

26th International Conference on Noise and Vibration Engineering (ISMA 2014)

**Held in Conjunction with the 5th International Conference on
Uncertainty in Structural Dynamics (USD 2014)**

**Leuven, Belgium
15-17 September 2014**

Volume 1 of 6

Editors:

**P. Sas
H. Denayer**

D. Moens

ISBN: 978-1-63439-506-9

Printed from e-media with permission by:

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



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

Copyright© (2014) by the Katholieke Universiteit Leuven Department of Mechanical Engineering
All rights reserved.

Printed by Curran Associates, Inc. (2014)

For permission requests, please contact the Katholieke Universiteit Leuven Department of Mechanical Engineering at the address below.

Katholieke Universiteit Leuven Department of Mechanical Engineering
Celestijnenlaan 300B
B-3001 Leuven, Belgium

Phone: +32 16 322643
Fax: +32 16 322987

info@mech.kuleuven.be

Additional copies of this publication are available from:

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

ISMA2014 PAPERS

Acoustic testing

Session AT

Influence of non-ideal diffuse sound field excitations on the control performance of active panel structures M. Misol, Ch. Bloch, H.P. Monner, DLR - Deutsches Zentrum für Luft- und Raumfahrt, Germany M. Sinapius, Technical University Braunschweig, Germany	39
Vibroacoustic test bed with Airbus A400M-fuselage D. Sachau, C. Köhne, Helmut-Schmidt-University, Germany K. Renger, H. Scheel, Airbus, Germany	55
A methodology for a robust inverse identification of model parameters for porous sound absorbing materials T.G. Zieliński, Polish Academy of Sciences, Poland	63

Active noise control

Session ANC

Design approach for an active double-glazed window O. Heuss, W. Kaal, Fraunhofer Institute for Structural Durability and System Reliability LBF, Germany T.B. Klaus, Fraunhofer Institute for Structural Durability and System Reliability LBF, Germany C. Thyges, J. Tschesche, R. Karsten, Technische Universität Darmstadt, Germany	77
Real-time implementation of the frequency-domain FxLMS algorithm without block delay for an adaptive noise blocker D. Sachau, S. Jukkert, Helmut-Schmidt-University, Germany	93
Active control of time-varying broadband noise and vibrations using a sliding-window Kalman filter S. van Ophem, University of Twente, Netherlands A.P. Berkhoff, TNO Technical Sciences, Netherlands	107

Active vibration control

Session AVC

Development of functionally integrated mounts for three- and six-axial vibration isolation of sensitive equipment T. Bartel, S. Gaisbauer, P. Stöhr, S. Herold, Fraunhofer Institute for Structural Durability and System Reliability LBF, Germany T. Melz, Technische Universität Darmstadt, Germany	119
---	-----

Improvement of position control via a local force feedback R. Bastaits, A. Preumont, Université Libre de Bruxelles, Belgium	131
Producing the quietest place on Earth - in your laboratory M. Beker, InnoSeis, Netherlands J.F.J. van den Brand, A. Bertolini, E. Hennes, National Institute for Subatomic Physics, Nikhef, Netherlands	141
Experimental vibration analysis of a rotorcraft active gurney flap system F.L.M. dos Santos, B. Peeters, Y. Lemmens, Siemens Industry Software NV, Belgium W. Desmet, KU Leuven, Belgium L.C.S. Góes, Instituto Tecnológico de Aeronáutica, Brazil	147
Improving the H-infinity norm estimate of an active vibration isolation system using local rational models E. Geerardyn, Vrije Universiteit Brussel, Belgium T. Oomen, Technische Universiteit Eindhoven, Netherlands J. Schoukens, Vrije Universiteit Brussel, Belgium	161
Active damping control for vibration isolation of high-static-low-dynamic-stiffness isolators M.A. Rahim, Universiti Malaysia Perlis, Malaysia T.P. Waters, E. Rustighi, University of Southampton, United Kingdom	173
Vibration analysis and control of the LIGO observatories' large chambers and support piers D. Tshilumba, Université Libre de Bruxelles, Belgium L.K. Nuttal, University of Wisconsin-Milwaukee, United States T. Mac Donald, Stanford University, United States R. Mittelman, Massachusetts Institute of Technology, United States B. Lantz, Stanford University, United States F. Matichard, California Institute of Technology, United States C. Collette, Université Libre de Bruxelles, Belgium	187
The role of controllability and observability in partial pole placement by the method of receptances X. Wei, University of Liverpool, United Kingdom A. Maha, Y.M. Ram, Louisiana State University, United States J.E. Mottershead, University of Liverpool, United Kingdom	201
Nonlinear identification of proof-mass actuators accounting for stroke saturation L. Wilmschurst, M.G. Tehrani, S.J. Elliott, University of Southampton, United Kingdom	209
Active structural acoustic control of rotating machinery using piezo-based rotating inertial actuators G. Zhao, N. Alujevic, KU Leuven, Belgium B. Depraetere, G. Pinte, Flanders' Mechatronics Technology Centre, Belgium J. Swevers, P. Sas, KU Leuven, Belgium	225

Aeroacoustics and flow noise

Session AA

Validation of a wind noise source characterization method for vehicle interior noise prediction D. Blanchet, A. Golota, ESI Group, Germany	241
---	-----

Vibroacoustic study of the response of a structure, excited by a turbulent boundary layer A. Clement, C. Leblond, J.-F. Sigrist, Ch. Audoly, DCNS Research, France J.-A. Astolfi, Institut de Recherche de l'Ecole Navale, France	257
System identification of the kinematics of a cylinder subjected to vortex-induced vibrations J. Decuyper, T. De Troyer, M.C. Runacres, Vrije Universiteit Brussel, Belgium	269
Iterative procedure for accurate plane wave decomposition in flow ducts H. Denayer, W. De Roeck, W. Desmet, KU Leuven, Belgium	279
Extension of the Amiet theory for compact leading edge airfoil noise prediction L. de Santana, W. Desmet, KU Leuven, Belgium C. Schram, von Karman Institute for Fluid Dynamics, Belgium	289
A case study for predicting wind noise inside a car compartment using a multi-disciplinary CFD and Acoustic approach R. Hallez, K. Vansant, Siemens Industry Software NV, Belgium	301
Structural optimization for one dimensional acoustic levitation devices - Numerical and experimental study D. Ilssar, I. Bucher, Technion, Israel N. Cohen, Engineering consulting and research, Israel	317
Reliable CFD/CAA broadband noise prediction of an unducted low speed axial HVAC fan H. Kuehnelt, A. Zanon, AIT Austrian Institute of Technology GmbH, Austria M. De Gennaro, AIT Austrian Institute of Technology GmbH, Italy D. Langmayr, ANSYS Germany GmbH, Germany D. Caridi, ANSYS Italia S.r.l., Italy	331
Radial mode decomposition of sound fields in flow ducts under consideration of a rigid body like swirl M. Spitalny, U. Tapken, DLR - Deutsches Zentrum für Luft- und Raumfahrt, Germany C. Faustmann, Graz University of Technology, Austria L. Enghardt, DLR - Deutsches Zentrum für Luft- und Raumfahrt, Germany	345

Building acoustics

Session BA

Creation of natural and comfortable feeling by blowing sound and wind in air conditioned space A. Arimitsu, S. Takemoto, T. Toi, Chuo University, Japan	361
Determination of the transmission loss for precast panels by using the apparent bending stiffness computed from point mobility measurements E.A. Piana, P. Milani, University of Brescia, Italy	371

Condition monitoring and damage detection

Session CMDD

Optimization of the envelope spectrum with the entropic uncertainty principle J. Antoni, INSA de Lyon, France	379
--	-----

Estimation of the size of a spall defect on a rolling bearing outer ring using Instantaneous Angular Speed measurements.	393
A. Bourdon, S. Chesné, INSA de Lyon, France	
H. André, Maia-Eolis, France	
D. Rémond, INSA de Lyon, France	
The effect of external dynamic loads on the lifetime of rolling element bearings: SEM analysis of raceway surface wear	405
W. Jacobs, R. Boonen, P. Sas, D. Moens, KU Leuven, Belgium	
A study of the coupling between test data accuracy and life prediction	415
A. Linderholt, Y.C. Chen, Linnaeus University, Sweden	
E. Orlowitz, A. Brandt, University of Southern Denmark, Denmark	
A redundant wavelet transform for vibration signals in electric motors	429
S. Seker, Istanbul Technical University, Turkey	
J. Dikun, Klaipeda University, Lithuania	
A wireless distributed sensor network with low-cost vibration sensors for structural health monitoring	437
J.J.M. van de Sande, T.G.H. Basten, H.C. Hakkesteegt, TNO Technical Sciences, Netherlands	

Damage detection and structural health monitoring

Session DDSHM

An assessment of frequency response curvature methods for damage localization	453
R.A.B. Almeida, A.P.V. Urgueira, J.D.P. Morais, Universidade Nova de Lisboa, Portugal	
N. Maia, University of Lisbon, Portugal	
Autoregressive Gaussian processes for structural damage detection	469
R. Fuentes, E.J. Cross, The University of Sheffield, United Kingdom	
A. Halfpenny, HBM-nCode United Kingdom, United Kingdom	
K. Worden, R.J. Barthorpe, The University of Sheffield, United Kingdom	
The influence of transversal crack geometry on the frequency changes of beams	485
G.-R. Gillich, Eftimie Murgu University of Resita, Romania	
M. Abdel Wahab, University of Ghent, Belgium	
Z.-I. Praisach, J.L. Ntakpe, Eftimie Murgu University of Resita, Romania	
A new modal-based damage location indicator	499
G.-R. Gillich, Z.-I. Praisach, Eftimie Murgu University of Resita, Romania	
M. Abdel Wahab, University of Ghent, Belgium	
H. Furdui, Eftimie Murgu University of Resita, Romania	
Nonlinear robust regression analysis as a means of exploring SHM data	513
K. Worden, N. Dervilis, E.J. Cross, The University of Sheffield, United Kingdom	
Transmissibility-based damage detection using linear discriminant analysis	527
Y.L. Zhou, Universidad Politécnica de Madrid, Portugal	
E. Figueiredo, Universidade Lusófona, Portugal	
N. Maia, R.P.C. Sampaio, University of Lisbon, Portugal	
R. Perera, Universidad Politécnica de Madrid, Spain	

Damping

Session D

Development of a vibration isolator with dry friction damping R. Boonen, P. Sas, KU Leuven, Belgium	537
Experimental investigation of damping flexural vibrations using granular materials C. Booty, E.P. Bowyer, V.V. Krylov, Loughborough University, United Kingdom	547
Frequency and amplitude dependent behaviour of tangled metal wire dampers K. Chandrasekhar, J.A. Rongong, E.J. Cross, The University of Sheffield, United Kingdom	559
Optimization and realization of distributed vibration absorbers S. Herold, D. Mayer, J. Pöhlmann, Fraunhofer Institute for Structural Durability and System Reliability LBF, Germany C. Schäfer, G.L. Stein, Technische Universität Darmstadt, Germany	573
Modal parameter estimation of the coupled moving-mass and beam time-varying system Z.-S. Ma, L. Liu, S.-D. Zhou, W. Yang, Beijing Institute of Technology, China	587
A numerical and experimental study on passive damping of a 3D structure using viscoelastic materials M.W.L.M. Rijnen, Eindhoven University of Technology, Netherlands F. Pasteuning, Philips Innovation Services, Netherlands R. Fey, Eindhoven University of Technology, Netherlands G. van Schothorst, Philips Innovation Services, Netherlands H. Nijmeijer, University of Technology Eindhoven, Netherlands	597
Understanding friction induced damping in bolted assemblies through explicit transient simulation G. Vermot des Roches, E. Balmes, SDTools, France	611

Damping with shunted circuits

Session DSC

Enhanced robustness for vibration control by means of piezo-actuators shunted to RL impedances M. Berardengo, A. Cigada, S. Manzoni, Politecnico di Milano, Italy M. Vanali, Università degli Studi di Parma, Italy	627
Multiple sweeping tuneable vibration absorbers for broad band vibration control P. Gardonio, M. Zilletti, Università degli Studi di Udine, Italy	639
Adaptive resonant piezoelectric shunt damping enhanced by a synthetic negative capacitance J.A.B. Gripp, Instituto Tecnológico de Aeronáutica, Brazil O. Heuss, Fraunhofer Institute for Structural Durability and System Reliability LBF, Germany L.C.S. Góes, Instituto Tecnológico de Aeronáutica, Brazil T. Melz, Technische Universität Darmstadt, Germany	653

Passive piezo damping of rotationally periodic structures with application to a bladed drum	667
B. Mokrani, R. Bastais, Université Libre de Bruxelles, Belgium	
M. Horodincu, I. Romanescu, Technical University “Gheorghe Asachi”, Romania	
I. Burda, Babes Bolyai University, Romania	
R. Vigié, Safran, Belgium	
A. Preumont, Université Libre de Bruxelles, Belgium	

Durability testing

Session DUT

Low frequency vibrations of the surface mining machines caused by operational loads and its impact on durability	683
E. Rusiński, P. Moczko, D. Pietrusiak, Wroclaw University of Technology, Poland	
The study of force specification in spacecraft force limited vibration testing	695
Z. Yue, J. Zhang, Y. Feng, J. Wang, Beijing Institute of Spacecraft Environment Engineering, China	

Dynamic environmental testing

Session DET

Reverberant Field Acoustic Control: a technology review	705
F. Bianciardi, K. Janssens, A. Carrella, J. Debille, Siemens Industry Software NV, Belgium	
Using Kurtosis control with random-control vibration tests: theory and practice	715
A. Carrella, B. Peeters, Siemens Industry Software NV, Belgium	
Qualification testing of racecar equipment subject to engine-induced vibrations: how to derive a test profile using a mission synthesis procedure	723
B. Cornelis, B. Dendas, A. Carrella, Siemens Industry Software NV, Belgium	
Improved MIMO FRF estimation and model updating for robust Time Waveform Replication on durability test rigs	737
B. Cornelis, A. Toso, W. Verpoest, B. Peeters, Siemens Industry Software NV, Belgium	
Endurance tests performed using contact and contactless excitation methods: application to composites components	753
D. Di Maio, F. Magi, University of Bristol, United Kingdom	
Validation of a Virtual Shaker Testing approach for improving environmental testing performance	767
S. Manzato, Siemens Industry Software NV, Belgium	
F. Bucciarelli, M. Arras, G. Coppotelli, Università di Roma “La Sapienza”, Italy	
B. Peeters, A. Carrella, Siemens Industry Software NV, Belgium	
Operational modal analysis on a wind turbine blade	783
F. Marulo, G. Petrone, V. D’Alessandro, University of Naples “Federico II”, Italy	
E. Di Lorenzo, Siemens Industry Software NV, Belgium	
Response analysis of specimens excited with non-Gaussian acceleration profiles	799
M. Troncosi, A. Rivola, University of Bologna, Italy	

Dynamics of aerospace structures

Session DAS

Dynamic Analysis and loads definition for the structural design of the Euclid spacecraft M. Bellini, Thales Alenia Space Italy, Italy A. Calvi, European Space Agency, Netherlands	809
A complex mode approach for the validation of FE models with structural damping F. Buffe, CNES, France N. Roy, TOP MODAL, France T. Larroque, INGELIANCE Technologies, France T. Brault, Safran, France	821
BepiColombo: sine test FEM correlation experiences J.F. Mercer, University of Surrey, United Kingdom A.M. Kiley, Airbus Defence and Space, United Kingdom G.S. Aglietti, University of Surrey, United Kingdom	835
Vibration control of classical columns using particle dampers A. Papalou, E. Strepelias, D. Roubien, Technological Educational Institute of Western Greece, Greece S. Bousias, T. Triantafillou, University of Patras, Greece	851
Modelling non-structural elements for microvibration analysis M. Remedia, G.S. Aglietti, University of Surrey, United Kingdom G. Richardson, B. LePage, SSTL, United Kingdom	859
Experimental evidence and numerical prediction of nonlinear modal interactions in a real-life aerospace structure L. Renson, J.-P. Noël, G. Kerschen, University of Liège, Belgium	869
Automated full field measurement system for nonlinear model validation C.W. Schwingshackl, G. D'Antonio, S. Tacconelli, L. Pesaresi, Imperial College London, United Kingdom	885
Final development and testing of a multifunctional power structure for the ROV-E project S.J.I. Walker, A. Cook, J. Foster, University of Southampton, United Kingdom G.S. Aglietti, University of Surrey, United Kingdom	895
Force Limited vibration testing: an evaluation of the computation of C2 for real load and probabilistic source J.J. Wijker, A. de Boer, University of Twente, Netherlands M.H.M. Ellenbroek, Dutch Space BV, Netherlands	911

Dynamics of civil structures

Session CIV

Numerical modeling and in situ vibration measurements during the design and construction of low vibration floors at the Corelab 1B research facility S. François, M. Schevenels, G. Lombaert, G. Degrande, KU Leuven, Belgium	927
--	-----

Base-isolated buildings and the added-mass effect	943
J.P. Talbot, W.I. Hamad, H.E.M. Hunt, Cambridge University, United Kingdom	
Interaction dynamics of a high-speed train moving on multi-span railway bridges with support settlements	955
J.D. Yau, Tamkang University, Taiwan	
L. Fryba, Institute of Applied and Theoretical Mechanics, ASCR, Czech Republic	

Dynamics of energy harvesters

Session HARV

Vibration energy harvesting based on mode localization	965
P. Gardonio, M. Zilletti, Università degli Studi di Udine, Italy	
On energy harvesting from time-limited excitations: simulations and case study	981
G. Gatti, University of Calabria, Italy	
M.J. Brennan, UNESP - Universidade Estadual Paulista "Júlio de Mesquita Filho", Brazil	
M.G. Tehrani, D.J. Thompson, University of Southampton, United Kingdom	
Nonlinear damping in an energy harvesting device	993
L. Simeone, M.G. Tehrani, S.J. Elliott, M. Hendijanizadeh, University of Southampton, United Kingdom	

Dynamics of rotating machinery

Session RMD

Dynamic analysis of coupling elements in IC engine test rigs	1005
M. Cocconcelli, University of Modena and Reggio Emilia, Italy	
A. Agazzi, E. Mucchi, G. Dalpiaz, University of Ferrara, Italy	
R. Rubini, University of Modena and Reggio Emilia, Italy	
Experimental and computational studies of the sound radiation of gearboxes	1019
S. Falkenberger, University of Applied Sciences of Ulm, Germany	
J. Neher, MAN Diesel & Turbo SE, Germany	
B. Graf, B. Wender, University of Applied Sciences of Ulm, Germany	
Vibration and acoustic characterization of a gearbox system with spur gears, shafts, bearings, and a compliant housing	1033
Y. Guo, Ohio State University, United States	
T. Eritenel, Romax Technology Inc., United States	
T.M. Ericson, York College of Pennsylvania, United States	
R. Parker, Virginia Tech, United States	
Efficient forced vibration analysis method for rotating electric machines	1043
A. Saito, H. Suzuki, M. Kuroishi, H. Nakai, Toyota Central R&D Labs., Inc., Japan	

Dynamic testing: methods and instrumentation

Session DT

Fault detection system using acoustic particle velocity in noisy environments based on kurtosis G. Carrillo Pousa, M. Korbasiewicz, D. Fernández Comesaña, Microflown Technologies, Netherlands	1059
Vibration control of flexible structures using fusion of inertial sensors and hyper-stable actuator/sensor pairs C. Collette, Université Libre de Bruxelles, Belgium F. Matichard, California Institute of Technology, United States	1065
Prototype of interferometric absolute motion sensor C. Collette, F. Nassif, J. Amar, C. Depouhon, S.-P. Gorza, Université Libre de Bruxelles, Belgium	1077
Laser excitation system for measuring frequency response function of underwater structures N. Hosoya, Shibaura Institute of Technology, Japan I. Kajiwar, Hokkaido University, Japan K. Umenai, Shibaura Institute of Technology, Japan	1089
Universal broadband torsional exciter from a permanent magnet synchronous motor T. Kimpfián, TriódArt Engineering Consultancy, Hungary F. Augusztinovicz, Budapest University of Technology and Economics, Hungary	1101
Experimental characterisation of a small compression driver using an internal microphone A. Lindberg, G. Pavić, INSA de Lyon, France	1111
Advantages of Multiple-Input Multiple-Output (MIMO) testing using low level excitation systems M.A. Peres, C. Kallmeyer, The Modal Shop, Inc., United States M.C. Witter, Structural Dynalysis, Ltd., United States R.M. Carneiro, F.D. Marques, L.P.R. de Oliveira, University of São Paulo, Brazil	1121
Antenna arrays for in-flight measurement of deformed shapes J.H. van Tongeren, J.J. van Es, H. Schippers, G. Vos, National Aerospace Laboratory NLR, Netherlands	1135
Developments in network based synchronization for improving computer based measurements K. Veggeberg, National Instruments, United States	1149
On the estimation of frequency response functions, dynamic rotational degrees of freedom and strain maps from different full field optical techniques A. Zanarini, University of Bologna, Italy	1155

Engineering non-linearities

Session ENL

Towards an ontology for verification and validation in structural dynamics I. Antoniadou, R.J. Barthorpe, K. Worden, The University of Sheffield, United Kingdom	1171
Non-unison resonant vibrations in nonlinear systems A. Cammarano, T. Hill, S.A. Neild, University of Bristol, United Kingdom	1179

Experimental model validation of a non-linear structure with lap-joint using the physical space approach	1185
A. delli Carri, D. Di Maio, A. Lucchetti, University of Bristol, United Kingdom	
I.A. Sever, Rolls-Royce plc, United Kingdom	
Vibration testing of large scale nonlinear structures	1199
J.M. Londono, J.E. Cooper, S.A. Neild, University of Bristol, United Kingdom	
Nonlinear vibration isolators with static loading errors and asymmetric stiffness	1211
A.D. Shaw, M.I. Friswell, Swansea University, United Kingdom	
S.A. Neild, University of Bristol, United Kingdom	
Statistical energy analysis of nonlinear vibrating systems	1225
G.M. Spelman, R.S. Langley, University of Cambridge, United Kingdom	
Active control of parametrically excited systems	1237
M.G. Tehrani, M. Kalkowski, S.J. Elliott, University of Southampton, United Kingdom	
Bayesian parameter estimation and model selection of a nonlinear dynamical system using Reversible Jump Markov Chain Monte Carlo	1253
D. Tiboaca, P.L. Green, R.J. Barthorpe, K. Worden, The University of Sheffield, United Kingdom	
The influence of drillstring-borehole interaction on backward whirl	1267
K. Vijayan, Swansea University, United Kingdom	
N. Vlajic, University of Bristol, United Kingdom	
M.I. Friswell, Swansea University, United Kingdom	

FP7 ANADE and FP7 FLOWAIRS: Computational and experimental aeroacoustics

Session CEA

Validation of a time domain impedance formulation for the case of a 2D rectangular lined duct with a non-uniform mean-flow with a finite boundary layer thickness	1281
A. Ammirati, H. Denayer, W. De Roeck, W. Desmet, KU Leuven, Belgium	
Numerical performance and accuracy of wake interaction noise prediction models	1297
G. Grasso, J. Christophe, C. Schram, von Karman Institute for Fluid Dynamics, Belgium	
A higher-order finite element method for the linearised Euler equations	1311
K. Hamiche, Siemens Industry Software NV, Belgium	
G. Gabard, University of Southampton, United Kingdom	
H. Beriot, Siemens Industry Software NV, Belgium	
Investigation of flow-acoustic interaction in automotive turbocharger	1327
R. Kabral, M. Åbom, KTH Royal Institute of Technology, Sweden	
Accurate interfacing schemes for the coupling of CFD data with high order DG methods for aeroacoustic propagation	1333
M. Muriel Gracia, B. Vanelderen, W. De Roeck, W. Desmet, KU Leuven, Belgium	

FP7 DemoTest-EV and TU1105 COST: NVH of electric vehicles
Session NVHEV

An investigation on impact-induced oscillations and noise in lubricated conjunctions N. Dolatabadi, S. Theodossiades, S.J. Rothberg, Loughborough University, United Kingdom	1347
Structural analysis of PMSM-radial flux, PMSM-axial flux and SRM used to propel a special electric scooter D. Fodorean, O. Birte, A. Popp, Universitatea Tehnica din Cluj-Napoca, Romania S. Gillijns, J. Anthonis, H. Van der Auweraer, Siemens Industry Software NV, Belgium C. Martis, Universitatea Tehnica din Cluj-Napoca, Romania	1361
A multi objective sound quality optimization of electric motor noise in hybrid vehicles J.A. Mosquera Sánchez, J. Villalba, University of São Paulo, Brazil K. Janssens, Siemens Industry Software NV, Belgium L.P.R. de Oliveira, University of São Paulo, Brazil	1371
Permanent magnet synchronous machine design for low-noise drive systems F.P. Piglesan, F. Jurca, C. Oprea, C. Martis, Universitatea Tehnica din Cluj-Napoca, Romania	1387
Multiphysical analysis of a three-phase PWM-supplied PMSM for light vehicle applications M. Sarrazin, Siemens Industry Software NV, Belgium D. Fodorean, Universitatea Tehnica din Cluj-Napoca, Romania S. Gillijns, B. Peeters, H. Van der Auweraer, Siemens Industry Software NV, Belgium C. Martis, Universitatea Tehnica din Cluj-Napoca, Romania	1401
Recovering phase relationships between non-synchronous microphone array measurements L. Yu, J. Antoni, Q. Leclère, INSA de Lyon, France	1415

FP7 EMVeM: Energy efficiency management for vehicles and machines
Session EMVEM

Experimental implementation of velocity feedback loops with hexagonal piezoelectric patch actuators D. Casagrande, P. Gardonio, Università degli Studi di Udine, Italy	1431
Measurement of the damping properties of carbon composite plates by the power input method M. Jaber, H. Schneeweiss, BMW Group, Germany J. Börs, Technische Universität Darmstadt, Germany T. Melz, Technische Universität Darmstadt, Germany	1445
Feasibility study of an energy harvesting system integrated with a rotational vibration absorber S. Perfetto, F. Infante, H. Atzrodt, D. Mayer, S. Herold, Fraunhofer Institute for Structural Durability and System Reliability LBF, Germany	1459
Model order reduction of dynamical structural simulation models of electric motors using Krylov subspaces M. Schwarzer, E. Barti, BMW Group, Germany T. Bein, Fraunhofer Institute for Structural Durability and System Reliability LBF, Germany	1473

FP7 eVADER: Electric vehicle alert for detection and emergency response

Session EVDR

Source arrays for directional and non-directional sound generation	1487
A.P. Berkhoff, TNO Technical Sciences, Netherlands	
B. Van Genechten, Siemens Industry Software NV, Belgium	
Acoustic Simulation for evaluating loudspeaker location for pedestrian warning systems in EV/HEV	1497
I. Bosmans, Siemens Industry Software NV, Belgium	
A. Tocarciuc, Siemens Industry Software NV, Romania	
K. Rissler, A. Brombach, Audi AG, Germany	
The expected impact of eVADER technology on the safety of vulnerable road users	1507
J.J. Garcia, J.M. Barrios, Applus+ IDIADA, Spain	
D. Quinn, Nissan Technical Centre Europe, United Kingdom	
G. Baudet, T. Schmitt, Renault SA, France	
J. Chamard, PSA Peugeot Citroën, France	

FP7 GRESIMO and FP7 eLiQuiD: Green and silent mobility

Session GSM

Assessment of the performance of trim materials: validation by mean of several measurement strategies	1521
L. De Ryck, C. Crampon, A. Geslain, M. Tournour, Siemens Industry Software NV, Belgium	
V. D'Ortona, W. Desmet, KU Leuven, Belgium	
Cylindrical nearfield acoustical holography using compressive sampling: feasibility and numerical examples	1531
M. Kirchner, KU Leuven / Virtual Vehicle Research Center, Austria	
E. Nijman, Virtual Vehicle Research Center, Austria	
Vibro-acoustic specifications and design indicators for lightweight vehicles	1547
M. Noubou Dassi, A. Gaudin, Z. Abbadi, L. Gagliardini, PSA Peugeot Citroën, France	
C. Pézerat, F. Gautier, Université du Maine, France	
Noise and vibration effects of hybrid electric vehicles	1561
V. Parmar, D. Di Rocco, W. Hellinger, AVL List GmbH, Austria	
Optimization efficiency in multidisciplinary vehicle design including NVH criteria	1571
R. Sala, M. Pierini, N. Baldanzini, Università degli Studi di Firenze, Italy	
Global optimization of smart lightweight structures	1587
R. Salloum, O. Heuss, D. Mayer, Fraunhofer Institute for Structural Durability and System Reliability LBF, Germany	
NVH assessment of polymer-based composite structures	1603
A. Treviso, B. Van Genechten, Siemens Industry Software NV, Belgium	
D. Mundo, University of Calabria, Italy	
M. Tournour, Siemens Industry Software NV, Belgium	

FP7 INTERACTIVE: Innovative concept modelling techniques for multi-attribute optimization of active vehicles

Session INT

On the correlation between a 3D high-fidelity multi-body vehicle model and a 1D 15-DOFs vehicle concept model S. Candreva, D. Mundo, University of Calabria, Italy M. Gubitosa, A. Toso, Siemens Industry Software NV, Belgium	1615
Sensitivity study on the equivalent mechanism model for conceptual design of vehicle body crash-worthiness S. Candreva, D. Straface, C. Garre, D. Mundo, University of Calabria, Italy F. Laszlo, S. Donders, Siemens Industry Software NV, Belgium P. Mas, Siemens Industry Software NV, France	1629
Use of concept modelling for online input force estimation F. Cosco, F. Naets, W. Desmet, KU Leuven, Belgium	1639
A study on vehicle body concept modelling: beam to joint connection and size optimization of beam-like structures G. De Gaetano, D. Mundo, University of Calabria, Italy G. Vena, G&G Design and Engineering, Italy M. Kroiss, IABG mbH, Germany L. Cremers, BMW Group, Germany	1653
Concept modelling and simulation in truck chassis design R. Liebrechts, DAF Trucks N.V., Netherlands	1665

FP7 TIRE-DYN: Tyre/road noise and experimental validation

Session TIR

A full three-dimensional tire model for road noise prediction Z. Abbadi, A. Gaudin, PSA Peugeot Citroën, France	1677
A simplified model of a rotating tire using cylindrical shells with free ends supported by an elastic foundation N. Alujevic, KU Leuven, Belgium N. Campillo-Davo, Universidad Miguel Hernandez de Elche, Spain P. Kindt, Goodyear S.A., Luxembourg B. Pluymers, P. Sas, W. Desmet, KU Leuven, Belgium	1691
Test sections to study the acoustical quality of thin noise reducing asphalt layers A. Bergiers, J. De Visscher, K. Denolf, A. Destrée, Belgian Road Research Centre, Belgium B. Vanhooreweder, Flemish Government, Agency for Roads and Traffic, Belgium C. Vuye, University of Antwerp, Belgium	1707
Modelling absorption in porous asphalt concrete for oblique incident sound waves M. Bezemer-Krijnen, Y.H. Wijnant, A. de Boer, University of Twente, Netherlands	1723

Tyre rolling simulation using a state-space formulation W.R. Graham, University of Cambridge, United Kingdom	1731
Modal analysis of cylindrical shell using circumference reduction method and non-linear least squares approach A. Kitahara, T. Yoshimura, Tokyo Metropolitan University, Japan	1747
Vibration behavior analysis of tire in operational condition by receptance method M. Matsubara, Toyohashi University of Technology, Japan N. Tsujiuchi, T. Koizumi, A. Ito, Y. Hirano, Doshisha University, Japan S. Kawamura, Toyohashi University of Technology, Japan	1755
Non-destructive technique for dynamic stiffness and acoustic assessment: study of gap graded mixtures with different content in bitumen V.F. Vázquez, University of Castilla-La Mancha, Spain J. Luong, University of Liège, Belgium S.E. Paje, University of Castilla-La Mancha, Spain	1769
Characterization of tyre exterior noise radiation S. Vercammen, Goodyear S.A., Luxembourg F. Bianciardi, Siemens Industry Software NV, Belgium P. Kindt, Goodyear S.A., Luxembourg W. Desmet, P. Sas, KU Leuven, Belgium	1781
Investigation of sound radiation by automotive tyres vibrating at low resonant frequencies A.C. Wood, V.V. Krylov, S.J. Walsh, Loughborough University, United Kingdom	1797

Friction induced vibrations

Session FRIV

Modeling squeal noise on dry automotive clutch Y. Aktir, Valeo, France J.-F. Brunel, P. Dufrenoy, Lille Mechanical Laboratory, France H. Mahé, Valeo, France	1813
Steady state of modal coupling instabilities as a dynamic energy equilibrium J. Brunetti, INSA de Lyon, France F. Massi, Università di Roma "La Sapienza", Italy W. D'Ambrogio, Università dell'Aquila, Italy L. Baillet, IsTerre - Université Joseph Fourier Grenoble, France	1827
Understanding the mechanism for the friction modifier suppressing wear-type rail corrugation from the viewpoint of friction-induced vibration G.X. Chen, W.J. Qian, X.L. Cui, X.L. Xiao, J.L. Mo, Southwest Jiaotong University, China	1843
On the role of local contact dynamics in the macroscopical frictional behaviour M. Di Bartolomeo, F. Massi, Università di Roma "La Sapienza", Italy L. Baillet, IsTerre - Université Joseph Fourier Grenoble, France A. Culla, A. Fregolent, Università di Roma "La Sapienza", Italy	1853

A finite element model reduction based on super-elements for brake squeal study O. Fazio, S. Nacivet, PSA Peugeot Citroën, France J.-J. Sinou, Ecole Centrale de Lyon, France	1867
Energy transfer between acoustic fields by dry frictional contacts for SHM: a lumped numerical analysis K.C. Gryllias, E. Chatelet, INSA de Lyon, France F. Massi, Università di Roma “La Sapienza”, Italy E. Moulin, University of Valenciennes, France	1877
Reanalysis and control-based techniques for non-deterministic friction induced vibrations analyses F. Massa, A. Gonzalez, H.Q. Do, T. Tison, J. Lauber, T.M. Guerra, University of Valenciennes, France	1891
Unstable mode coupling at the origin of hip endoprosthesis squeaking noise F. Massi, Università di Roma “La Sapienza”, Italy G. Ouenzerfi, INSA de Lyon, France E. Renault, R&D TORNIER, France Y. Berthier, INSA de Lyon, France A. Tufo, Università di Roma “La Sapienza”, Italy P. Piriou, CHU Ambroise Paré, Belgium	1903
Non-linear dynamics of stick-slip phenomena for a three DOFs mechanical system S.G. Neglia, A. Culla, A. Fregolent, Università di Roma “La Sapienza”, Italy	1917
Experimental and numerical characterization of system response under dry frictional contact D. Tonazzi, F. Massi, Università di Roma “La Sapienza”, Italy L. Baillet, IsTerre - Université Joseph Fourier Grenoble, France A. Culla, A. Fregolent, Università di Roma “La Sapienza”, Italy E. Regis, M. Lambert, INSA de Lyon, France	1931
The effects of groove-textured surfaces on friction-induced noise of brake disc materials J. Yang, J.L. Mo, Southwest Jiaotong University, China H. Ouyang, The University of Liverpool, United Kingdom J. Zhao, G.X. Chen, M. Zhu, Southwest Jiaotong University, China	1947
Analytical and numerical investigation of friction-induced instability in a propeller-shaft system with various friction laws Z.G. Zhang, Z.Y. Zhang, K.K. Che, B. Jing, X.J. Yang, H.X. Hua, Shanghai Jiao Tong University, China	1957

Ground vibrations

Session GV

Effects of shear coupling on the acoustic characteristics of torsional waves in buried fluid-filled pipes Y. Gao, J. Muggleton, University of Southampton, United Kingdom	1967
The ground cross-modal impedance as a tool to analyse multiple plates coupled to the ground L. Grau, ACOUPHEN, France B. Laulagnet, INSA de Lyon, France	1977

Comparison of soil excitation methods for surface wave speed measurements M. Iodice, E. Rustighi, J. Muggleton, University of Southampton, United Kingdom	1991
Focusing of ground vibrations generated by high-speed trains V.V. Krylov, Loughborough University, United Kingdom	2007

Inverse methods - load identification

Session INV

Identification of time varying stiffness using derivative estimator and polynomial basis S. Chesné, INSA de Lyon, France F. Martel, Université de Sherbrooke, Canada C. Chochol, INSA de Lyon, France D. Rancourt, Université de Sherbrooke, Canada D. Rémond, INSA de Lyon, France	2017
On the experimental inverse characterization of poroelastic materials using an impedance tube L.F. Córser, D.A. Siviero, B.N. Huallpa, J.R.F. Arruda, T.S. Pegoretti, Universidade Estadual de Campinas, Brazil P. Lamary, Universidade Federal do Ceará, Brazil	2029
New approach for impact detection by finding sparse solution D. Ginsberg, C.-P. Fritzen, University of Siegen, Germany	2043
Identification of loads of thin structures with the corrected Force Analysis technique: an alternative to spatial filtering regularization Q. Leclère, INSA de Lyon, France F. Ablitzer, C. Pézerat, Université du Maine, France	2057
Measurement of firing impulse force in rifles B. Lonzi, Università Politecnica delle Marche, Italy M. Martarelli, Università degli Studi e-Campus, Italy C. Santolini, L. Scalise, Università Politecnica delle Marche, Italy	2065
Characterisation of a small vibration source G. Pavić, C. Sandier, INSA de Lyon, France X. Carniel, CETIM, France	2077
Force identification using mixed and penalized optimization techniques A. Rezayat, V. Nassiri, S. Vanlanduit, P. Guillaume, Vrije Universiteit Brussel, Belgium	2087
Geometrical interpretation and visualization of inverse acoustic problems in the presence of model uncertainties and measurement error E.S. Viana, Universidade Estadual de Campinas, Brazil V. Martin, Institut Jean Le Rond d'Alembert, France J.R.F. Arruda, Universidade Estadual de Campinas, Brazil	2101

Lightweight structures and materials

Session LW

Estimation of the elastic properties of an adhesive joint of thermoplastic honeycomb sandwich panels through analysis of structural resonant behaviour S. Debruyne, KU Leuven @ Kulab, Belgium D. Vandepitte, KU Leuven, Belgium K. Van Massenhove, KU Leuven @ Kulab, Belgium	2115
Soundproof performance of polymer-based panel with double-layer structure I.H. Kim, H.I. Lee, Korea Institute of Construction Technology, Korea (Republic of)	2125
Sensitivity of macroscopic properties of a multi-layer panel including porous material on the micro-level parameters of an open cell porous material E. Lundberg, P. Göransson, KTH Royal Institute of Technology, Sweden U. Orrenius, Bombardier Transportation, Sweden B. Semeniuk, KTH Royal Institute of Technology, Sweden	2135
Dynamic analysis of functionally graded materials using the wavelet finite element method M. Musuva, C. Mares, Brunel University, United Kingdom	2151
Modeling viscoelastic damping insertion in lightweight structures with generalized Maxwell and fractional derivative models R. Pirk, Institute of Aeronautics and Space (IAE), Brazil L. Rouleau, V. D'Ortona, W. Desmet, B. Pluymers, KU Leuven, Belgium	2165

Medium and high frequency techniques

Session MHF

Proper Generalized Decomposition, an useful tool to consider multi-parametric uncertainties over mid-frequency broad bands A. Barbarulo, H. Riou, A. Cattabiani, G. Helluy, P. Ladevèze, LMT-Cachan, France	2179
Phased geometrical acoustics in a small cabin M. Boucher, B. Pluymers, W. Desmet, KU Leuven, Belgium	2193
A predictive method to analyze shallow shell vibrational behavior in medium-frequency regime A. Cattabiani, H. Riou, A. Barbarulo, P. Ladevèze, LMT-Cachan, France	2203
Computing the uncertain vibrations of plates with spatially extended random excitation using the image source method J. Cuenca, M. Kurowski, B. Peeters, Siemens Industry Software NV, Belgium	2217
Medium-high frequency optimization using SEA sensitivity A. Culla, Università di Roma "La Sapienza", Italy W. D'Ambrogio, Università dell'Aquila, Italy A. Fregolent, S. Milana, Università di Roma "La Sapienza", Italy	2231
Efficient evaluation of the frequency-averaged power injected into systems of industrial complexity R. D'Amico, W. Desmet, KU Leuven, Belgium	2245

Vibro-acoustic simulation of damped orthotropic plates with the wave based method H. Devriendt, D. Vandepitte, W. Desmet, KU Leuven, Belgium	2261
Hybrid wave based - transfer matrix modeling of sound insulation problems A. Dijckmans, G. Vermeir, KU Leuven, Belgium	2277
An extension to random point process theory for predicting the vibration response of uncertain structures R.S. Langley, University of Cambridge, United Kingdom A. Cicirello, University of Cambridge, United Kingdom E. Deckers, KU Leuven, Belgium	2293
Time response of complex dynamic systems C. Lecomte, University of Southampton, United Kingdom	2305
A validation of some recent BEM and FEM techniques for predicting exterior acoustic transfer functions for a mockup of an engine installed in the engine bay G. Miccoli, IMAMOTER Institute, Italy K. Vansant, Siemens Industry Software NV, Belgium C. Bertolini, Autoneum Management AG, Italy	2315
Vibration energy control in mid frequency range based on principal component analysis N. Okubo, Y. Ii, Chuo University, Japan K. Furuya, Gifu University, Japan T. Toi, Chuo University, Japan A. Seto, S. Kanoko, Nippon Steel & Sumitomo Metal, Japan	2331
Generalized reverberant acoustic field modeling based on the Gaussian Orthogonal Ensemble E. Reynders, KU Leuven, Belgium	2341
Reflection and transmission of waves in helical beams N. Sondergaard, inuTech GmbH, Germany J. Renno, University of Southampton, United Kingdom	2357
Discrete Flow Mapping - extending DEA towards an efficient mesh based simulation tool for high-frequency vibro-acoustics G. Tanner, University of Nottingham, United Kingdom D.J. Chappell, Nottingham Trent University, United Kingdom	2373

Modal testing: methods and case studies

Session MTC

Real milling force based dynamic parameter extraction method G. Aguirre, A. Iglesias, J. Muñoa, A. Astarloa, IK4-Ideko, Spain J. Ciurana, Universidad de Girona, Spain	2383
A method to estimate automotive powertrain inertia properties using operational vibrations F. Barillon, L. Polac, C. Thévenard, Renault SA, France	2395
Modal identification of time-varying systems using Hilbert transform and signal decomposition M. Bertha, J.-C. Golinval, University of Liège, Belgium	2409

Autonomous Modal Analysis - A method for Experimental Modal Analysis using self-generated excitation	2421
A. Colombo, E. Bianchi, AgustaWestland, Italy	
M. Scaccabarozzi, Politecnico di Milano, Italy	
D.J. Ewins, University of Bristol, United Kingdom	
A. Cigada, S. Manzoni, Politecnico di Milano, Italy	
A. delli Carri, University of Bristol, United Kingdom	
Nonlinear identification of a numerical benchmark structure: from measurements to FE model updating	2437
A. delli Carri, D.J. Ewins, University of Bristol, United Kingdom	
An overview of experimental strain-based modal analysis methods	2453
F.L.M. dos Santos, B. Peeters, J. Lau, Siemens Industry Software NV, Belgium	
W. Desmet, KU Leuven, Belgium	
L.C.S. Góes, Instituto Tecnológico de Aeronáutica, Brazil	
Polymax Plus estimator: better estimation of the modal parameters and their confidence bounds	2469
M. El-kafafy, Vrije Universiteit Brussel, Belgium	
B. Peeters, Siemens Industry Software NV, Belgium	
T. De Troyer, P. Guillaume, Vrije Universiteit Brussel, Belgium	
Contactless acoustic excitation for experimental modal analysis in composite components	2485
J. Garcia Lopez, F. Deblauwe, T. Knechten, L. Pluym, Siemens Industry Software NV, Belgium	
M.V. Kazanci, A. Tekeli, Ford OTOSAN, Turkey	
AIRBUS A350XWB Ground Vibration Testing: Efficient techniques for customer oriented on-site modal identification	2495
Y. Govers, M. Böswald, DLR - Deutsches Zentrum für Luft- und Raumfahrt, Germany	
P. Lubrina, S. Giclais, C. Stephan, Onera - The French Aerospace Lab, France	
N. Botargues, Airbus, France	
Improved Modal Assurance Criterion using a quantification of identification errors per mode/sensor	2509
G. Martin, E. Balmes, SDTools, France	
T. Chancelier, Chassis Brakes International, France	
Comparison of optical and conventional measurement techniques for experimental modal analysis of CFRP aero engine components	2521
C. Schedlinski, ICS Engineering GmbH, Germany	
K.-H. Dufour, Rolls-Royce plc, Germany	
J. Schell, E. Biegler, J. Sauer, Polytec GmbH, Germany	
A. Hennig, ICS Engineering GmbH, Germany	
Experimental evaluation of modal parameter based system identification procedure	2535
M. Yu, N. Feng, E. Hahn, The University of New South Wales, Australia	

Model order reduction

Session MOR

- Analysis of forced response of high-mode vibrations of mistuned bladed discs using reduced-order modelling methodology 2551
 Y. Duan, C. Zang, Nanjing University of Aeronautics and Astronautics, China
 E. Petrov, University of Sussex, United Kingdom
- Meta-models of repeated dissipative joints for damping design phase 2565
 C. Hammami, Arts et Métiers Paritech, France
 E. Balmes, SDTools, France
- Energy-based interior mode selection for reduced-order models under harmonic excitation 2577
 I. Palomba, D. Richiedei, A. Trevisani, Università degli Studi di Padova, Italy
- Model order reduction using an adaptive basis for geometrically nonlinear structural dynamics 2587
 J.B. Rutzmoser, D.J. Rixen, Technische Universität München, Germany
 P. Tiso, Delft University of Technology, Netherlands
- On the forced harmonic response of coupled systems via a WFE-based super-element approach 2597
 P.B. Silva, Universidade Estadual de Campinas, Brazil
 J.-M. Mencik, INSA Centre Val de Loire, Université François Rabelais, France
 J.R.F. Arruda, Universidade Estadual de Campinas, Brazil
- A nonlinear model order reduction method for cable slab dynamics 2611
 A. Sridhar, P. Tiso, Delft University of Technology, Netherlands
 T. Hardeman, Philips Innovation Services, Netherlands

Model updating and correlation

Session MU

- Calibration and cross-validation of a car component using frequency response functions and a damping equalization technique 2625
 T. Abrahamsson, Chalmers University of Technology, Sweden
 F. Bartholdsson, M. Hallqvist, K.H.A. Olsson, M. Olsson, A. Sällström, Volvo Car Corporation, Sweden
- Benchmark on modal characterization of built-up structures: numerical variability and test-analysis correlation on an industrial pump 2641
 S. Audebert, Electricité de France, France
 S. Ghavamian, Numerical Engineering & Consulting Services, France
 C. Kaici, Siemens Industry Software NV, France
- Integrating tools to improve finite element models of machine tools via experimental modal data 2655
 J.M. Hernandez-Vazquez, I. Garitaonandia, M.H. Fernandes, J. Albizuri, University of the Basque Country UPV/EHU, Spain
 J. Muñoz, IK4-Ideko, Spain

Parameter identification of a printed circuit board structure using model updating and scanning laser vibrometer measurements Z. Huang, C. Zang, Nanjing University of Aeronautics and Astronautics, China M.I. Friswell, Swansea University, United Kingdom	2671
Comparative study of model correlation methods with application to model order reduction C. Lein, M. Beitelschmidt, Technische Universität Dresden, Germany	2683
Extending a deterministic computational model updating technique to estimating the parameter variability caused by non-deterministic test data – a tool for Structural Health Monitoring M. Link, M. Weiland, University of Kassel, Germany	2701
Model updating and validation of a dual-rotor system H. Miao, C. Zang, Nanjing University of Aeronautics and Astronautics, China M.I. Friswell, Swansea University, United Kingdom	2715
Experimental characterization of vibro-acoustic properties of an aircraft fuselage R. Winter, M. Norambuena, J. Biedermann, M. Böswald, DLR - Deutsches Zentrum für Luft- und Raumfahrt, Germany	2731

Monitoring and diagnostics of rotating machinery

Session RMM

Diagnostic of rolling element bearing in low speed regime using the instantaneous angular speed and cyclostationary tools K. Ait Sghir, O. Cousinard, Université de Reims, France M. El badaoui, INSA de Lyon, France F. Bolaers, J.-P. Dron, W. Mustapha, Université de Reims, France	2749
Fault diagnosis in roller element bearings by using a linear autoregressive model H. Al-Bugharbee, Strathclyde University, United Kingdom I. Trendafilova, University of Strathclyde, United Kingdom	2765
Detection of rattle noise with optical encoders in run-up conditions S. Baudin, D. Rémond, J. Antoni, INSA de Lyon, France O. Sauvage, PSA Peugeot Citroën, France	2777
Internal combustion engine analysis using EngineEnvelope (EE) L. Bregant, M. Spagnol, G. Caizzi, Università degli Studi di Trieste, Italy	2787
Enhanced visual analysis of aircraft engines based on spectrograms J. Griffaton, Safran, France J. Picheral, A. Tenenhaus, Supélec, France	2795
Dynamic pattern recognition method for bearing monitoring S. Kerroumi, L. Rasolofondraibe, CReSTIC, University of Reims Champagne Ardenne, France X. Chimentin, GRESPI, University of Reims Champagne Ardenne, France	2809
Towards an automatic diagnostics system for gearboxes based on vibration measurements A.P. Ompusunggu, B.K. Y'Ebondo, S. Devos, F. Petre, Flanders' Mechatronics Technology Centre, Belgium	2821

Frequency response functions and modal parameters of a rotating system exhibiting rotating damping	2837
B. Vervisch, S. Derammelaere, K. Stockman, M. Loccufer, University of Ghent, Belgium	
Detection of a blade crack in bladed disks: methodology and validation	2851
S. Zucca, Politecnico di Torino, Italy	
B.I. Epureanu, University of Michigan, United States	

Multi-body dynamics and control

Session MB

Efficient time-domain simulation of the forced response of a moving axis	2867
C. Brecher, M. Fey, M. Daniels, RWTH Aachen University, Germany	
Modelling and validation of the leaf spring model for multi-body vehicle simulations	2877
B. Kadziela, M. Manka, T. Uhl, AGH University of Science and Technology, Poland	
A. Toso, S. Donders, Siemens Industry Software NV, Belgium	
A design approach to mechanical shock mitigation in optomechanical systems	2887
M. Nefzi, Carl Zeiss, Germany	
F. Wagner, K. Baumann, ICS Engineering GmbH, Germany	
Nonlinear kinematic state estimation in rigid-link multibody systems by spherical simplex sigma point unscented Kalman filters	2899
I. Palomba, D. Richiedei, A. Trevisani, Università degli Studi di Padova, Italy	
Integration of Hamiltonian systems with a structure-preserving algorithm	2915
S. Rahrovani, T. Abrahamsson, K. Modin, Chalmers University of Technology, Sweden	
Vibration analysis of an automotive forming tool using coupled MBS-FEM simulation and experimental validation	2931
K. Swidergal, OTH Regensburg, Germany	
C. Lubeseder, I. von Wurmb, J. Meinhardt, BMW Group, Germany	
M. Wagner, OTH Regensburg, Germany	
S. Marburg, Universität der Bundeswehr, Germany	
Accuracy of the floating frame with nonlinear elastic expression: a comparative study	2943
L. Wu, P. Tiso, Delft University of Technology, Netherlands	

Non-linearities: identification and modelling

Session NL

Full field dynamic deflection and strain for linear components connected with nonlinear connectors	2951
P. Avitabile, Obando, K. Truong, University of Massachusetts Lowell, United States	
Non-linear identification of multi-degree of freedom systems using the restoring force surface method	2967
M. Böswald, U. Füllekrug, DLR - Deutsches Zentrum für Luft- und Raumfahrt, Germany	
A phase calibration method for memoryless nonlinear systems	2981
I. Bucher, O. Halevi, Technion, Israel	

A comparison of worst-case predictions with experimental results for a locally nonlinear beam T. Butlin, Cambridge University, United Kingdom	2989
Experimental and numerical study of the nonlinear vibrations of an assembly with friction joints M. Claeys, CEA, France J.-J. Sinou, Ecole Centrale de Lyon, France J.-P. Lambelin, R. Todeschini, CEA, France	3005
Nonlinear modal analysis using pattern recognition N. Dervilis, D.J. Wagg, P.L. Green, K. Worden, The University of Sheffield, United Kingdom	3017
Practical design of a nonlinear tuned vibration absorber C. Grappasonni, G. Habib, T. Detroux, University of Liège, Belgium F. Wang, Technical University of Denmark, Denmark G. Kerschen, University of Liège, Belgium J.S. Jensen, Technical University of Denmark, Denmark	3029
Effect of the joints nonlinear behavior on the dynamics of optical automotive systems A. Hmid, Valeo, France L. Manin, C. Roucoules, R. Dufour, INSA de Lyon, France	3047
Path continuation for the concept of non-linear normal modes using a normal flow algorithm M. Jersch, K. Willner, D. Süß, Friedrich-Alexander-University Erlangen-Nuremberg, Germany	3059
Nonlinear dynamic interactions between a cable and its casing: Application to automotive gearshift command system L. Manin, M.-A. Andrianoely, T. Nouri-Baranger, G. Ferraris, R. Dufour, INSA de Lyon, France	3065
A rigorous phase separation method for testing nonlinear structures J.-P. Noël, L. Renson, C. Grappasonni, G. Kerschen, University of Liège, Belgium	3079
Consideration of local stiffening and clearance nonlinearities in coupled systems using a generalized Harmonic Balance Method S. Peter, F. Schreyer, P. Reuss, L. Gaul, University of Stuttgart, Germany	3097
Development of a numerical tool for industrial structures with local nonlinearities A. Sénéchal, B. Petitjean, L. Zoghaib, Airbus Group, France	3111
Implementation of an equivalent linear contact model to study the dynamical characteristics of assembled structures with different contact pairs A. Sharma, W. Mueller-Hirsch, Robert Bosch GmbH, Germany S. Herold, Fraunhofer Institute for Structural Durability and System Reliability LBF, Germany T. Melz, Technische Universität Darmstadt, Germany	3127
Characterization of the nonlinear behavior of a F-16 aircraft using discrete-time Volterra series S.B. Shiki, S. da Silva, UNESP - Universidade Estadual Paulista "Júlio de Mesquita Filho", Brazil F.L.M. dos Santos, B. Peeters, Siemens Industry Software NV, Belgium	3143
Time-efficient analysis of nonlinear peak bending behavior C. Sprock, W. Sextro, University of Paderborn, Germany	3153
Use of nonlinear Kalman filtering for modal analysis C. Stephan, Onera - The French Aerospace Lab, France J.-L. Dion, H. Festjens, ISMEP (Supmeca), France S. Giclais, Onera - The French Aerospace Lab, France	3161

Numerical investigation of jointed oscillators using harmonic balance techniques D. Süß, K. Willner, Friedrich-Alexander-University Erlangen-Nuremberg, Germany	3173
Complete semi-analytical damper model identification using triangular displacement inputs B. Titurus, University of Bristol, United Kingdom	3179
Experimental driven demystification of system identification of nonlinear mechanical systems M. Vaes, Y. Rolain, J. Pattyn, G. Vandersteen, J. Schoukens, Vrije Universiteit Brussel, Belgium	3189
Motivation and interpretation of a block-oriented nonlinear model in structural mechanics L. Vanbeylen, A. Van Mulders, Vrije Universiteit Brussel, Belgium	3203

Operational modal analysis

Session OMA

Using the EM algorithm to estimate the state space model for OMAX F.J. Cara, J. Juan, E. Alarcón, Universidad Politécnica de Madrid, Spain	3209
Performances assessment of OMA methods applied to altered vibration signals V. Delavaud, T. Gouache, B. Coulangue, Cornis, France L.O. Gonidou, S. Foucaud, CNES, France	3223
Input-output analysis vs. output-only analysis for time-varying mechanical systems K. Dziedziech, W. Staszewski, AGH University of Science and Technology, Poland B. Basu, Trinity College Dublin, Ireland T. Uhl, AGH University of Science and Technology, Poland	3237
Measurement of the best linear time-invariant approximation of linear time-periodic systems E. Louarroudi, R. Pintelon, J. Lataire, Vrije Universiteit Brussel, Belgium	3249
Consistent estimation of autonomous linear time-invariant systems from multiple experiments I. Markovsky, R. Pintelon, Vrije Universiteit Brussel, Belgium	3265
Effects of simultaneous versus roving sensors measurement in operational modal analysis E. Orlowitz, A. Brandt, University of Southern Denmark, Denmark	3269
Mass normalization of a 3D tubular structure combining operational modal analysis and a numerical model F. Pelayo, M.L. Aenlle, University of Oviedo, Spain R. Brincker, Aarhus University, Denmark	3281
A refined FDD algorithm for Operational Modal Analysis of buildings under earthquake loading F. Pioldi, R. Ferrari, E. Rizzi, Università di Bergamo, Italy	3293
Transmissibility based OMA for time-varying loading conditions W. Weijtjens, J. Lataire, C. Devriendt, P. Guillaume, Vrije Universiteit Brussel, Belgium	3309
On the role of spatial resolution in advanced vibration measurements for operational modal analysis and model updating A. Zanmarini, University of Bologna, Italy	3323

Periodic structures and metamaterials

Session PER

Hyper-damping properties of oscillators and meta-materials with negative stiffness elements I. Antoniadis, National Technical University of Athens, Greece D. Chronopoulos, The University of Nottingham, United Kingdom V. Spitas, D. Koulocheris, National Technical University of Athens, Greece	3337
Design of a resonant metamaterial based acoustic enclosure C. Claeys, B. Pluymers, P. Sas, W. Desmet, KU Leuven, Belgium	3351
Loss factor estimates for plates with periodic grids of embedded Acoustic Black Holes S.C. Conlon, J.B. Fahnline, The Pennsylvania State University, United States F. Semperlotti, University of Notre Dame, United States	3359
Wave propagation in coupled periodic lattices and application to vibration attenuation through a piezoelectric network B. Lossouarn, J.-F. Deü, M. Aucejo, Conservatoire National des Arts et Métiers, France	3369

Railway dynamics and ground vibrations

Session RAIL

Influence of sleeper spacing on vibration and noise of railway tracks K. Abe, S. Batjargal, K. Koro, Niigata University, Japan	3385
Design, construction and verification measurements of vibration isolation of the new Budapest metro line M4, with special regard to structure-borne noise levels in surrounding buildings F. Augusztinovicz, Budapest University of Technology and Economics, Hungary P. Forián Szabó, FSzP Ltd., Hungary P. Fiala, A.B. Nagy, F. Márki, Budapest University of Technology and Economics, Hungary Z. Horváth, CDM Hungary Ltd., Hungary	3397
Prediction of noise of the stations of the new Budapest metro line M4 F. Augusztinovicz, Budapest University of Technology and Economics, Hungary A.T. Fürjes, Aqrata Acoustic Engineering Company Ltd., Hungary F. Márki, Budapest University of Technology and Economics, Hungary	3413
Numerical and experimental study of stiff wave barriers for the mitigation of railway induced vibrations P. Coulier, A. Dijckmans, KU Leuven, Belgium V. Cuéllar, CEDEX, Spain A. Ekblad, A. Smekal, Trafikverket, Sweden G. Degrande, G. Lombaert, KU Leuven, Belgium	3429
Interest of the transient accelerated testing approach on railway equipment qualification A. Coulon, B. Nélain, N. Vincent, Vibratex, France	3445

Simulation of railway rolling noise emission: determination of the average wheel roughness of a vehicle G. Desanghere, Akron, Belgium B. Stallaert, H. Masoumi, D2S International, Belgium	3459
A study of riding comfort evaluation of korean next-generation high-speed railway S.-S. Kim, H.-M. Noh, Korea Railroad Research Institute, Korea (Republic of) H. Ji, University of Science & Technology, Korea (Republic of) C. Park, S. Choi, Korea Railroad Research Institute, Korea (Republic of)	3475
Estimation of nonlinearities in the wheel-rail rolling noise generation process O. Lundberg, KTH Royal Institute of Technology, Sweden A. Nordborg, Sound View Instruments, Sweden S. Finnveden, KTH Royal Institute of Technology, Sweden I. Lopez Arteaga, University of Technology Eindhoven, Netherlands	3485
Numerical characterization of railway wheels with sandwich-type damping solutions I. Merideno, Tecnun-University of Navarra, Spain J. Nieto, N. Gil-Negrete, CEIT, Spain J.G. Giménez Ortiz, Tecnun-University of Navarra, Spain A. Landaberea, J. Iartza, CAF S.A., Spain	3497
Rail vehicle source assessment within a virtual certification process U. Orrenius, Bombardier Transportation, Sweden B. Betgen, Vibratec, France L. Feng, M. Åbom, KTH Royal Institute of Technology, Sweden E. Latorre Iglesias, D.J. Thompson, University of Southampton, United Kingdom S. Brunström, Bombardier Transportation, Sweden	3511
Remote Condition Monitoring of Railway Track using FBG sensors N. Roveri, A. Carcaterra, A. Sestieri, Università di Roma "La Sapienza", Italy	3527
Towards a model for prediction of railway tread brake noise P. Torstensson, A. Pieringer, Chalmers University of Technology, Sweden L. Baeza, Universidad Politécnica Valencia, Spain	3543
Topology optimization of one-dimensional wave impeding barriers C. Van hoorickx, M. Schevenels, G. Lombaert, KU Leuven, Belgium	3557
Statistical identification of geometric parameters for high speed train catenary O. Vo Van, SNCF, France E. Balmes, SDTools, France J.-P. Massat, SNCF, France	3573
Numerical simulation of impact noise generated at the railway insulated joint Z. Yang, Z. Li, S. Rahimi, R.P.B.J. Dollevoet, Delft University of Technology, Netherlands	3583

Self-excited vibrations

Session SEV

Hybrid synthesis of fluid structure interaction by non-linear feedback control strategy for characterizing steam generators tubes subjected to impacts	3595
W. Benmalek, M. Collet, E. Foltête, M. Ouisse, FEMTO-ST Institute, France	
M. Corus, Electricité de France S.A., France	
Experimental and numerical study of nonlinear dynamic behaviour of an aerofoil	3609
S. Fichera, S. Jiffri, X. Wei, University of Liverpool, United Kingdom	
A. Da Ronch, University of Southampton, United Kingdom	
N. Tantaroudas, J.E. Mottershead, University of Liverpool, United Kingdom	
Effect of substructuring techniques on the simulation of friction-induced vibrations	3619
I. Iroz, University of Stuttgart, Germany	
S. Carvajal, Dr. Ing. h.c. F. Porsche Aktiengesellschaft, Germany	
M. Hanss, P. Eberhard, University of Stuttgart, Germany	
Real-time assessment of flutter stability based on automated output-only modal analysis	3633
G. Jelcic, J. Schwochow, Y. Govers, M. Böswald, DLR - Deutsches Zentrum für Luft- und Raumfahrt, Germany	
Modelling chatter stability in boring operations	3647
D. Östling, Sandvik Teeness AS, Norway	

Structural dynamics: methods and case studies

Session SD

High performance frequency response analysis with Abaqus	3655
M. Belyi, Dassault Systems SIMULIA Corp., United States	
Efficient simulation of the active vibratory energy flow of structures in a given frequency band	3663
J. Ebert, T. Stoewer, BMW Group, Germany	
C. Schaal, J. Bös, Technische Universität Darmstadt, Germany	
T. Melz, Technische Universität Darmstadt, Germany	
Structural intensity analysis for car body design: going beyond interpretation issues through vector field processing	3677
B. Lamarsaude, Conservatoire National des Arts et Métiers, France	
Y. Bousseau, A. Jund, PSA Peugeot Citroën, France	
3D homogenization: identification of equivalent anisotropic material properties of heterogeneous structures and dynamic applications on preloaded finite element models and superelements	3687
P. Millithaler, Vibratec, France	
E. Sadoulet-Reboul, M. Ouisse, FEMTO-ST Institute, France	
J.-B. Dupont, Vibratec, France	
N. Bouhaddi, FEMTO-ST Institute, France	

Assessment of image-based FE models in structural dynamics	3701
I. Stade, Bauhaus-Universität Weimar, Germany	
C. Guist, BMW Group, Germany	
C. Könke, T. Richter, Bauhaus-Universität Weimar, Germany	
Study on dynamics of wheel-soil interaction under lunar gravity based on nonlinear FEA	3709
Y.J. Yang, S.C. Fan, S.H. Xiang, Beijing Institute of Spacecraft Environment Engineering, China	

Structural health monitoring

Session SHM

Passive imaging of defect in reverberant plate using correlation of ambient noise	3717
L. Chehami, J. de Rosny, Institut Langevin, France	
E. Moulin, University of Valenciennes, France	
C. Prada-Julia, Institut Langevin, France	
J. Assaad, University of Valenciennes, France	
Detecting defects in composite beams and plates using Bayesian inference	3727
H. Chung, K. Lee, Auckland University of Technology, New Zealand	
On the use of the cepstrum and artificial neural networks to identify structural mass changes from response-only measurements	3739
U. Dackermann, University of Technology, Sydney, Australia	
W.A. Smith, The University of New South Wales, Australia	
J. Li, University of Technology, Sydney, Australia	
R.B. Randall, The University of New South Wales, Australia	
SHM of composite plates: Vibration based method by using PZT sensors	3751
R. de Medeiros, M. Sartorato, University of São Paulo, Brazil	
D. Vandepitte, KU Leuven, Belgium	
V. Tita, University of São Paulo, Brazil	
Singular Spectrum Analysis for identifying structural nonlinearity using free-decay responses. Application for delamination detection and diagnosis in composite laminates.	3767
D. Garcia, I. Trendafilova, University of Strathclyde, United Kingdom	
Probabilistic approach in assessing structural damage using multistage artificial neural network using static and dynamic data	3777
L.D. Goh, N. Bakhary, A.A. Rahman, B.H. Ahmad, Universiti Teknologi Malaysia, Malaysia	
Experimental verification of selected methods sensitivity to damage size and location	3789
J. Iwaniec, P. Kurowski, AGH University of Science and Technology, Poland	
Multi Fault Diagnosis Based on Loading Matrix and Score Matrix of Principal Component Analysis for a Centrifugal Pump	3805
B. Kamiel, I. Howard, Curtin University, Australia	
Remote tree root mapping using a tree trunk vibration technique	3807
J. Muggleton, University of Southampton, United Kingdom	

An investigation in vibration modeling and vibration-based monitoring for composite laminates R. Palazzetti, D. Garcia, I. Trendafilova, University of Strathclyde, United Kingdom C. Fiorini, A. Zucchelli, University of Bologna, Italy	3819
Characterisation of defects in pipe systems using a newly developed tubular acoustic reflection simulator L. Tao, K. Groves, B. Lennox, R. Gardner, The University of Manchester, United Kingdom	3829
Random vibration response-only damage detection for a set of composite beams K.J. Vamvoudakis-Stefanou, J. Sakellariou, S.D. Fassois, University of Patras, Greece	3839

Substructuring and coupling

Session SC

Identification of interface forces for inverse dynamic substructuring applications W. D'Ambrogio, Università dell'Aquila, Italy A. Fregolent, Università di Roma "La Sapienza", Italy	3855
Decoupling of mechanical systems: the link-preserving, decoupling method L. Keersmaekers, L. Mertens, R. Penne, G. Steenackers, University of Antwerp, Belgium P. Guillaume, Vrije Universiteit Brussel, Belgium	3869
Dynamic sub-structuring with passive state-space components A. Liljerehn, AB Sandvik Coromant, Sweden T. Abrahamsson, Chalmers University of Technology, Sweden	3879
Vehicle steering design using solution spaces for decoupled dynamical subsystems M. Münster, M. Lehner, BMW Group, Germany D.J. Rixen, Technische Universität München, Germany M. Zimmermann, BMW Group, Germany	3891
A robust approach for substructure decoupling P. Peeters, KU Leuven, Belgium T. Tamarozzi, Siemens Industry Software NV, Belgium F. Vanhollebeke, ZF Wind Power Antwerpen NV, Belgium W. Desmet, KU Leuven, Belgium	3907

Transfer path analysis and inverse methods

Session TPA

Pass-by noise engineering: a review of different transfer path analysis techniques K. Janssens, F. Bianciardi, L. Britte, P. Van de Ponsele, H. Van der Auweraer, Siemens Industry Software NV, Belgium	3923
Multiway analysis of vehicle acceleration behavior T. Jimbo, R. Hibino, H. Yamaguchi, Toyota Central R&D Labs., Inc., Japan H. Matsunaga, H. Otsubo, Toyota Motor Corporation, Japan	3941
Analysis of uncertainties of TPA with tonal excitation S. Mohamady, M. Vorländer, RWTH Aachen University, Germany	3957

- A robust Transfer Path Analysis method for steering gear vibrations on a test bench 3967
 M. van der Seijs, E.A. Pasma, Delft University of Technology, Netherlands
 D. de Klerk, Müller-BBM VAS B.V., Netherlands
 D.J. Rixen, Technische Universität München, Germany

Vehicle noise and vibration (NVH)

Session NVH

- Multi-material optimization of a public transport vehicle for NVH, statics and mass improvements 3981
 J. Korta, T. Uhl, AGH University of Science and Technology, Poland
- Results exploration and decision making with NVH-CAE applications 3993
 B. Leblanc, A. Koch, Altair Engineering GmbH, Germany
- Vibration and acoustic noise estimation for switched reluctance motors with quasi-axisymmetry hypothesis 4009
 H. Mechmeche, Renault SA, France
 M. Hecquet, A. Tounzi, F. Gillon, L2EP, France
 G. Fritz, Renault SA, France
- Splitting the eigenfrequencies as a tool to suppress squeal in friction units 4025
 B. Ryzhik, LuK GmbH & Co. oHG, Germany
- Transmitted power assessment from reverberant cavity set-up measurements 4037
 N. Schaefer, KU Leuven, Belgium
 B. Bergen, Toyota Motor Europe, Belgium
 B. Pluymers, W. Desmet, KU Leuven, Belgium
- EC145 Mercedes-Benz Style with Advanced Interior Acoustics 4047
 R. Schatz, R. Heger, P. Korntheuer, Airbus Helicopters, Germany
- Evaluation of SPC and BSS for indoor pass-by noise contribution analysis 4063
 A. Schuhmacher, Brüel & Kjær (Sound and Vibration Measurement A/S), Denmark
 E. Varricchio, Fiat Group Automobiles S.p.a., Italy
- Predicting cavitation desinence in automotive torque converters 4079
 C. Walber, PCB Piezotronics, United States
 J. Blough, C. Anderson, M. Johnson, Michigan Technological University, United States
 J. Schweitzer, General Motors Powertrain, United States

Vibration isolation and control

Session VIC

- The effect of the elastomeric damper on the dynamics of helicopter tail rotor shaft 4095
 E. Dikmen, H. Isci, Turkish Aerospace Industries (TAI), Turkey
- Shock isolation systems using non linear stiffness and damping 4111
 D.F. Ledezma-Ramirez, M. Guzman-Nieto, P.E. Tapia-Gonzalez, Universidad Autónoma de Nuevo León, Mexico
 N.S. Ferguson, University of Southampton, United Kingdom

Application of S.I.D. to non-linear engine mounts design	4123
U. Tornar, PSA Peugeot Citroën, France	

Vibro-acoustic modelling and prediction

Session VAM

Sound frequency dependent mesh modelling to simulate the acoustic insulation of stud based double-leaf walls	4139
A. Arjunan, University of Wolverhampton, United Kingdom	
C.J. Wang, University of Sussex, United Kingdom	
K. Yahiaoui, University of Wolverhampton, United Kingdom	
D. Mynors, University of Sussex, United Kingdom	
T. Morgan, V.B. Nguyen, M. English, Hadley Industries PLC, United Kingdom	
Coupling of Boundary Element and Wave Based Methods for the efficient solution of bounded acoustic problems with inclusions	4151
O. Atak, D. Huybrechs, B. Pluymers, W. Desmet, KU Leuven, Belgium	
Absorbent Boundary Conditions for plane wave based Discontinuous Galerkin Method	4163
R. Bouëte, O. Dazel, Université du Maine, France	
Global sensitivity analysis of acoustic transmission models through infinite plates	4177
J.-L. Christen, M.N. Ichchou, Ecole Centrale de Lyon, France	
B. Troclet, Airbus Defence and Space, France	
M. Ouisse, FEMTO-ST Institute, France	
An isogeometric indirect boundary element method for Helmholtz problems	4189
L. Coox, O. Atak, D. Vandepitte, W. Desmet, KU Leuven, Belgium	
Numerical prediction of dispersion characteristics for high-order waves in composite waveguides	4203
Ch. Droz, M.N. Ichchou, J.-P. Lainé, Ecole Centrale de Lyon, France	
Sound field synthesis of a moving virtual sound source applying the Spectral Division Method	4217
G. Firtha, P. Fiala, Budapest University of Technology and Economics, Hungary	
Accuracy of vibro-acoustic simulations with approximative multilayer damping models	4233
S. Jonckheere, D. Vandepitte, W. Desmet, KU Leuven, Belgium	
A validation of high performance computational codes for large professional audio systems simulation	4249
G. Miccoli, IMAMOTER Institute, Italy	
T. Nizzoli, Independent VA and Electroacoustics Consultant, Italy	
Appropriate cost functions for minimizing the radiated sound power of a simply supported baffled plate	4263
J. Michielsen, I. Lopez Arteaga, H. Nijmeijer, University of Technology Eindhoven, Netherlands	
Analysis of the frequency response behaviour of anisotropic multilayered structures and potential acoustic performance optimizations	4279
J.P. Parra Martinez, P. Göransson, KTH Royal Institute of Technology, Sweden	
O. Dazel, Université du Maine, France	
J. Cuenca, Siemens Industry Software NV, Belgium	

Numerical modelling of visco-thermal acoustics using finite elements C. Sambuc, G. Lielens, J.-P. Coyette, Free Field Technologies MSC Software Company, Belgium	4291
A wave based condensation method for computing the acoustic efficiency of sound packages submitted to sliding or clamped lateral boundary conditions Q. Serra, M.N. Ichchou, Ecole Centrale de Lyon, France J.-F. Deü, Conservatoire National des Arts et Métiers, France	4303
A multi-physical loudspeaker model including experimental modal information of the membrane Y. Shiozawa, R. D'Amico, KU Leuven, Belgium H. Onitsuka, YAMAHA Corporation, Japan W. Desmet, KU Leuven, Belgium	4317
A coupling method for the parallel solution of vibro-acoustic problems A.Y. Wang, F.-X. Roux, Université Pierre et Marie Curie, France P. Ricoux, TOTAL SA, France	4329
Solving the Helmholtz equation in terms of amplitude and phase; revisited Y.H. Wijnant, F.H. de Vries, University of Twente, Netherlands	4339

Wind turbine dynamics

Session WIND

Dynamic characterization of wind turbine gearboxes using Order-Based Modal Analysis E. Di Lorenzo, S. Manzato, Siemens Industry Software NV, Belgium F. Vanhollebeke, S. Goris, ZF Wind Power Antwerpen NV, Belgium B. Peeters, Siemens Industry Software NV, Belgium W. Desmet, KU Leuven, Belgium F. Marulo, University of Naples "Federico II", Italy	4349
Weak coupling aeroelastic analysis for the structural characterisation of wind turbine blades G. Fernandez, H. Usabiaga, IK4-Ikerlan, Spain D. Vandepitte, KU Leuven, Belgium	4363
Excitation and vibration response based damage diagnosis in wind turbine blades: an exploratory study A. Gómez González, S.D. Fassois, University of Patras, Greece	4371
Non-stationary statistical fault indicators estimation applied on IAS machine surveillance J.L. Gomez, A. Bahmani, H. André, Maia-Eolis, France D. Rémond, A. Bourdon, INSA de Lyon, France	4385
Modal analysis of a large direct-drive off-shore wind turbine generator rotor M. Kirschneck, Delft University of Technology, Netherlands D.J. Rixen, Technische Universität München, Germany H. Polinder, R. van Ostayen, Delft University of Technology, Netherlands	4393
Wind turbine power train robust model calibration with load uncertainties D. Pereiro, IK4-Ikerlan, Spain S. Cogan, E. Sadoulet-Reboul, FEMTO-ST Institute, France F. Martinez, IK4-Ikerlan, Spain	4407

Experimental characterization of operating bladed rotor using Harmonic Power Spectra and Stochastic Subspace Identification	4421
D. Tcherniak, Brüel & Kjær(Sound and Vibration Measurement A/S), Denmark	
S. Yang, Praxair Inc., United States	
M.S. Allen, University of Wisconsin-Madison, United States	