. Berardengo—Università di Parma; S. Manzoni—Politecnico di Milano; M. Vanali—Università di Parma; F. Lucà—Politecnico di Milano

Wednesday, January 30, 2019

Model Validation & Uncertainty Quantification

49. Uncertainty Quantification & Propagation in Structural Dynamics

Organizer(s):

Chair Person(s): Z. Mao—University of Massachusetts Lowell

09:00 A #4421 **Validation of Force Reconstruction for Linear and Nonlinear System Response**

P. Logan—University of Massachusetts Lowell; D. Fowler—University of Massachusetts Lowell; P. Avitabile—University of Massachusetts Lowell

09:20 A #4588 **Influence of Furniture on the Modal Properties of Wooden Floors**

L. Andersen—Aarhus University; C. Frier—Aalborg University; L. Pedersen—Aalborg University; P. Persson—Lund University

09:40 A #4336 **Characteristic Analysis of Dolly Rollover Test: A Study of effects of Initial Conditions on the Kinematics of the Vehicle and Occupants**

M. Seyedi—Florida State University; G. Dolzyk—Florida State University; S. Jung—Florida State University; J. Wekezer—Florida State University

10:00 A #4472 **Dynamic Characteristics Prediction for Rubber Absorber used in High Speed Train Based on Rubber Benchmark Experiment**

D. Liu—Nanjing University of Aeronautics & Astronautics; Q. Guo—Nanjing University of Aeronautics & Astronautics; Y. Tao—Nanjing University of Aeronautics & Astronautics; M. Zhan—Nanjing University of Aeronautics & Astronautics; H. Li—Nanjing University of Aeronautics & Astronautics

Wednesday, January 30, 2019

Dynamics of Civil Structures

50. Emerging Methods for SHM

Organizer(s):

Chair Person(s): K. Worden—University of Sheffield

09:00 A #4679 **On Wave Propagation in Smart Buildings**

M. Maza—Universidad Nacional de Córdoba; M. Albakri—Virginia Tech; V. Malladi—Virginia Tech; P. Tarazaga—Virginia Tech

09:20 A #4417 **Frequency-Domain Fast Maximum Likelihood Estimation of Complex Modes**

B. Li—Zhejiang University

Wednesday, January 30, 2019

Aerospace Testing Techniques

51. Aircraft/Aerospace

Organizer(s):

Chair Person(s): D. Epp–Sandia National Laboratories

- 09:00 A **#4535** **Flight Environments Demonstrator: Part I – Experiment Design & Test Planning**
B. Owens–Sandia National Laboratories; R. Mayes–Sandia National Laboratories; M. Khan–Sandia National Laboratories; D. Tipton–Sandia National Laboratories; B. Zwink–Sandia National Laboratories
- 09:20 A **#4504** **Flight Environments Demonstrator: Part II – Ground Trials of a Sounding Rocket Experiment for Characterization of Flight**
B. Zwink–Sandia National Laboratories/University of Massachusetts Lowell; D. Tipton–Sandia National Laboratories; B. Owens–Sandia National Laboratories; R. Mayes–Sandia National Laboratories; M. Khan–Sandia National Laboratories
- 09:40 A **#4424** **Flight Environments Demonstrator: Part III – Sensitivity of Expansion to Model Accuracy**
D. Fowler–Sandia National Laboratories; R. Schultz–Sandia National Laboratories; B. Owens–Sandia National Laboratories
- 10:00 A **#4609** **Data Based Modeling of Aero Engine Vibration Responses**
M. Krishnan–Virginia Tech; R. Jin–Virginia Tech; I. Sever–Rolls Royce plc, UK; P. Tarazaga–Virginia Tech
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Wednesday, January 30, 2019

Nonlinear Structures & Systems

52. Jointed Structures I

Organizer(s): M. Brake–Rice University

Chair Person(s): M. Brake–Rice University; C. Schwingshackl–Imperial College London

- 09:00 A **#4283** **Tutorial: Bolted Joints and Tribomechadynamics**
M. Brake–Rice University
- 10:00 A **#3082** **Spider Configurations for Models with Discrete Iwan Elements**
A. Singh–University of Wisconsin-Madison; M. Wall–University of Wisconsin-Madison; M. Allen–University of Wisconsin-Madison; R. Kuether–Sandia National Laboratories
-

Wednesday, January 30, 2019

Finite Element Techniques

53. Finite Element Techniques

Organizer(s):

Chair Person(s): B. Witt–Sandia National Laboratories

- 11:00 A **#4239** **Modeling and Test Methodologies for Monitoring Cementless Femoral Stem Insertion: Approach Development and Validation using Press-Fit Cylinders**
T. Dardeno–University of Massachusetts Lowell; P. Avitabile–University of Massachusetts Lowell

- 11:20 A **#4276** **Using the SEREP Idea for the Projection of Modal Coordinates to Different Finite Element Meshes**
W. Witteveen—Upper Austria University of Applied Sciences; S. Pöchacker—Upper Austria University of Applied Sciences; F. Pichler—Upper Austria University of Applied Sciences
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Wednesday, January 30, 2019

Modal Analysis/Dynamic Systems

54. Aerospace Applications

Organizer(s):

Chair Person(s): R. Singhal—David Florida Lab, Canadian Space Agency

- 11:00 A **#4439** **Development and Validation of Data Processing Techniques for Aircraft Ground Vibration Testing**
S. Vettori—Siemens Industry Software NV; E. Di Lorenzo—Siemens Industry Software NV; B. Peeters—Siemens Industry Software NV; A. Carcaterra—University of Rome "La Sapienza"
- 11:20 A **#4169** **Pressure Stiffened Modal Correlation of a Cylindrical Pressure Vessel**
E. Jewell—Stanford University; I. Yunis—National Aeronautics and Space Administration, Langley Research Center
- 11:40 A **#4241** **New Approaches to Inverse Structural Modification Theory using Random Projections**
P. Cheema—The University of Sydney; M. Alamdari—University of New South Wales; G. Vio—The University of Sydney
- 12:00 P **#4698** **Modal Analysis and Characterization of Mounting Cart Used for Testing in the Combined Environment Acoustic Chamber**
M. Hall—Air Force Research Laboratory
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Dynamic Environments Testing

55. Introduction to Shock & Vibration Testing Issues

Organizer(s): T. Schoenherr—Sandia National Laboratories

Chair Person(s): T. Schoenherr—Sandia National Laboratories

- 11:00 A **#4601** **Issues in Laboratory Simulation of Field Vibration Data: Experimental Results of a Typical Structure**
P. Varoto—University of Sao Paulo
- 11:20 A **#4598** **An Approach to Component Testing: An Analytical Study**
B. Dilworth—MIT Lincoln Laboratory; L. Thibault—MIT Lincoln Laboratory; A. Karliceck—MIT Lincoln Laboratory
- 11:40 A **#4481** **Defining Component Environments and Margin through Zemblanic Consideration of Function Spaces**
M. Starr—Sandia National Laboratories; D. Segalman—Michigan State University
- 12:00 P **#4335** **Application of Transfer Path Analysis Techniques to the Boundary Condition Challenge Problem**
J. Harvie—VIBES.technology; M. van der Seijs—VIBES.technology

Wednesday, January 30, 2019

Model Validation & Uncertainty Quantification

56. Digital Twins for Structural Dynamics

Organizer(s):

Chair Person(s): R. Barthorpe—The University of Sheffield

- 11:00 A #5748 **On Key Technologies for Realising Digital Twins for Structural Dynamics Applications**
D. Wagg—University of Sheffield; P. Gardner—University of Sheffield; R. Barthorpe—University of Sheffield; K. Worden—University of Sheffield
- 11:20 A #5827 **On Digital Twins, Mirrors and Virtualisations**
K. Worden—University of Sheffield; E. Cross—University of Sheffield; P. Gardner—University of Sheffield; R. Barthorpe—University of Sheffield; D. Wagg—University of Sheffield
- 11:40 A #4663 **Online Digital Twins for Structural Integrity Monitoring of Offshore Oil Platforms**
H. Ebrahimi—SC Solutions, Inc.; S. Ghahari—University of California, Los Angeles; B. Moaveni—Tufts University; E. Taciroglu—University of California, Los Angeles
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Wednesday, January 30, 2019

Dynamics of Civil Structures

57. Sensors Technology & Real Time SHM

Organizer(s):

Chair Person(s): E. Cheynet—University of Stavanger

- 11:00 A #4499 **Convolutional Neural Networks for Real-time and Wireless Damage Detection**
O. Avci—Qatar University; O. Abdeljaber—Qatar University; S. Kiranyaz—Qatar University; D. Inman—University of Michigan
- 11:20 A #4526 **Experimental Evaluation of Low-Cost Accelerometers for Dynamic Characterization of Bridges**
K. Grimmelsman—Intelligent Infrastructure Systems; N. Zolghadri—Intelligent Infrastructure Systems
- 11:40 A #4116 **Improving an Experimental Test Bed with Time-varying Parameters for Developing High-rate Structural Health Monitoring Methods**
D. Foley—University of Florida; B. Joyce—Naval Surface Warfare Center; J. Hong—Iowa State University; S. Laflamme—Iowa State University; J. Dodson—Air Force Research Laboratory
- 12:00 P #4212 **Modal Tracking on a Building with a Reduced Number of Sensors System**
W. González—University of Chile; R. Boroschek—University of Chile
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Wednesday, January 30, 2019

Analytical Methods

58. Analytical Methods

Organizer(s):

Chair Person(s): M. Arviso—Sandia National Laboratories; A. Mazzei—Kettering University

- 11:00 A #4090 **Harmonic Forcing of Damped Non-homogeneous Elastic Rods**
A. Mazzei, Jr.—Kettering University; R. Scott—University of Michigan
- 11:20 A #4653 **Generating Anechoic Traveling Wave in Beams with Various Boundary Conditions**
S. Motaharibidgoli—Virginia Tech; V. Malladi—Virginia Tech; P. Tarazaga—Virginia Tech

11:40 A #4286 **Three-Dimensional Vibration Behavior of FGM Doubly-Curved Laminated Structures**
M. Anamagh–Sabanci University; B. Bediz–Sabanci University

Wednesday, January 30, 2019

Nonlinear Structures & Systems

59. Jointed Structures II

Organizer(s): M. Brake–Rice University

Chair Person(s): C. Schwingshackl–Imperial College London; M. Brake–Rice University

11:00 A #4284 **On the Modal Surrogacy of Joint Parameter Estimates in Bolted Joints**

N. Balaji–Rice University; M. Brake–Rice University

11:20 A #4446 **A Test-Case on Continuation Methods for Bladed-Disk Vibration with Contact and Friction**

Z. Saeed–Politecnico di Torino; G. Jenovencio–Technical University of Munich; S. Arul–IT4I National Supercomputing Center; A. Sudhakar–IT4I National Supercomputing Center; J. Blahoš–Imperial College London; L. Pesaresi, Imperial College London; J. Yuan–Imperial College London; F. El Haddad–Imperial College London; H. Hetzler–University of Kassel; L. Salles–Imperial College London

11:40 A #4505 **A Priori Methods to Assess the Strength of Nonlinearities for Design Applications**

E. Rojas–New Mexico State University; S. Punla-Green–Rensselaer Polytechnic Institute; C. Broadman–Rice University; M. Brake–Rice University; B. Pacini–Sandia National Laboratories; R. Flicek, Sandia National Laboratories; D. Quinn–University of Akron; C. Schwingshackl–Imperial College London; E. Dodgen–Department of Energy's National Security Campus

12:00 P #3083 **Predicting S4 Beam Joint Nonlinearity using Quasi-Static Modal Analysis**

M. Wall–University of Wisconsin-Madison; S. Zare Estakhraji–University of Wisconsin-Madison; M. Allen–University of Wisconsin-Madison

Wednesday, January 30, 2019

Modal Analysis/Dynamic Systems

60. BMA: Vendor Presentations & Tutorials I

Organizer(s): M. Mains–University of Cincinnati

Chair Person(s): T. Marinone–ATA Engineering, Inc.; B. Dilworth–MIT Lincoln Laboratory

02:00 P #5806 **Introduction to Rotor Dynamics and Balancing**

B. Damiano–Oak Ridge National Laboratory

03:00 P #5888 **From Test Planning to FE Model Updating**

E. Dascotte–Dynamic Design Solutions (DDS) NV

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Modal Analysis/Dynamic Systems

61. Operational Modal & Wind Turbine

Organizer(s):

Chair Person(s): R. Allemang–University of Cincinnati, SDRL

02:00 P #5723 **Effects of Sensor Count on Damping Estimates from Operational Modal Analysis**

E. Orlowitz–Siemens Gamesa

- 02:20 P **#5727** **Ambient Vibration Tests and Modal Response Analysis of an Old Age High-rise Building in Downtown Vancouver, Canada**
M. Motamedi—University of British Columbia; C. Ventura—University of British Columbia; P. Adebar—University of British Columbia; R. Angappan Murugavel—University of British Columbia
- 02:40 P **#5745** **System Identification of a Full Scale Wood Frame Building Specimen Subjected to Shake Table Tests**
M. Motamedi—University of British Columbia; C. Ventura—University of British Columbia
- 03:00 P **#4260** **Modal Analysis of the Wind Turbine Blades with Different Test Setup Configurations**
E. Di Lorenzo—Siemens Industry Software NV; S. Manzato—Siemens Industry Software NV; B. Peeters—Siemens Industry Software NV; V. Ruffini—University of Bristol; P. Berring—Technical University of Denmark; P. Haselbach, Technical University of Denmark; K. Branner—Technical University of Denmark; M. Luczak—Technical University of Denmark
- 03:20 P **#4600** **Combining Machine Learning and Operational Modal Analysis Approaches to Gain Insights in Wind Turbine Drivetrain Dynamics**
N. Gioia—Vrije Universiteit Brussel; P. Daems—Vrije Universiteit Brussel; T. Verstraeten—Vrije Universiteit Brussel; P. Guillaume—Vrije Universiteit Brussel; J. Helsen—Vrije Universiteit Brussel

Wednesday, January 30, 2019

Dynamic Environments Testing

62. Multiple-Input/Multiple-Output Testing I

Organizer(s): T. Schoenherr—Sandia National Laboratories; J. Harvie—VIBES.technology

Chair Person(s): D. Fowler—University of Massachusetts Lowell

- 02:00 P **#4429** **Input Signal Synthesis for Open-loop Multiple-input/Multiple-output Testing**
R. Schultz—Sandia National Laboratories; G. Nelson—Sandia National Laboratories
- 02:20 P **#4427** **Force Estimation Methods and Numerical Corrections for IMMAT Test Design**
R. Schultz—Sandia National Laboratories
- 02:40 P **#4360** **Strategies for Shaker Placement for Impedance-Matched Multi-Axis Testing**
D. Rohe—Sandia National Laboratories; G. Nelson—Sandia National Laboratories; R. Schultz—Sandia National Laboratories
- 03:00 P **#4228** **Accumulated Lifetimes in Single-Axis Vibration Testing**
A. Bouma—New Mexico State University; A. Campbell—University of Utah; T. Roberts—Rose-Hulman Institute of Technology; S. Taylor—Los Alamos National Laboratory; C. Haynes—Los Alamos National Laboratory; D. Harvey, Los Alamos National Laboratory
- 03:20 P **#4131** **Effects of Multi-Axial versus Single-Axial Excitation of Jointed Systems**
S. Smith—Rice University; M. Brake—Rice University

Wednesday, January 30, 2019

Model Validation & Uncertainty Quantification

63. Uncertainty in Early Stage Design I

Organizer(s): R. Platz—Fraunhofer Institute for Structural Durability and System Reliability LBF; G. Stevens—Los Alamos National Laboratory

Chair Person(s): G. Stevens—Los Alamos National Laboratory; R. Platz—Fraunhofer Institute for Structural Durability and System Reliability LBF

- 02:00 P **#4167** **Establishing an RMS von Mises Stress Error Bound for Random Vibration Analysis**
D. Day—Sandia National Laboratories; M. Khan—Sandia National Laboratories; M. Ross—Sandia National Laboratories; B. Stevens—Sandia National Laboratories
- 02:20 P **#5790** **Modeling and Stochastic Dynamic Analysis of a Piezoelectric Shunted Rotating Beam**
Z. Zhang—Shanghai Jiao Tong University; N. Duan—Shanghai Jiao Tong University; J. Tian—Shanghai Jiao Tong University; H. Hua—Shanghai Jiao Tong University
- 02:40 P **#4443** **Quantification and Evaluation of Parameter and Model Uncertainty for Passive and Active Vibration Isolation**
J. Lenz—Technische Universität Darmstadt; R. Platz—Fraunhofer Institute for Structural Durability and System Reliability LBF
- 03:00 P **#4685** **Incorporating Uncertainty in the Physical Substructure during Hybrid Substructuring**
C. Ligeikis—University of Connecticut; R. Christenson—University of Connecticut
- 03:20 P **#4117** **Verification and Validation for a Finite Element Model of a Hyperloop Pod Space Frame**
V. Jayakumar—University of Cincinnati; T. Indraneel—University of Cincinnati; R. Chawla—University of Cincinnati; S. Mohanty—University of Cincinnati; D. Shiyani—University of Cincinnati; S. Shetty, University of Cincinnati; S. Abdallah—University of Cincinnati

Wednesday, January 30, 2019

Dynamics of Civil Structures

64. SHM of Civil Infrastructure: Bridges

Organizer(s):

Chair Person(s): M. Gul—University of Alberta; M. Sanayi—Tufts University

- 02:00 P **#4392** **Identifying Traffic-induced Vibrations of a Suspension Bridge: A Modelling Approach Based on Full Scale Data.**
E. Cheynet—University of Stavanger; J. Snæbjörnsson—Reykjavik University; J. Bogunovic Jakobsen—University of Stavanger
- 02:20 P **#4465** **A Study of Suspension Bridge Vibrations Induced by Heavy Vehicles**
J. Snæbjörnsson—University of Stavanger/Reykjavik University; T. Fadnes—University of Stavanger; J. Jakobsen—University of Stavanger; O. Gudmestad—University of Stavanger
- 02:40 P **#4522** **The Influence of Truck characteristics on the Vibration Response of a Bridge**
N. Zolghadri—Pennonni Associates Inc.; K. Grimmelman—Pennonni Associates Inc.
- 03:00 P **#4534** **Theoretical and Experimental Verifications of Bridge Frequency using Indirect Method**
S. Urushadze—Institute of Theoretical and Applied Mechanics; J. Yau—Tamkang University; Y. Yang—Chongqing University; J. Bayer—Institute of Theoretical and Applied Mechanics
- 03:20 P **#4630** **Dynamic Response of the Suspended on a Single Cable Footbridge**
M. Miskiewicz—Gdansk University of Technology; L. Pyrzowski—Gdansk University of Technology; K. Wilde—Gdansk University of Technology

Wednesday, January 30, 2019

Sensors & Instrumentation

65. Alternative Sensing

Organizer(s):

Chair Person(s): M. Stefanski—Air Force Research Laboratory

- 02:00 P **#4219 Latest Design Trends in Modal Accelerometers for Aircraft Ground Vibration Testing**
J. Sinske–DLR – German Aerospace Center, Institute of Aeroelasticity; Y. Govers–DLR – German Aerospace Center, Institute of Aeroelasticity; T. Petzsche–Kistler Instrumente GmbH
- 02:20 P **#4518 Accelerometer Mounting Techniques Demystified**
C. Walber–PCB Piezotronics, Inc.; J. Kessler–PCB Piezotronics, Inc.
- 02:40 P **#4110 Rotordynamic Studies Utilizing Digital Image Correlation**
D. Winterhoff–Trilion Engineering Services
- 03:00 P **#4607 Clamping Force Effects on the Performance of Mechanically Attached Piezoelectric Transducers for Impedance-Based NDE**
C. Tenney–Virginia Tech; M. Albakri–Virginia Tech; C. Williams–Virginia Tech; P. Tarazaga–Virginia Tech

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Nonlinear Structures & Systems

66. Jointed Structures III

Organizer(s): M. Brake–Rice University

Chair Person(s): M. Brake–Rice University; C. Schwingshackl–Imperial College London

- 02:00 P **#4343 The Measurement of Tangential Contact Stiffness for Nonlinear Dynamic Analysis**
C. Schwingshackl–Imperial College London; D. Nowell–Imperial College London
- 02:20 P **#4536 Predictive Modeling of Bolted Assemblies with Surface Irregularities**
M. Fronk–Georgia Institute of Technology; G. Guerra–New Mexico State University; M. Southwick–University of Pittsburg; R. Kuether–Sandia National Laboratories; P. Tiso–ETH Zurich; A. Brink, Sandia National Laboratories; D. Quinn–University of Akron
- 02:40 P **#4452 Optical Full Field Monitoring of Bolted Lap-Joint Behaviour under Vibration**
S. Klaassen–Technische Universität München; M. Brøns–Technical University of Denmark; G. Chauda–Michigan State University; T. Kasper–Leibniz University Hanover; C. Schwingshackl–Imperial College London; M. Brake, Rice University
- 03:00 P **#4459 A Modified Bouc-Wen Model to Identify the Impact of Wear on the Dynamics of Frictional Interfaces with Experimental Validation**
L. Tamatam–Politecnico di Torino; A. Fantetti–Imperial College London; M. Volvert–University of Liège; L. Liu–University of Wisconsin-Madison; I. Lawal–Rice University; M. Brake, Rice University; C. Schwingshackl–Imperial College London; D. Nowell–Imperial College London

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Modal Analysis/Dynamic Systems

67. BMA: Vendor Presentations & Tutorials II

Organizer(s): M. Mains–University of Cincinnati

Chair Person(s): T. Marinone–ATA Engineering, Inc.; B. Dilworth–MIT Lincoln Laboratory

- 04:10 P **#5800 Experimental Modal Analysis and FE Model Correlation Using MATLAB**
A. Brandt–University of Southern Denmark

Wednesday, January 30, 2019

Modal Analysis/Dynamic Systems

68. Applications & Structural Health Monitoring

Organizer(s):

Chair Person(s): E. Stasiunas—NASA Marshal Space Flight Center

- 04:10 P **#4122** **Reliability Analysis of Carbon Strip Subjected to High Speed Sliding Contact**
S. Derosa—Norwegian University of Science and Technology; P. N vik—Norwegian University of Science and Technology; A. Collina—Politecnico di Milano; A. R nnquist—Norwegian University of Science and Technology
- 04:30 P **#4567** **Structural Health Monitoring on Industrial Structures Using a Combined Numerical and Experimental Approach**
F. Keilpflug—University of Applied Sciences Wildau; R. Kamenzky—University of Applied Sciences Wildau; D. Alarc n—University of Applied Sciences Wildau; T. Mallareddy—University of Applied Sciences Wildau; P. Blaschke—University of Applied Sciences Wildau
- 04:50 P **#4489** **Structural Health Monitoring with Self-Organizing Maps and Artificial Neural Networks**
O. Avci—Qatar University; O. Abdeljaber—Qatar University; S. Kiranyaz—Qatar University; D. Inman—University of Michigan
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Dynamic Environments Testing

69. Multiple-Input/Multiple-Output Testing II

Organizer(s): T. Schoenherr—Sandia National Laboratories; J. Harvie—VIBES.technology

Chair Person(s): A. Morello—Los Alamos National Laboratory

- 04:10 P **#4633** **Understanding Multi-Axis Resonant Plate Shock Response**
W. Larsen—Michigan Tech University; J. Blough—Michigan Tech University; J. DeClerck—Michigan Tech University; C. VanKarsen—Michigan Tech University; D. Soine—Honeywell Federal Manufacturing & Technologies, LLC.; R. Jones, Honeywell Federal Manufacturing & Technologies, LLC.
- 04:30 P **#4184** **A Method for Determining Impact Force for Single and Tri Axis Resonant Plate Shock Simulations**
B. Ferri—Sandia National Laboratories; R. Hopkins—Sandia National Laboratories
- 04:50 P **#4136** **Quantifying the Effect of Component Inertial Properties on System Level Dynamics**
J. Moore—Sandia National Laboratories; T. Schoenherr—Sandia National Laboratories; D. Smith-Stamps—Sandia National Laboratories
- 05:10 P **#4515** **Comparing Fixed-Base and Shaker Table Model Correlation Methods using Jim Beam**
J. Ristow—NASA; J. Gray—University of Washington

Wednesday, January 30, 2019

Model Validation & Uncertainty Quantification

70. Uncertainty in Early Stage Design II

Organizer(s): R. Platz–Fraunhofer Institute for Structural Durability and System Reliability LBF; G. Stevens–Los Alamos National Laboratory

Chair Person(s): R. Platz–Fraunhofer Institute for Structural Durability and System Reliability LBF; G. Stevens–Los Alamos National Laboratory

- 04:10 P **#4262** **Model Validation Strategy and Estimation of Response Uncertainty for a Bolted Structure with Model-form Errors**
H. Li–Nanjing University of Aeronautics & Astronautics; Q. Guo–Nanjing University of Aeronautics & Astronautics; M. Zhan–Nanjing University of Aeronautics & Astronautics; Y. Tao–Nanjing University of Aeronautics & Astronautics
- 04:30 P **#4523** **Input Estimation and Dimension Reduction for Material Models**
S. Myren–Rose-Hulman Inst. of Technology; E. Herrera–New Mexico Institute of Mining and Technology; A. Shoats–Stanford University; E. Lawrence–Los Alamos National Laboratory; E. Casleton–Los Alamos National Laboratory; D. Luscher, Los Alamos National Laboratory; S. Fensin–Los Alamos National Laboratory
- 04:50 P **#5714** **Applying Uncertainty Quantification to Structural Systems: Parameter Reduction for Evaluating Model Complexity**
W. Locke–Clemson University; S. Kupis–Clemson University; C. Gehb–Technische Universität Darmstadt; R. Platz–Fraunhofer Institute for Structural Durability and System Reliability LBF; S. Atamturktur–The Penn State University
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Wednesday, January 30, 2019

Dynamics of Civil Structures

71. Machine Learning & Model Updating

Organizer(s):

Chair Person(s):

- 04:10 P **#4593** **Experimental Study on Digital Image Correlation for Deep Learning-Based Damage Diagnostic**
N. Gulgec–Lehigh University; M. Takac–Lehigh University; S. Pakzad–Lehigh University
- 04:30 P **#4644** **Event Detection and Localization Using Machine Learning on a Staircase**
C. Thompson–Virginia Tech; B. Feichtl–Virginia Tech; T. Liboro–Virginia Tech; S. Siddiqui–Virginia Tech; S. Malladi–Virginia Tech; T. Devine, Virginia Tech; P. Tarazaga–Virginia Tech
- 04:50 P **#4616** **Model Updating using Interval Arithmetic and Contractor Programming for Set Inversion**
T. Kernicky–University of North Carolina at Charlotte; M. Whelan–University of North Carolina at Charlotte
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Wednesday, January 30, 2019

Sensors & Instrumentation

72. Data Acquisition

Organizer(s):

Chair Person(s): C. Walber–

- 04:10 P **#5705** **Flexible Data Acquisition System Design and Architecture for a Multi-force Testing Facility**
M. Stefanski—U.S. Air Force Research Laboratory; T. Linck—University of Dayton Research Institute
- 04:30 P **#4301** **Instrumentation and Data Acquisition Mistakes in a Structural Dynamic Facility and How to Learn from Them**
M. Stefanski—U.S. Air Force Research Laboratory
- 04:50 P **#5809** **Development of SHM Module for CNT Composite Fiber Based Resistive Strain Sensing and Capacitive Delamination Sensing**
K. Kim—KAIST; J. Lee—KAIST
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Nonlinear Structures & Systems

73. Jointed Structures IV

Organizer(s): M. Brake—Rice University

Chair Person(s): C. Schwingshackl—Imperial College London; M. Brake—Rice University

- 04:10 P **#4200** **Potential and Limitation of a Nonlinear Modal Testing Method for Friction-damped Systems**
M. Scheel—University of Stuttgart; T. Schulz—MesH Engineering GmbH; M. Krack—University of Stuttgart
- 04:30 P **#4346** **Measuring Frictional Contact and Kinematic Behavior of Jointed Beams with Non-Flat Interfaces**
W. Chen—Tongji University; I. Lawal—Rice University; M. Brake—Rice University
- 04:50 P **#3080** **Analysis of Transient Vibrations for Estimating Bolted Joint Tightness**
M. Brøns—Technical University of Denmark; J. Thomsen—Technical University of Denmark; S. Sah—Technical University of Denmark; D. Tcherniak—Brüel & Kjær Sound & Vibration Measurement A/S; A. Fidlin—Karlsruhe Institute of Technology
- 05:10 P **#4311** **Experimental Nonlinear Vibration Analysis of a Shrouded Bladed Disk Model on a Rotating Test Rig**
F. Kaptan—Leibniz University Hannover; L. Panning-von Scheidt—Leibniz University Hannover; J. Wallaschek—Leibniz University Hannover
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Thursday, January 31, 2019

Modal Analysis/Dynamic Systems

74. BMA: Vendor Presentations & Tutorials III

Organizer(s): M. Mains—University of Cincinnati

Chair Person(s): B. Dilworth—MIT Lincoln Laboratory

- 10:00 A **#5824** **Understanding the Stability Diagram – How to Pick Poles/Modes**
J. Hiatt—Siemens PLM; S. Manzato—Siemens PLM
- 11:00 A **#5825** **Considerations for Acquiring High-quality Modal Data**
J. Hiatt—Siemens PLM

Thursday, January 31, 2019

Modal Analysis/Dynamic Systems

75. Vibration Control

Organizer(s):

Chair Person(s): J. Winkel—NASA Glenn Research Center

- 10:00 A **#4206** **Numerical and Experimental Modal Analysis of a Cantilever Beam Axially Loaded by a Tendon Which Is Attached in a Single Spanwise Location**
V. Ondra—University of Bristol; B. Titurus—University of Bristol
- 10:20 A **#4406** **Experimental Evaluation of Piezoelectric Shunt-mediated Resonance Shift in Coupled Cantilevers**
M. Hall—East Carolina University; J. Vignola—The Catholic University of America; T. Ryan—East Carolina University
- 10:40 A **#4237** **Implementation of a Passive/Active Pendulum Vibration Absorber in a Flexible Structure**
D. Flores-Sanchez—Universidad Politécnica de Pachuca; M. Pineda-Arciniega—Tecnológico Nacional de México/I.T. La Laguna; H. Abundis-Fong—Tecnológico Nacional de México/I.T. La Laguna
- 11:00 A **#4655** **On the Adaptive Vibration Suppression on a Flexible Spatial Structure**
O. Garcia-Perez—Centro de Investigación y de Estudios Avanzados del I.P.N.; L. Trujillo-Franco—Centro de Investigación y de Estudios Avanzados del I.P.N.; G. Silva-Navarro—Centro de Investigación y de Estudios Avanzados del I.P.N
- 11:20 A **#4637** **Shaping the Frequency Response Function (FRF) of a Multi-Degree-Of-Freedom (MDOF) Structure Using Arrays of Tuned Vibration Absorbers (TVA)**
C. Neighborgall—Virginia Tech; K. Kothari—Virginia Tech; V. Malladi—Virginia Tech; P. Tarazaga—Virginia Tech; S. Paruchuri—Virginia Tech; A. Kurdila, Virginia Tech
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Thursday, January 31, 2019

Dynamic Environments Testing

76. Laboratory Test Fixtures I

Organizer(s): T. Schoenherr—Sandia National Laboratories; J. Harvie—VIBES.technology

Chair Person(s): D. Soine—Honeywell FM&T

- 10:00 A **#4357** **Testing Summary for the Box Assembly with Removable Component Structure**
D. Rohe—Sandia National Laboratories; S. Smith—Rice University; M. Brake—Rice University; J. DeClerck—Michigan Technological University; M. Alvarez Blanco—Siemens Industry Software NV; T. Schoenherr, Sandia National Laboratories; T. Skousen—Sandia National Laboratories
- 10:20 A **#4084** **Analytically Investigating Impedance-Matching Test Fixtures**
T. Hall—AWE Plc
- 10:40 A **#4210** **Use of Topology Optimization to Design Shock and Vibration Test Fixtures**
T. Schoenherr—Sandia National Laboratories; P. Coffin—Sandia National Laboratories; B. Clark—Sandia National Laboratories
- 11:00 A **#4358** **Comparison of Multi-Axis Testing of the BARC Structure with Varying Boundary Conditions**
D. Rohe—Sandia National Laboratories; R. Schultz—Sandia National Laboratories; T. Schoenherr—Sandia National Laboratories; R. Jones Jr.—Kansas City National Security Campus; T. Skousen—Sandia National Laboratories

- 11:20 A **#4476** **Combining Test and Simulation to Tackle the Challenges Derived from Boundary Conditions Mismatches in Environmental Testing**
U. Musella—Siemens Industry Software NV/Vrije Universiteit Brussel; M. Alvarez Blanco—Siemens Industry Software NV; D. Mastrodicasa—University of Rome La Sapienza; G. Monco—University of Ferrara; E. Di Lorenzo—Siemens Industry Software NV; S. Manzato, Siemens Industry Software NV; B. Peeters—Siemens Industry Software NV; E. Mucchi—University of Ferrara; P. Guillaume—Vrije Universiteit Brussel
- 11:40 A **#4589** **Replicating Responses: Environmental Testing of Unknown Boundary Conditions**
T. Devine—Virginia Tech; S. Malladi—Virginia Tech; P. Tarazaga—Virginia Tech

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Model Validation & Uncertainty Quantification

77. Bayesian Type Filters for Real Time Identification II

Organizer(s): E. Chatzi—ETH Zürich; S. Azam—University of Nebraska Lincoln; V. Dertimanis—

Chair Person(s): S. Azam—University of Nebraska Lincoln; V. Dertimanis—ETH Zurich

- 10:00 A **#4553** **On-board Monitoring of Rail Roughness via Axle box Accelerations of Revenue Trains with Uncertain Dynamics**
V. Dertimanis—ETH Zurich; M. Zimmermann—ETH Zurich; F. Corman—ETH Zurich; E. Chatzi—ETH Zurich
- 10:20 A **#5702** **Output-only Strain Estimation in Dynamic Systems: A Comparative Study of Online Updating Approaches**
S. Eftekhari Azam—University of Nebraska—Lincoln; H. Ebrahimian—SC Solutions, Inc.; B. Moaveni—Tufts University; D. Linzell—University of Nebraska—Lincoln
- 10:40 A **#4398** **Input Estimation of a Full-scale Concrete Frame Structure with Experimental Measurements**
X. Liu—Georgia Institute of Technology; Y. Wang—Georgia Institute of Technology
- 11:00 A **#4571** **Calibration of a Large Nonlinear Finite Element Model with Many Uncertain Parameters**
R. Astroza—Universidad de los Andes; N. Barrientos—Universidad de los Andes; Y. Li—University of Alberta; E. Saavedra Flores—Universidad de Santiago de Chile
- 11:20 A **#4259** **Recursive Bayesian Filtering for Steel Bridge, Output-only, Strain-based Health Prediction**
S. Eftekhari Azam—University of Nebraska—Lincoln; A. Rageh—University of Nebraska—Lincoln; D. Linzell—University of Nebraska—Lincoln

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Dynamics of Civil Structures

78. Human Induced Vibrations

Organizer(s):

Chair Person(s): A. Rønquist—Norwegian University of Science and Technology; J. Caicedo—University of South Carolina

- 10:00 A **#4442** **Floor Vibrations and Elevated Non-structural Masses**
C. Frier—Aalborg University; L. Pedersen—Aalborg University; L. Andersen—Aarhus University
- 10:20 A **#4474** **Design and Performance of a Bespoke Lively All-FRP Footbridge**
J. Russell—University of Warwick; J. Mottram—University of Warwick; S. Zivanovic—University of Exeter; X. Wei—University of Warwick

- 10:40 A **#4657** **Footbridge Vibrations and their Sensitivity to Pedestrian Load Modelling**
L. Pedersen–Aalborg University; C. Frier–Aalborg University
- 11:00 A **#4648** **Smart Gait Analysis for Human Condition Inference**
V. Malladi–Virginia Tech; P. Tarazaga–Virginia Tech; E. Kessler–Virginia Tech
- 11:20 A **#4678** **Recreating Periodic Events: Characterizing Footsteps in a Continuous Walking Signal**
E. Kessler–Virginia Tech; P. Tarazaga–Virginia Tech; S. Gugercin–Virginia Tech
- 11:40 A **#4579** **Structural Property Guided Gait Parameter Estimation Using Footstep-Induced Floor Vibrations**
J. Fagert–Carnegie Mellon University; M. Mirshekari–Carnegie Mellon University; S. Pan–Carnegie Mellon University; P. Zhang–Carnegie Mellon University; H. Noh–Carnegie Mellon University

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Nonlinear Structures & Systems

79. Experimental Nonlinear Dynamics I

Organizer(s): R. Wiebe–University of Washington; S. Spottswood–U.S. Air Force Research Laboratory; D. Ehrhardt–Ehrhardt Engineering LLC; R. Perez–U.S. Air Force Research Laboratory

Chair Person(s): D. Ehrhardt–Ehrhardt Engineering LLC; R. Wiebe–University of Washington

- 10:00 A **#4233** **Tutorial: Nonlinear Modeling & Simulation**
P. Tiso–ETH Zürich
- 11:00 A **#3069** **Experimental Validation of Internal Resonance of Partial Contacting Cycles in Rotordynamics**
E. Chipato–Swansea University; A. Shaw–Swansea University; M. Friswell–Swansea University
- 11:20 A **#4127** **The Best Linear Approximation of MIMO systems: First Results on Simplified Nonlinearity Assessment**
P. Csurcsia–Siemens Industry Software NV/Vrije Universiteit Brussel; B. Peeters–Siemens Industry Software NV; J. Schoukens–Vrije Universiteit Brussel
- 11:40 A **#4266** **Investigation of Nonlinear Dynamic Phenomena Applying Real-time Hybrid Simulation**
M. Hochrainer–University of Applied Sciences; A. Puhwein–University of Applied Sciences

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Nonlinear Structures & Systems

80. Reduced Order Models for Jointed Structures

Organizer(s): M. Brake–Rice University; R. Kuether–Sandia National Laboratories

Chair Person(s): M. Brake–Rice University; R. Kuether–Sandia National Laboratories

- 10:00 A **#4177** **Gerrymandering for Interfaces: Modeling the Mechanics of Jointed Structures**
T. Dreher–University of Stuttgart; N. Balaji–William Marsh Rice University; J. Groß–University of Stuttgart; M. Brake–Rice University; M. Krack–University of Stuttgart
- 10:20 A **#4492** **Reduced Order Modeling of Bolted Joints in Frequency Domain**
G. Karapistik–ROKETSAN; E. Cigeroglu–Middle East Technical University
- 10:40 A **#4602** **Reduction of Nonlinear Degrees of Freedom in Jointed Hurty/Craig-Bampton Substructures**
P. Hughes–University of California, San Diego; R. Kuether–Sandia National Laboratories
- 11:00 A **#4250** **Theoretical Frame for Jointed Structures Dynamic Simulation using Fixed Point Algorithm Resolution and Model Reduction**
A. Meurdefroid–Laboratoire Quartz - Supméca; N. Peyret–Laboratoire Quartz - Supméca; G. Chevallier–Univ. of Bourgogne Franche-Comté

- 11:20 A #4285 **Nonlinear System Identification Methods for Jointed Structures**
M. Jin—Tongji University; M. Brake—Rice University
- 11:40 A #5734 **Vibroimpact Induced Damping in an Architected Sandwich Composite**
E. Sadoulet-Reboul—Univ.Bourgogne Franche-Comté; G. Chevallier—Univ.Bourgogne Franche-Comté; T. Citerne—Univ.Bourgogne Franche-Comté; G. Michon—Institut Supérieur de l'Aéronautique et de l'Espace; P. Cornuault—Univ.Bourgogne Franche-Comté
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Modal Analysis/Dynamic Systems

81. BMA: Vendor Presentations & Tutorials IV

Organizer(s): M. Mains—University of Cincinnati

Chair Person(s): B. Dilworth—MIT Lincoln Laboratory

- 01:00 P #5893 **Shaker Excitation for New/Young Engineers**
M. Lamparelli—Spectral Dynamics, Inc.
- 01:40 P #5815 **Modal Measurements Demo**
W. Fladung—ATA Engineering, Inc.
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Modal Analysis/Dynamic Systems

82. System Identification

Organizer(s):

Chair Person(s): A. Wicks—

- 01:00 P #4408 **Estimating Applied Loads and Response Accelerations on a Dynamic System Using Vibration Data**
E. Koçak—Roketsan Inc.; C. Gençoğlu—Roketsan Inc.; B. Acar—Roketsan Inc.; K. Gürses—Roketsan Inc.
- 01:20 P #4565 **Finite Element Model Updating of the UCF Grid Benchmark Connections Using Experimental Modal Data**
M. Mehrkash—University of New Hampshire; E. Santini-Bell—University of New Hampshire
- 01:40 P #4230 **Application of Wavelet Transform Analysis to Modal Identification**
C. Lin—National Pingtung University of Science and Technology
- 02:00 P #4617 **Adaptive Flutter induction using Active Compressive Loads**
M. Krishnan—Virginia Tech; M. Albakri—Virginia Tech; P. Tarazaga—Virginia Tech
- 02:20 P #4632 **A Theoretical Study on the Generation and Propagation of Traveling Waves in Strings and Rods**
I. Anakok—Virginia Tech; S. Malladi—virginia tech; P. Tarazaga—Virginia Tech
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Dynamic Environments Testing

83. Laboratory Test Fixtures II

Organizer(s): T. Schoenherr—Sandia National Laboratories; J. Harvie—VIBES.technology

Chair Person(s): J. Harvie—VIBES.technology

- 01:00 P **#4085** **Quantification of Modal Truncation with Respect to a Test Fixture's Ability to Replicate a Structural Dynamic Environment**
T. Schoenherr—Sandia National Laboratories
- 01:20 P **#4494** **Modal Projection Matching**
B. Zwink—University of Massachusetts Lowell/Sandia National Laboratories; P. Avitabile—University of Massachusetts Lowell; D. Tipton—Sandia National Laboratories
- 01:40 P **#4401** **Fixture Neutralization Method - Adjustment of Vibration Response to Account for Fixture-Test Article Dynamic Coupling Effects Using Measured FRFs**
J. Reyes—University of Massachusetts Lowell; P. Avitabile—University of Massachusetts Lowell; R. Jones—DoE's KCNSC; D. Soine—DoE's KCNSC
- 02:00 P **#4405** **Implementation of the Fixture Neutralization Methodology Using Data Physics Vibration Controller**
J. Reyes—University of Massachusetts Lowell; P. Avitabile—University of Massachusetts Lowell
- 02:20 P **#4211** **Electromechanical Impedance Method for Applications in Boundary Condition Replication**
T. Devine—Virginia Tech; S. Malladi—Virginia Tech; P. Tarazaga—Virginia Tech

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Model Validation & Uncertainty Quantification

84. Model-based Decision-making for Cultural Heritage Applications

Organizer(s): S. Cogan—CNRS; R. Viala—Université Bourgogne Franche-Comté; V. Almanza—Université de Cergy-Pontoise

Chair Person(s): S. Cogan—CNRS; R. Viala—Université Bourgogne Franche-Comté

- 01:00 P **#4667** **Model-based Decision Support Methods Applied to the Conservation of Musical Instruments: Application to an Antique Cello**
R. Viala—Univ. Bourgogne Franche-Comté; V. Placet—Univ. Bourgogne Franche-Comté; S. Le Conte—Musée de la musique; S. Vaiedelich—Musée de la musique; S. Cogan—Univ. Bourgogne Franche-Comté
- 01:20 P **#5759** **Hygro-mechanical Modelling of Wood and Glutin-based Bondlines of Wooden Cultural Heritage Objects**
D. Konopka—Technische Universität Dresden; M. Kaliske—Technische Universität Dresden
- 01:40 P **#4441** **Model-based Decision Support for Assessing the Playability of Heritage Musical Instruments**
V. Almanza—Université de Cergy-Pontoise; E. Foltête—FEMTO-ST Institute; S. Serfaty—Université de Cergy-Pontoise; S. Le Conte—Musée de la musique/Centre de Recherche sur la Conservation; V. Placet—FEMTO-ST Institute; S. Cogan, FEMTO-ST Institute; S. Vaiedelich—Musée de la musique/Centre de Recherche sur la Conservation
- 02:00 P **#5763** **Modelling of Sympathetic String Vibrations in the Clavichord Using a Modal Udwadia-Kalaba Formulation**
J. Jiolat—Sorbonne Université; J. Le Carrou—Sorbonne Université; J. Antunes—Instituto Tecnológico e Nuclear; C. d'Alessandro—Sorbonne Université
- 02:20 P **#3079** **Nondestructive Consolidation Assessment of Historical Camorcanna Ceilings by Scanning Laser Doppler Vibrometry**
M. Martarelli—e-Campus; P. Castellini—UnivPM; A. Annessi—UnivPM

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Dynamics of Civil Structures

85. Bridges

Organizer(s):

Chair Person(s): C. Ventura—The University of British Columbia; J. Caicedo—University of South Carolina

- 01:00 P **#4277** **Dynamic Tests and Technical Monitoring of a Novel Sandwich Footbridge**
J. Chroscielewski—Gdansk University of Technology; M. Miskiewicz—Gdansk University of Technology; L. Pyrzowski—Gdansk University of Technology; M. Rucka—Gdansk University of Technology; B. Sobczyk—Gdansk University of Technology; K. Wilde, Gdansk University of Technology; B. Meronk—Gdansk University of Technology
- 01:20 P **#4232** **Damage Detection by Experimental Modal Analysis of Steel Bridge Using a Modal Vibration Shaker**
B. Svendsen—The Norwegian University of Science and Technology; G. Frøseth—The Norwegian University of Science and Technology; A. Rønquist—The Norwegian University of Science and Technology
- 01:40 P **#4305** **A Large Scale SHM System: A Case Study on Pre-stressed Bridge and Cloud Architecture**
G. Bertagnoli—Polytechnic of Turin; A. Cigada—Polytechnic of Milan; F. Lucà—Polytechnic of Milan; M. Malavisi—Polytechnic of Turin; D. Melpignano—ST Microelectronics
- 02:00 P **#4385** **Monitoring Bridges in Smart Cities using Smartphones**
Q. Mei—University of Alberta; M. Gül—University of Alberta
- 02:20 P **#5750** **Launching Semi-Automated Modal Identification of the Port Mann Bridge**
A. Mendler—University of British Columbia; C. Ventura—University of British Columbia; L. Nandimandalam—University of British Columbia; Y. Kaya—B.C. Ministry of Transportation and Infrastructure
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Nonlinear Structures & Systems

86. Aeroelasticity

Organizer(s): G. Michon—ISAE-Supaéro

Chair Person(s): L. Sanches —ISAE-Supaéro

- 01:00 P **#4521** **Multi-Harmonic Balance Analysis of Self-Excited Systems**
J. Schoneman—ATA Engineering
- 01:20 P **#4196** **On the Dynamic Response of Flow-Induced Vibration of Nonlinear Structures**
B. Seyed-Aghazadeh—Miami University; H. Samandari—Miami University; R. Abrisham Baf—Miami University
- 01:40 P **#4275** **Experimental and Numerical Aeroelastic Analysis of Airfoil-Aileron System with Nonlinear Energy Sink**
C. Fernandez-Escudero—ISAE-Supaero/Polytechnique Montréal; M. Gagnon—Polytechnique Montréal; E. Laurendeau—Polytechnique Montréal; S. Prothin—ISAE-Supaero; A. Ross—Polytechnique Montreal; G. Michon, Université de Toulouse

02:00 P #4309 **Nonlinear Dynamical Analysis for Coupled Fluid-Structure Systems**
Q. Akkaoui—Universite Paris-Est Marne la Vallee; E. Capiez-Lernout—Universite Paris Est Marne La Vallee; C. Soize—Universite Paris-Est Marne La Vallee; R. Ohayon—Conservatoire National des Arts et Metiers

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Nonlinear Structures & Systems

87. Nonlinear Excitation and Harvesting

Organizer(s): A. Brink—Sandia National Laboratories; L. Virgin—Duke University

Chair Person(s): A. Brink—Sandia National Laboratories

- 01:00 P #5861 **A New Benchmark for Random Vibration of Nonlinear Systems**
A. Brink—Sandia National Laboratories; D. Quinn—University of Akron; M. Brake—Rice University; P. Tiso—ETH Zurich
- 01:20 P #4490 **Nonlinear 3D Modeling and Vibration Analysis of Horizontal Drum Type Washing Machines**
C. Baykal—Middle East Technical University; E. Cigeroglu—Middle East Technical University; Y. Yazicioglu—Middle East Technical University
- 01:40 P #4178 **An Analysis of the Gimballed Horizontal Pendulum System for Use as a Rotary Vibrational Energy Harvester**
D. Sequeira—Duke University; J. Little—Duke University; B. Mann—Duke University
- 02:00 P #4573 **Dynamic Behavior and Output Charge Analysis of a Bistable Clamped-ends Energy Harvester**
M. Derakhshani—University of Louisville; T. Berfield—University of Louisville
- 02:20 P #4257 **Reinforcement Learning for Active Damping of Harmonically Excited Pendulum with Highly Nonlinear Actuator**
J. Turner—Duke University; L. Manring—Duke University; B. Mann—Duke University
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Modal Analysis/Dynamic Systems

88. BMA: Vendor Presentations & Tutorials V

Organizer(s): M. Mains—University of Cincinnati

Chair Person(s): M. Mains—University of Cincinnati

- 03:00 P #5829 **Modal Parameter Estimation Demonstration**
M. Mains—University of Cincinnati
- 04:00 P #5830 **Modal Model Validation**
M. Mains—University of Cincinnati
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Dynamic Environments Testing

90. Laboratory Test Fixtures III

Organizer(s): T. Schoenherr—Sandia National Laboratories; J. Harvie—VIBES.technology

Chair Person(s): T. Skousen—Sandia National Laboratories

- 03:00 P **#5818 Sensitivity Study of BARC Assembly**
J. DeClerck—Michigan Technological University; J. Blough—Michigan Technological University; W. Larsen—Michigan Technological University; C. VanKarsen—Michigan Technological University; D. Soine—Honeywell Federal Manufacturing & Technologies, LLC.; R. Jones, Honeywell Federal Manufacturing & Technologies, LLC.
- 03:20 P **#4195 Non-stationarity and non-Gaussianity in Vibration Fatigue**
J. Slavič—University of Ljubljana; M. Česnik—University of Ljubljana; M. Palmieri—University of Perugia; L. Capponi—University of Perugia; F. Cianetti—University of Perugia; M. Boltežar, University of Ljubljana
- 03:40 P **#5775 Monitoring of Environmental and Sound-induced Vibrations on Artistic Stained Glasses**
A. Lavatelli—Politecnico di Milano; E. Zappa—Politecnico di Milano; A. Cigada—Politecnico di Milano; F. Canali—Veneranda Fabbrica del Duomo di Milano
- 04:00 P **#4375 Comparison of Vibration Comfort Criteria by Controlled Field Tests on An Existing Long-span Floor**
L. Cao—Tongji University; J. Chen—Tongji University
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Model Validation & Uncertainty Quantification

91. Uncertainty Quantification & Propagation in Structural Dynamics II

Organizer(s): B. Moaveni—Tufts University; C. Papadimitriou—University of Thessaly

Chair Person(s): B. Moaveni—Tufts University; C. Papadimitriou—University of Thessaly

- 03:00 P **#4519 Bayesian Model Updating of a Five-Story Building Using Zero-Variance Sampling Method**
M. Akhlaghi—Tufts University; S. Bose—University at Buffalo; P. Green—University of Liverpool; B. Moaveni—Tufts University; A. Stavridis—University at Buffalo
- 03:20 P **#4623 Optimal Sensor Placement for Response Reconstruction in Structural Dynamics**
C. Papadimitriou—University of Thessaly
- 03:40 P **#4661 Integration of Mechanics-Based Finite Element Models with Data for Post-Earthquake Assessment of Critical Civil Structures**
H. Ebrahimian—SC Solutions Inc.; S. Ghahari—University of California, Los Angeles; E. Taciroglu—University of California, Los Angeles
- 04:00 P **#4245 Structural Health Monitoring in Uncertain Nonlinear Systems**
L. Giacom Villani—Universidade Estadual Paulista; S. da Silva—Universidade Estadual Paulista; A. Cunha, Jr.—Universidade do Estado do Rio de Janeiro; M. Todd—University of California San Diego
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Thursday, January 31, 2019

Dynamics of Civil Structures

92. SHM: Ground Improvement & Dampers

Organizer(s):

Chair Person(s): L. Pedersen—Aalborg University

- 03:00 P **#4249 Assessment of Ground-borne Vibration Impact on Nearby Underground Facilities Induced by Ground Excavation**
S. Wang—Hong Kong Polytechnic University; S. Zhu—Hong Kong Polytechnic University

03:20 P #4584 **Response of a SDOF System with an Inerter-based Tuned Mass Damper Subjected to Non-stationary Random Excitation**

A. Javidialesaadi—University of Tennessee; N. Wierschem—University of Tennessee

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Nonlinear Structures & Systems

93. Experimental Nonlinear Dynamics II

Organizer(s): R. Wiebe—University of Washington; S. Spottswood—U.S. Air Force Research Laboratory; D. Ehrhardt—Ehrhardt Engineering LLC; R. Perez—U.S. Air Force Research Laboratory

Chair Person(s): D. Ehrhardt—Ehrhardt Engineering LLC; R. Wiebe—University of Washington

- 03:00 P #4415 **Dynamic Response of a Curved Plate Subjected to a Moving Local Heat Gradient**
D. Ehrhardt—Ehrhardt Engineering LLC; B. Gockel—Air Force Research Laboratory; T. Beberniss—Air Force Research Laboratory
- 03:20 P #4214 **Experimental Nonlinear Dynamics of a Post-Buckled Composite Laminate Plate**
J. Ferguson—United States Air Force Academy; S. Spottswood—Air Force Research Laboratory; R. Perez—Air Force Research Laboratory; D. Ehrhardt—Air Force Research Laboratory; M. Snyder—United States Air Force Academy; M. Obenchain, United States Air Force Academy
- 03:40 P #4397 **Stable Transition between Remote Equilibria of Post-buckled Beams Using Piezoelectric Actuation**
H. Xiu—University of Georgia; R. Davis—University of Georgia
- 04:00 P #4208 **Dynamics of a Non-Contact Linear-to-Rotary Magnetic Transmission System**
X. Wang—Duke University; B. Mann—Duke University
- 04:20 P #4696 **Modal Measurements on a Circular Plate Demonstrating Non-linear Structural Dynamics**
W. Bonness—The Penn State University; J. Fahnline—The Penn State University; E. Myer—The Penn State University
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Nonlinear Structures & Systems

94. Modeling of Damped Systems

Organizer(s):

Chair Person(s): M. Krack—University of Stuttgart

- 03:00 P #4495 **Comparison of ANM and Predictor-Corrector Method to Continue Solutions of Harmonic Balance Equations**
L. Woiwode—University of Stuttgart; N. Narayanaa Balaji—Rice University; J. Kappauf—University of Kassel; F. Tubita—Ecole Centrale de Lyon; L. Guillot—École Centrale de Marseille; C. Vergez, École Centrale de Marseille; B. Cochelin—École Centrale de Marseille; A. Grolet—Ecole Nationale Supérieure d'Arts et Métiers; M. Krack—University of Stuttgart
- 03:20 P #4543 **A Novel Computational Method to Calculate Nonlinear Normal Modes of Complex Structures**
H. Samandari—Miami University; E. Cigeroglu—Middle East Technical University
- 03:40 P #4470 **Constructing Backbone Curves from Free-Decay Vibrations Data in Multi-Degrees of Freedom Oscillatory Systems**
M. Cenedese—ETH Zürich; G. Haller—ETH Zürich

- 04:00 P **#4251** **Experimental and Numerical Analysis of a Prototype for the Design of Active Damping Mechanical Joints**
G. Matten—Univ. of Bourgogne Franche-Comté; E. Sadoulet-Reboul—Univ. of Bourgogne Franche-Comté; G. Chevallier—Univ. of Bourgogne Franche-Comté; N. Peyret—Supméca
- 04:20 P **#3074** **A New Iwan / Palmov Implementation for Fast Simulation and System Identification**
D. Shetty—University of Wisconsin - Madison; M. Allen—University of Wisconsin - Madison
- 04:40 P **#4242** **Simulation of a Self-Resonant Beam-Slider-System Considering Geometric Nonlinearities**
F. Müller—University of Stuttgart; M. Krack—University of Stuttgart