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6th European Workshop on Structural Health Monitoring

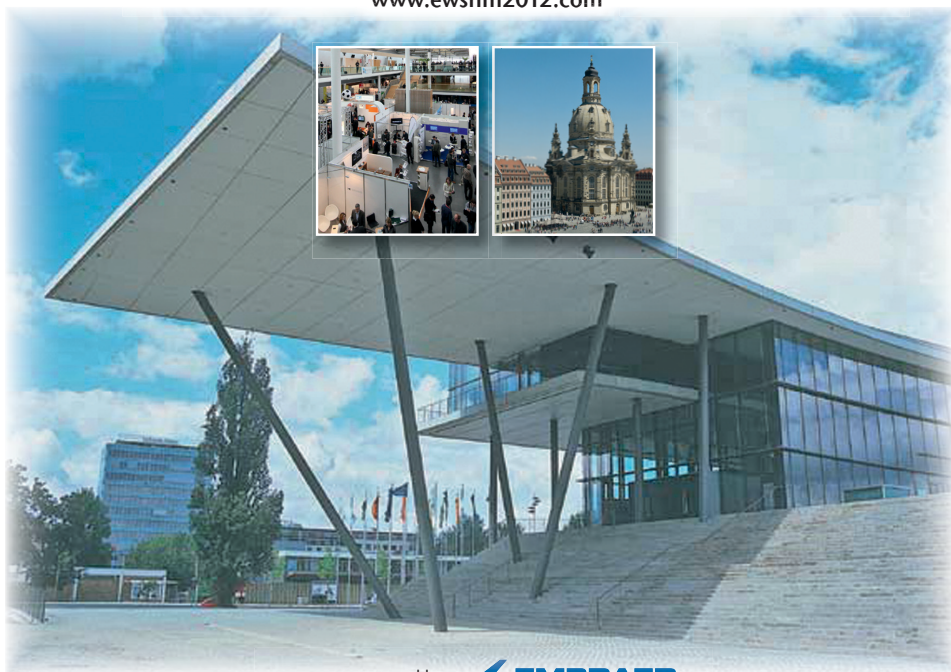
July 3 – 6, 2012

in Connection with

**1st European Conference of the Prognostics
and Health Management Society**

MARITIM Hotel & International Congress Center Dresden, Germany

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Tuesday, July 3, 2012

	A Hall 4+5	B Room 6
09:00	Opening	
09:20 – 10:40 page 40	Tu.1.A Keynote Presentations <i>F.-K. Chang</i>	
11:10 – 12:30 page 42	Tu.2.A Aeronautics <i>M. Buderath</i>	Tu.2.B Civil <i>V. Le Cam</i>
14:00 – 15:20 page 62	Tu.3.A Aeronautics <i>M. Tur</i>	Tu.3.B Civil <i>A.E. Del Grosso</i>
15:50 – 17:10 page 82	Tu.4.A Aeronautics <i>X.P. Qing</i>	Tu.4.B Civil <i>H. Wenzel</i>
17:30	Reception, Poster Session and Technology Show	

Wednesday, July 4, 2012

08:30 – 10:30 page 102	We.1.A Joint Session (EWSHM + PHM) <i>A. Hess</i>	
11:00 – 12:20 page 105	We.2.A Aeronautics <i>U. Berger</i>	We.2.B Wind Energy <i>H. Friedmann</i>
14:00 – 15:20 page 125	We.3.A Aeronautics <i>E. Lindgren</i>	We.3.B Energy <i>J. Schreiber</i>
15:50 – 17:10 page 145	We.4.A Composites <i>N. Takeda</i>	We.4.B Civil – Bridges <i>Y.Q. Ni</i>
19:00	Grand Banquet at Albertinum	

Tu.2.C Electromagnetic <i>V.V. Vengrinovich</i>	Tu.2.D Structural Simulation <i>S. Gopalakrishnan</i>	Tu.2.E Damage <i>T. Kundu</i>
Tu.3.C Piezoelectric <i>V. Giurgiutiu</i>	Tu.3.D Structural Simulation <i>M. Krawczuk</i>	Tu.3.E Damage <i>J. Kullaa</i>
Tu.4.C Fiber Optics <i>A. Güemes</i>	Tu.4.D Structural Simulation <i>J. Holnicki-Szulc</i>	Tu.4.E Nano + Micro <i>C. Boller</i>

We.2.C Optical Sensors <i>W.R. Habel</i>	We.2.D Acoustics <i>P. Tscheliesnig</i>	We.2.E Statistical Approach <i>K. Worden</i>
We.3.C Sensors <i>S. Krishnaswamy</i>	We.3.D Acoustics <i>F. Schubert</i>	We.3.E Strain Monitoring and Sandwich Structures <i>M. Frövel</i>
We.4.C Sensing/Sensors <i>W.J. Staszewski</i>	We.4.D Signal Processing <i>N. Rajic</i>	We.4.E Design Principles <i>W. Ostachowicz</i>

Thursday, July 5, 2012

	A Hall 4+5	B Room 6
09:00 – 10:20 <i>page 165</i>	Th.1.A Keynote Presentations <i>P. Cawley</i>	
10:50 – 12:10 <i>page 167</i>	Th.2.A Materials and Qualification <i>M. Salvia</i>	Th.2.B Civil <i>F. Casciati</i>
13:30 – 14:50 <i>page 187</i>	Th.3.A Astronautics <i>B. Rocha</i>	Th.3.B SHM Applications <i>N.M. Maia</i>
15:20 <i>page 203</i>	Th.4.A SHM in Action (Plenary) <i>C. Boller</i>	
18:30	Boat trip on Elbe River	

Friday, July 6, 2012

09:00 – 10:20 <i>page 204</i>	Fr.1.A SHM Applications in Transportation <i>M. Todd</i>	Fr.1.B SHM Applications <i>T. Stepinski</i>
10:50 – 12:10 <i>page 220</i>	Fr.2.A SHM Applications in Transportation <i>M. Scheerer</i>	Fr.2.B Composite Materials SHM Applications <i>W. Hillger</i>
13:30	Site Visits	

C Room 5

D Room 4

E Room 3

Th.2.C Wireless Sensing <i>T. Uhl</i>	Th.2.D Signal Processing <i>S.D. Fassois</i>	Th.2.E Design and Analysis <i>C.-P. Fritzen</i>
Th.3.C Miscellaneous Sensors <i>S.G. Pierce</i>	Th.3.D Signal Processing <i>J. Rodellar</i>	

Fr.1.C Sensing in Aeronautics <i>Z. Su</i>	Fr.1.D PCA for Signal Processing <i>D. Söffker</i>
Fr.2.C Sensor Systems + General (Sensors) <i>F. Ricci</i>	Fr.2.D Physics of Monitoring <i>A. Zak</i>

	A Hall 4+5	B Room 6
09:00	Opening Tu.1.A KEYNOTE PRESENTATIONS <i>F.-K. Chang</i>	
09:20	Tu.1.A.1 USAF Perspective on Foundational Challenges for Enhanced Damage Sensing <i>E. Lindgren, Air Force Research Laboratory, Wright-Patterson, USA; D.S. Stargel, AFOSR/RSA, Arlington, USA</i>	
10:00	Tu.1.A.2 The Role of SHM in Civil Lifecycle Engineering <i>H. Wenzel, R. Veit-Egerer, M. Widmann, VCE Holding, Wien, Austria</i>	
10:40	Break	
	Tu.2.A AERONAUTICS <i>M. Buderath</i>	Tu.2.B CIVIL <i>V. Le Cam</i>
11:10	Tu.2.A.1 Onboard – SHM for Life Time Prediction and Damage Detection on Aircraft Structure Using Fibre Optical Sensor and LAMB Wave Technology <i>U. Berger, IABG, Ottobrunn, Germany</i>	Tu.2.B.1 Sensor Fault Identification on Laboratory Tower <i>E. Zugasti, J. Anduaga, M.A. Arregui, P. Arrillaga Elgoro, F. Martinez, Ikerlan IK4, Arrasate-Mondragón, Spain</i>
11:30	Tu.2.A.2 Flight Load Monitoring of Aerospace Structures Using a Fibre Bragg Grating System <i>B. Rocha, A. Beltempo, M. Martinez, R. Rutledge, M. Yanishevsky, National Research Council Canada, Ottawa, Canada</i>	Tu.2.B.2 Monitoring of Bridges with Static Strain and Displacement Data <i>A.E. Del Grosso, University of Genoa, Italy</i>
11:50	Tu.2.A.3 Energy Harvesting, Wireless, Non-Contacting Slip Ring for Rotorcraft <i>S. Arms, M. Hamel, M. Hogan, C. Townsend, MicroStrain, Williston, USA; N. Phan, R. Semidey, NAVAIR, Patuxent River, USA</i>	Tu.2.B.3 35-year Structural Monitoring of a Prestressed-Concrete Pressurized Wind Tunnel <i>V. Lanticq, V. Lamour, Cementys, Paris, France; P. Desplas, ONERA, Maizac, France</i>

	C Room 5	D Room 4	E Room 3
	Tu.2.C ELECTROMAGNETIC <i>V.V. Vengrinovich</i>	Tu.2.D STRUCTURAL SIMULATION <i>S. Gopalakrishnan</i>	Tu.2.E DAMAGE <i>T. Kundu</i>
	Tu.2.C.1 Sensing of Deformations Through Grids of Antennas <i>S. Caizzone, DLR, Weßling, Germany</i>	Tu.2.D.1 Impact-Load-Based Damage Identification in Joints of Skeletal Structures <i>A. Swiercz, J. Holnicki-Szulc, IFTR PAS, Warsaw, Poland; P. Kolakowski, Adaptro-nica, Lomianki, Poland</i>	Tu.2.E.1 Guidelines for Using the Finite Element Method for Modeling of Guided Lamb Wave Propagation in SHM Processes <i>V. Giurgiutiu, M. Gresil, B. Poddar, Y. Shen, University of South Carolina, Columbia, USA</i>
	Tu.2.C.2 Calibration of Elasto-Magnetic Sensors for Cable Stay Monitoring <i>D. Zonta, P. Esposito, M. Mollignoni, R. Zandonini, University of Trento, Italy; J. Yim, Y. Zhao, Intelligent Instrument System, Bull Ridge, USA; M. Wang, Northeastern University, Boston, USA; B. Torres Górriz, Universitat Politècnica de Valencia, Spain</i>	Tu.2.D.2 Spectral Finite Element Method for Propagation of Guided Elastic Waves in Wind Turbine Blades for SHM Purposes <i>A. Zak, M. Krawczuk, W. Ostachowicz, Polish Academy of Sciences, Gdansk, Poland</i>	Tu.2.E.2 On Quantitative Evaluation of Fatigue Cracks: An Active Way Using Nonlinear Acousto-Ultrasonic Waves <i>Z. Su, L. Cheng, M. Hong, Q. Wang, C. Zhou, The Hong Kong Polytechnic University, Hong Kong, China</i>
	Tu.2.C.3 Fatigue Damage Evaluation by Use of "Smart Sensors" <i>J. Schreiber, U. Cikalova, Fraunhofer IZFP, Dresden, Germany</i>	Tu.2.D.3 Local Interaction Simulation Approach for Temperature Effect Modelling in Lamb Wave Propagation <i>P. Kijanka, P. Packo, W.J. Staszewski, T. Uhl, AGH University of Science and Technology, Krakow, Poland</i>	Tu.2.E.3 Critical Parameters of Impact Damage Detection in Composite Plates Using an Active Nonlinear Acousto-Ultrasonic Piezoceramic Sensor <i>D.A. Saravanas, N. Chrysochoidis, University of Patras, Greece</i>

	A Hall 4+5	B Room 6
12:10	Tu.2.A.4 Damage Detection in a Helicopter Composite Tailboom by Mode Conversion of Lamb Waves <i>W. Hillger, A. Szewieczek, DLR, Braunschweig, Germany</i>	Tu.2.B.4 Development of Dual PZT Based Impedance Measurement Techniques for Large-Scale Structures <i>H. Sohn, H.J. Lim, H.M. Song, KAIST, Daejeon, South Korea</i>
12:30	Lunch	
	Tu.3.A AERONAUTICS <i>M. Tur</i>	Tu.3.B CIVIL <i>A.E. Del Grosso</i>
14:00	Tu.3.A.1 Considerations on the Reliability of GUV-Based SHM Systems for CFRP Aerospace Structures <i>B. Eckstein, M. Bach, EADS Innovation Works, Bremen, Germany; C.P. Fritzen, Universität Siegen, Germany</i>	Tu.3.B.1 Damage Detection on the NPL Footbridge under Changing Environmental Conditions <i>K. Worden, E.J. Cross, University of Sheffield, United Kingdom; E. Barton, National Physical Laboratory, Teddington, United Kingdom</i>
14:20	Tu.3.A.2 N.N.	Tu.3.B.2 Physics-Based Output-Only Model Identification of Reinforced Concrete Structures from Static Response <i>B. Karczewski, M. Schnellenbach-Held, Univ. Duisburg-Essen, Essen, Germany</i>
14:40	Tu.3.A.3 Structural Health Monitoring Network System with Wireless Communications Inside Closed Aerospace Structures <i>E. Barrera, R. Meléndez, M. Ruiz, Technical University of Madrid, Spain; A. Cano, V. Cokojaj, AERNnova, Madrid, Spain; G. Aranguren, L. Casado, P.M. Monje, University of the Basque Country, Bilbao, Spain</i>	Tu.3.B.3 Monitoring of Progressive Micro-cracking in Concrete Using Diffuse Ultrasound <i>P. Shokouhi, BAM, Berlin, Germany</i>

	C Room 5	D Room 4	E Room 3
	Tu.2.C.4 Electromechanical Impedance Technique and Scanning Vibrometry for Structure Characterization <i>L. Skarbek, P. Malinowski, S. Opoka, W. Ostachowicz, T. Wandowski, Polish Academy of Sciences, Gdansk, Poland</i>	Tu.2.D.4 Modeling and Monitoring of Damage in Grouted Joints <i>A. Künzel, Y. Petryna, TU Berlin, Germany; M. Link, Universität Kassel, Germany</i>	Tu.2.E.4 Application of the Beam-Forming Technique for Damage Detection in Plate Like Structures <i>F. Ricci, D. Caporrino, L. Lecce, E. Monaco, S. Tancredi, Univ. of Naples Federico II, Naples, Italy; A. Mal, University of California (UCLA), Los Angeles, USA</i>
	Tu.3.C PIEZOELECTRIC <i>V. Giurgiutiu</i>	Tu.3.D STRUCTURAL SIMULATION <i>M. Krawczuk</i>	Tu.3.E DAMAGE <i>J. Kullaa</i>
	Tu.3.C.1 Energy Harvesting for Wireless Sensors by Using Piezoelectric Transducers <i>C. Dürager, EMPA, Dübendorf, Switzerland</i>	Tu.3.D.1 A Generalized Equivalent Loading Model for Piezoelectric Elements <i>P. Masson, R. Mohamed, P.M. Yazdanpanah, GAUS – Université de Sherbrooke, Canada</i>	Tu.3.E.1 Application of Air-Coupled Ultrasonic Transducers for Damage Assessment of Composite Panels <i>L. Ambrozinski, T. Stepinski, T. Uhl, AGH University of Science and Technology, Krakow, Poland; B. Piwakowski, Ecole Centrale de Lille, Villeneuve d'Ascq, France</i>
	Tu.3.C.2 Investigation of the Thermal Performance of Piezoelectric Actuators <i>R. Rimasauskienė, P. Malinowski, M. Mieloszyk, W. Ostachowicz, T. Wandowski, Polish Academy of Sciences, Gdansk, Poland</i>	Tu.3.D.2 Prediction of Temperature Induced Deformation of a Supertall Structure Using Structural Health Monitoring Data <i>P. Zhang, Y. Ni, Y. Xia, The Hong Kong Polytechnic University, Hong Kong, China</i>	Tu.3.E.2 Assessment of Mode Shape-Based Damage Detection Methods under Real Operational Conditions <i>T. Siebel, A. Friedmann, M. Koch, D. Mayer, Fraunhofer LBF, Darmstadt, Germany</i>
	Tu.3.C.3 Vibration Based Damage Identification in a Composite T-Beam Utilising Low Cost Integrated Actuators and Sensors <i>T.H. Ooijselaar, R. Akkerman, A. de Boer, R. Loendersloot, L. Warnet, University of Twente, Enschede, The Netherlands</i>	Tu.3.D.3 Zero-Pad Effects on Conditional Simulation and Application of Spatially-Varying Earthquake Motions <i>V.N. Dinh, B. Basu, Trinity College, Dublin, Ireland</i>	Tu.3.E.3 Nonlinear Ultrasound to Monitor Radiation Damage in Structural Steel <i>K. Matlack, L. Jacobs, J.-Y. Kim, Georgia Institute of Technology, Atlanta, USA; J. Wall, EPRI, Charlotte, USA; H.-W. Viehrig, Helmholtz Centre Dresden-Rossendorf, Dresden, Germany; J. Qu, Northwestern University, Evanston, USA</i>

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15:00	Tu.3.A.4 Damage Detection in the Aircraft Structure with the Use of Integrated Sensors – SYMOST Project <i>K. Dragan, L. Ambrozinski, T. Uhl, AGH University of Science and Technology, Krakow, Poland; M. Dziendzikowski, Air Force Institute of Technology, Warsaw, Poland</i>	Tu.3.B.4 Real-time Bridge Scouring Safety Monitoring System <i>J. Tong, Hungkuang University, Taichung, Taiwan; Y. Lin, Y.-T. Liu, National Chung Hsing Univ., Taichung, Taiwan; T.-H. Lee, National Taichung Univ. of Education, Taichung, Taiwan</i>
15:20	Break	
	Tu.4.A AERONAUTICS <i>X.P. Qing</i>	Tu.4.B CIVIL <i>H. Wenzel</i>
15:50	Tu.4.A.1 Helicopter HUMS & The Path to CBM <i>F. Hoffmann, Eurocopter Deutschland, München, Germany</i>	Tu.4.B.1 A Portable Imaging System for Defects Detection of Concrete Structures <i>J. Tong, Hungkuang University, Taichung, Taiwan; S.-T. Liao, Chung Hua University, Hsinchu, Taiwan</i>
16:10	Tu.4.A.2 Capability Study of Embedded Ultrasonic Transducer Microsystems for SHM Applications in Airplane Composite Structures <i>F. Schubert, G. Lautenschlaeger, N. Meyendorf, M. Röllig, Fraunhofer IZFP, Dresden, Germany; M. Franke, Cotesa, Mittweida, Germany; B. Boehme, TU Dresden, Germany</i>	Tu.4.B.2 A Global Approach for Detection of Leaks in Closed-Loop Water Distribution Networks <i>D. Sala, Polish Academy of Sciences, Warsaw, Poland; P. Kolakowski, Adaptro-nica, Lomianki, Poland</i>
16:30	Tu.4.A.3 Hierarchical Sensing System Combining Optical Fiber Network and Distributed Built-In CVM Sensors: Delamination Monitoring of CFRP Structure <i>S. Minakuchi, H. Banshoya, S. Ii, N. Takeda, The University of Tokyo, Kashiwa-shi, Japan</i>	Tu.4.B.3 New Tools for the Monitoring of Cooling Towers <i>S. Piot, H. Lancon, SITES, Rueil-Malmaison, France</i>

	C Room 5	D Room 4	E Room 3
	Tu.3.C.4 Modal Piezoelectric Transducers with Shaped Electrodes for Improved Passive Shunt Vibration Control of Smart Piezo-Elastic Beams <i>C.M. Vasques, INEGI, University of Porto, Portugal</i>	Tu.3.D.4 Monitoring of Flexible Support Effects Using the Responses of Multi-Span Bridges Via Wavelet Transform <i>V.N. Dinh, B. Basu, Trinity College, Dublin, Ireland</i>	Tu.3.E.4 Design of Optimal Layout of Active Sensing Diagnostic Network for Achieving Highest Damage Detection Capability in Structures <i>F.-K. Chang, V. Janapati, K. Lonkar, Stanford University, USA</i>
	Tu.4.C FIBER OPTICS <i>A. Güemes</i>	Tu.4.D STRUCTURAL SIMULATION <i>J. Holnicki-Szulc</i>	Tu.4.E NANO + MICRO <i>C. Boller</i>
	Tu.4.C.1 Strain and Temperature Monitoring at Cryogenic Operative Conditions <i>M. Giordano, IMCB CNR, Napoli, Italy; N. Beni, A. Makovec, Z. Szillasi, ATOMKI, Hungary; M. Baiko, CERN, Genf, Switzerland; S. Buontempo, M. Esposito, INFN, Università di Messina, Italy; A. Petriccione, National Research Council, Portici, Italy; G. Breglio, A. Saccomanno, Università di Napoli "Federico II", DIMP, Napoli, Italy; A. Chiuchiolo, A. Cusano, University of Sannio, Benevento, Italy</i>	Tu.4.D.1 In Situ Damping Characterization for Improved Imaging in Structural Health Monitoring <i>P. Masson, P.-C. Ostiguy, N. Quaegebeur, GAUS - Université de Sherbrooke, Canada</i>	Tu.4.E.1 Experimental Validation of a Micro-Sized Polarization Resistance Corrosion Sensor for Structural Health Management Applications <i>B.C. Laskowski, D. Brown, D. Darr, J. Morse, Analatom, Sunnyvale, USA</i>
	Tu.4.C.2 Advances in Developing Standards for Fibre-Optic Sensors <i>W.R. Habel, BAM, Berlin, Germany</i>	Tu.4.D.2 Towards a More Realistic Representation of Concrete Cracking for the Design of SHM Systems: Updating and Uncertainty Evaluation of Implicit Gradient Cracking Models <i>M. Brehm, A. Deraemaeker, T.J. Massart, Univ. Libre de Bruxelles, Brussels, Belgium</i>	Tu.4.E.2 Remotely Deployable Autonomous Surface Inspection and Characterisation Using Active Whisker Sensors <i>C.N. Macleod, S.G. Pierce, CUE, University of Strathclyde, Glasgow, United Kingdom; A. Pipe, J. Sullivan, BRL, University of the West of England, Bristol, United Kingdom</i>
	Tu.4.C.3 Photonic Crystal Fiber Long-Period Gratings as a Fiber-Optic Sensing Platform for Applications in Structural Health Monitoring <i>S. Krishnaswamy, S. Zheng, Y. Zhu, Northwestern University, Center for Quality Engineering, Evanston, USA</i>	Tu.4.D.3 A Semi-Analytical Layerwise Wave Propagation Model for Composite Strips with Piezoelectric Actuators and Sensors and Capabilities of Damage Detection <i>D.A. Saravanas, A. Barouni, University of Patras, Greece</i>	Tu.4.E.3 Nanosensors for Corrosion Detection <i>J. Schreiber, Fraunhofer IZFP, Dresden, Germany</i>

	A Hall 4+5	B Room 6
16:50	Tu.4.A.4 Evaluation of Flight Data from an Airworthy Structural Health Monitoring System Integrally Embedded in an Unmanned Air Vehicle <i>I. Kressel, J. Balter, P. Guedj, IAI Israel Aerospace Industries, Ben Gurion Intl. Airport, Israel; A. Pillai, M. Prasad, Aeronautical Development Establishment, Bangalore, India; N. Gupta, A. Joseph, R. Sundaram, National Aerospace Labs, Bangalore, India; Y. Botsev, N. Gorbатов, A. Handelman, M. Tur, Tel-Aviv University, Israel</i>	Tu.4.B.4 SHM System for the Roof Structure of a Trade Market Hall <i>M. Leitel, Y. Petryna, TU Berlin, Germany</i>
17:30	Reception, Poster Session and Technology Show	

	We.1.A JOINT SESSION (EWSHM + PHM) <i>A. Hess</i>
08:30	We.1.A.1 History of Engine Vibe Monitoring: A Personal Perspective <i>R. Greaves, Meggitt, Fribourg, Switzerland</i>
09:10	We.1.A.2 EADS Aspiration to develop PHM Technologies and Services <i>M. Buderath, CASSIDIAN, Manching, Germany</i>
09:50	We.1.A.3 Human Factors in Non-Destructive Testing: How to Tackle the Problem of Variability in the Inspection Results? <i>M. Bertovic, C. Müller, BAM, Berlin, Germany; B. Fahlbruch, TÜV NORD Systems Berlin, Germany</i>
10:30	Break

Tu.4.C.4 Embedding Technologies of FBG Sensors in Composites: Technologies, Applications and Practical Use <i>R.P. Beukema, National Aerospace Laboratory NLR, Emmeloord, The Netherlands</i>	Tu.4.D.4 Wave Propagation Correlations between Finite Element Simulations and Tests for Enhanced Structural Health Monitoring <i>J.M. Royo, C. Bernad, Instituto Tecnológico de Aragón, Zaragoza, Spain; V. Cokonaj, A.C. Ebri, AERnova, Madrid, Spain</i>	Tu.4.E.4 A Nanoporous Anodic Aluminium Oxide as Basis on Creation of High-Performance Microsensors (Mechanical, Physical, Chemical, Bio-, MEMS and Actuators) <i>V.N. Belyi, N.I. Mukhurov, I. Gasenkova, Belarus Akademie der Wissenschaften, Minsk, Belarus</i>
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11:00

We.2.A
AERONAUTICS
U. Berger

We.2.B
WIND ENERGY
H. Friedmann

We.2.A.1

Structural Health Monitoring in an Operational Airliner – An Intermediate Report on Leakage Monitoring with Percolation Sensors
H. Pfeiffer, M. Patitsa, I. Pitropakis, M. Wevers, Katholieke Universiteit Leuven, Heverlee, Belgium; P. Heer, H. Sekler, Lufthansa Technik, Frankfurt/Main, Germany

We.2.B.1

Damage Detection on Wind Turbine Blades via Response-Only and Excitation-Response Vibration Based Statistical Time Series Methods
K. Zoglopitis, S. Nielsen, Aalborg University, Aalborg, Denmark; S.D. Fassois, University of Patras, Greece

11:20

We.2.A.2

Next Generation Data Acquisition Technologies for Aging Aircraft
D. Heyes, Curtiss-Wright Controls Avionics & Electronics, Dublin, Ireland; S. Willis, ACRA CONTROL, Dublin, Ireland

We.2.B.2

A Real-Time Deflection Monitoring System for Wind Turbine Blades Using a Built-in Laser Displacement Sensor
P. Giri, H.C. Kim, J.-R. Lee, Chonbuk National University, Jeonju, South Korea

11:40

We.2.A.3

Minimum Attenuation Frequency Selection Method for Composite Tailplane Structural Health Monitoring
D. Gao, Y. Wang, Z. Wu, Dalian University of Technology, Dalian, China; X.P. Qing, COMAC, Beijing, China

We.2.B.3

Condition Monitoring of a Wind Turbine Gearbox using the Empirical Mode Decomposition Method and Outlier Analysis
I. Antoniadou, N. Dervilis, G. Manson, K. Worden, University of Sheffield, United Kingdom; T. Barszcz, W.J. Staszewski, AGH University of Science and Technology, Krakow, Poland

12:00

We.2.A.4

Damage Detection in Stiffened Composite Panels Using Lamb Wave
M. Mitra, B. Janarthan, P.M. Mujumdar, Indian Institute of Technology Bombay, Mumbai, India

We.2.B.4

Wind Turbine Blade Fatigue Tests: Lessons Learned and Application to SHM System Development
S. Taylor, C.M. Ammerman, K. Farinholt, C. Farrar, G. Park, Los Alamos National Laboratory, Los Alamos, USA; J. Jang, H. Jeong, Chonbuk National University, Jeonju, South Korea; M. Todd, University of California (UCSD), La Jolla, USA

12:20

Lunch

We.2.C
OPTICAL SENSORS
W.R. Habel

We.2.D
ACOUSTICS
P. Tscheliesnig

We.2.E
STATISTICAL APPROACH
K. Worden

We.2.C.1

Development of a PMMA-POF Based Fiber Optic Inclinator with Smart Transport and Installation Characteristics
K. Krebber, M. Wendt, BAM, Berlin, Germany; R. Glötzl, GLÖTZL Gesellschaft für Baumesstechnik, Rheinstetten, Germany

We.2.D.1

A New Technique for Acoustic Source Localization in an Anisotropic Plate without Knowing its Material Properties
T. Kundu, University of Arizona, Tucson, USA

We.2.E.1

Fault Detection and Identification in Time-Varying Structures via an FS-TAR Model Based Method
S.D. Fassois, M. Spiridonakos, University of Patras, Greece

We.2.C.2

Temperature-Corrected Determination of Mechanical Deformations in Geotechnical Structures Using Brillouin-Based Fiber Optic Sensors
A. Wosniok, K. Krebber, BAM, Berlin, Germany; R. Glötzl, RG-Research, Ettlingen, Germany

We.2.D.2

Fatigue Monitoring of High Strength Concrete Using Acoustic Emission and Ultrasonic Techniques
R. Wagner, M. Reiterer, RED Bernard, Vienna, Austria; A. Strauss, S. Urban, Univ. of Natural Resources and Life Sciences, Vienna, Austria

We.2.E.2

Applicability of a Markov-Chain Monte Carlo Method for Damage Detection on Data from the Z-24 and Tamar Suspension Bridges
E. Figueiredo, L. Radu, Catholic Univ. of Portugal, Rio de Mouro, Portugal; C. Farrar, Los Alamos National Laboratory, Los Alamos, USA; J. Brownjohn, E.J. Cross, R. Westgate, K. Worden, University of Sheffield, United Kingdom

We.2.C.3

Fast and Distributed Brillouin Sensing for Dynamic SHM
Y. Peled, A. Motil, M. Tur, Tel-Aviv University, Israel; I. Kressel, IAI Israel Aerospace Industries, Ben Gurion Intl. Airport, Israel

We.2.D.3

Contribution of Acoustic Emission to Evaluate the Influence of Hygrothermal Aging on Mechanical Behavior of Hemp Reinforced Polypropylene Composites
M. Salvia, S. Bouzouita, Ecole Centrale Lyon, Ecully Cedex, France; H. Ben Daly, A. Dogui, Ecole Nationale d'Ingénieurs de Monastir, Tunisia

We.2.E.3

Damage Detection and Precise Localization on 3D Truss Structures via a Vibration Based Functional Model Method
S.D. Fassois, C.S. Sakaris, J.S. Sakellariou, University of Patras, Greece

We.2.C.4

Displacement Monitoring in Geotechnical Applications Using Optical Fiber Sensors in Geosynthetics
N. Nöther, fibrisTerre, Berlin, Germany; R. Glötzl, GLÖTZL Gesellschaft für Baumesstechnik, Rheinstetten, Germany; S. Großmann, R. Oehmichen, U. Weisemann, HTW Dresden (FH), Dresden, Germany; H. Ehrenberg, L. Vollmert, NAUE, Espelkamp, Germany

We.2.D.4

Classification of Wear by Means of Acoustic Emission and Signal Processing Techniques
D. Söffker, D. Baccar, Univ. Duisburg-Essen, Duisburg, Germany

We.2.E.4

A Bayesian Approach for Identification of Structural Crack Using Strain Measurements
G. Yan, Nanjing Univ. of Aeronautics and Astronautics, Nanjing, China

	A Hall 4+5	B Room 6
	We.3.A AERONAUTICS <i>E. Lindgren</i>	We.3.B ENERGY <i>J. Schreiber</i>
14:00	We.3.A.1 Predictive Numerical Simulation of Lamb Wave Scattering from a Wing Skin Defect for Structural Health Monitoring System Design <i>N. Rajic, C. Rosalie, DSTO, Fishermans Bend, Australia; W.K. Chiu, W. Ong, Department of Mechanical and Aerospace, Victoria, Australia</i>	We.3.B.1 Structural Health Monitoring of Power Plant Components Based on a Local Temperature Measurement Concept <i>J. Rudolph, S. Bergholz, R. Hilpert, AREVA NP, Erlangen, Germany</i>
14:20	We.3.A.2 Aircraft Landing Gear Fluid Level and Landing Energy Monitoring System <i>D. Wiser, C. Starr, ES3, Clearfield, USA; L. Coffin, N. Phan, NAVAIR, Patuxent River, USA; K. Nance, NTT Aerospace, Keller, USA</i>	We.3.B.2 Electromagnetic Eddy Current Sensors for Evaluation of Sea-Cure and 2205 Duplex Condenser Tubing <i>K. Krzywosz, EPRI, Charlotte, USA; H. Henaff, M. Mayos, EDF, Saint-Denis, France</i>
14:40	We.3.A.3 Prediction of Landing Gear Loads Using Machine Learning Techniques <i>P. Sartor, P. Southern, Messier-Bugatti-Dowty, Gloucester, United Kingdom; E.J. Cross, K. Worden, University of Sheffield, United Kingdom</i>	We.3.B.3 Impact Damage Detection for Composite Material Typical of Wind Turbine Blades Using Novelty Detection <i>N. Dervilis, I. Antoniadou, R. Barthorpe, K. Worden, University of Sheffield, United Kingdom</i>
15:00	We.3.A.4 Current Aerospace Applications of Structural Health Monitoring in China <i>X.P. Qing, COMAC, Beijing, China; Z. Wu, Dalian University of Technology, Dalian, China; S. Yuan, Nanjing Univ. of Aeronautics and Astronautics, Nanjing, China</i>	We.3.B.4 Application of Modern SHM Methods in Electric Power Industry <i>P. Gasior, J. Kaleta, Wroclaw University of Technology, Wroclaw, Poland; A. Przygoda, Rafako, Raciborz, Poland</i>
15:20	Break	

	C Room 5	D Room 4	E Room 3
	We.3.C SENSORS <i>S. Krishnaswamy</i>	We.3.D ACOUSTICS <i>F. Schubert</i>	We.3.E STRAIN MONITORING AND SANDWICH STRUCTURES <i>M. Frövel</i>
	We.3.C.1 In-situ Impact Monitoring of Polymer-Based Multi Material Systems by Stress Optical Analysis <i>C. Taudt, P. Hartmann, Westsächsische Hochschule Zwickau, Germany</i>	We.3.D.1 Modelling the Effect of Roughness and Pitting on Ultrasonically Monitored Wall Thickness Data <i>F. Cegla, A. Jarvis, Imperial College, London, United Kingdom</i>	We.3.E.1 A Loading Basis for Plate Structure under Tension Loads and Application to Full-Field Reconstruction <i>D. Martini, LCND – Aix-Marseille University, Aix-en-Provence, France; J.-P. Charles, C. Hochard, LMA – Aix-Marseille University, Marseille Cedex, France</i>
	We.3.C.2 Monitoring the Loads Inside Adhesive Joints by Fiber Bragg Sensors <i>E. Shafir, G. Berkovic, Y. Saadi, S. Zilberman, Soreq NRC, Yavne, Israel; O. Alus, H. Bar, O. Breuer, M. Rein, Y. Shoin, Rafael, Haifa, Israel</i>	We.3.D.2 Simulating the Sound Propagation of Guided Waves Using the Elastodynamic Finite Integration Technique (EFIT) <i>J. Prager, M.-U. Rahman, BAM, Berlin, Germany</i>	We.3.E.2 Lamb Wave Propagation Modelling Using Cellular Automata <i>W.J. Staszewski, P. Kluska, T. Uhl, AGH University of Science and Technology, Krakow, Poland; M.J. Leamy, Georgia Institute of Technology, Atlanta, USA</i>
	We.3.C.3 Development of a New Bio-Inspired Mobile Sensing System <i>C. Du, X.P. Qing, COMAC, Beijing, China; D. Gao, Y. Wang, Z. Wu, Y. Zheng, Dalian University of Technology, Dalian, China</i>	We.3.D.3 Investigation of AE Generation from Fatigue Cracks for Structural Health Monitoring in 2014 Aluminium Alloy <i>D. Gagar, P. Irving, Cranfield University, Cranfield, United Kingdom; P. Foote, BAE Systems, Bristol, UK; J. McFeat, BAE Systems, Lancashire, United Kingdom</i>	We.3.E.3 Optical Measurement Techniques for Strain Analysis and Defect Detection in Composite Materials <i>E. Moser, T. Walz, Dantec Dynamics, Ulm, Germany</i>
	We.3.C.4 Structure-Integrated Fibre-Optic Strain Wave Sensor for Pile Testing and Monitoring of Reinforced Concrete Piles <i>C. Schilder, W.R. Habel, D. Hofmann, H. Kohlhoff, BAM, Berlin, Germany</i>	We.3.D.4 Low Power SHM via Frequency-Steerable Acoustic Transducers and Compressive Sensing <i>L. De Marchi, N. Speciale, N. Testoni, University of Bologna, Italy; E. Baravelli, M. Ruzzene, Georgia Institute of Technology, Atlanta, USA</i>	We.3.E.4 Interaction of Lamb Waves with a Disbond in Sandwich Structures <i>F. Ricci, Univ. of Naples Federico II, Naples, Italy; H. Baid, A. Mal, University of California (UCLA), Los Angeles, USA</i>



15:50

We.4.A COMPOSITES

N. Takeda

We.4.A.1

A Numerical Analysis of the Dynamic Behaviour of a Composite Rotor Considering its Sequential Damage Process

A. Filippatos, W. Hufenbach, P. Kostka, TU Dresden, Germany

16:10

We.4.A.2

Ultrasonic Guided Wave Dispersive Characteristics in Composite Structures under Variable Temperature and Operational Conditions

M.A. Torres-Arredondo, C.-P. Fritzen, Universität Siegen, Germany

16:30

We.4.A.3

Investigation on Wave Behaviour at Defects in 2D Composite Structures Using Spectral Finite Elements in the Time Domain

B. Hennings, R. Lammering, Helmut-Schmidt-Universität, Hamburg, Germany

16:50

We.4.A.4

Within-the-Bond Strategy for In-Situ Inspection of Composite Bonded Joints Using Piezoceramics

N. Quaegebeur, P. Masson, P. Micheau, GAUS - Université de Sherbrooke, Canada

19:00

Grand Banquet at Albertinum

A Hall 4+5

B Room 6

We.4.B CIVIL – BRIDGES

Y.Q. Ni

We.4.B.1

Neutral-Axis Position Based Damage Detection of Bridge Deck Using Strain Measurement: Numerical and Experimental Verifications

Y.Q. Ni, H. Xia, X. Ye, The Hong Kong Polytechnic University, Hong Kong, China

We.4.B.2

Neutral-Axis Position Based Damage Detection of Bridge Deck Using Strain Measurement: Formulation of a Kalman Filter Estimator

Y.Q. Ni, H. Xia, X. Ye, The Hong Kong Polytechnic University, Hong Kong, China

We.4.B.3

Determination of Stay Cable Force Based on Multiple Vibration Measurements to Consider the Effects of Unsymmetrical Boundary Constraints

W.-H. Wu, C.-C. Chen, G. Lai, M.-R. Leu, National Yunlin Univ. of Science and Techn., Toului, Taiwan

We.4.B.4

Effects of Temperature Variation on Cable Forces of an Extradosed Bridge

C.-C. Chen, C.-Y. Liu, W.-H. Wu, National Yunlin Univ. of Science and Techn., Toului, Taiwan

C Room 5

D Room 4

E Room 3

We.4.C SENSING / SENSORS

W.J. Staszewski

We.4.C.1

Synchronized Wireless Sensor Network for Landing Gear Loads Monitoring

S. Arms, M. Hogan, C. Townsend, Micro-Strain, Williston, USA; L. Coffin, N. Phan, R. Semidey, NAVAIR, Patuxent River, USA; D. Rhoads, R. Safa-Bakhsh, The Boeing Company, Philadelphia, USA

We.4.C.2

Energy-Efficient Strain Gauges for the Wireless Condition Monitoring Systems in Mechanical Engineering

M. Berndt, T. Fellner, J. Wilde, R. Zeiser, Albert-Ludwigs-Universität Freiburg, Germany

We.4.C.3

Intelligent Bridges – Adaptive Systems for Information and Holistic Evaluation in Real Time

T. Neumann, P. Haardt, BAST, Bergisch Gladbach, Germany

We.4.C.4

Utilization of different Nondestructive Measurement Techniques for Stress Measurement in Steel Strands

C. Lemos, E. Caetano, A. Dimande, A. Lage, A.M. Sarmento, INEGI, University of Porto, Portugal

We.4.D SIGNAL PROCESSING

N. Rajic

We.4.D.1

Demonstration of Guided Wave Sensor Signals Effected by Cyclic Loads and Breathing Fatigue Cracks

M. Vospornig, M. Reiterer, RED Bernard, Vienna, Austria; R. Heuer, TU Wien, Austria

We.4.D.2

Comparison and Practical Aspects of Two Approaches for Online Load Reconstruction

Y. Niu, C.-P. Fritzen, Universität Siegen, Germany

We.4.D.3

Feature-Based Resampling for Classification Using Discrete Wavelet Transform for Diagnostic Purposes of Industrial Processes with Periodic Data

M.-S. Saadawia, D. Söffker, Univ. Duisburg-Essen, Duisburg, Germany

We.4.D.4

Automated System for Tracking and Evaluating Aircraft Structural Damages

T. Lanza, R. Rogulski, R.P. Rulli, C. Wallner, Embraer, Sao Jose dos Campos, Brazil

We.4.E DESIGN PRINCIPLES

W. Ostachowicz

We.4.E.1

Analytical and Experimental Investigation of Environmental Influences on Lamb Wave Propagation and Damping Measured with a Piezo-Based System

K. Schubert, M. Christ, A.S. Herrmann, A. Stieglitz, Faserinstitut Bremen, Germany

We.4.E.2

The Origins of Measurement Uncertainty in SHM – NPL Footbridge Case Study

E. Barton, T. Esward, National Physical Laboratory, Teddington, United Kingdom

We.4.E.3

Structural Health Monitoring Processing and Decision Making Architecture

M. Leonard, M.M. Derriso, Air Force Research Laboratory, Wright-Patterson, USA

We.4.E.4

Experimental Study of a Model-free Method for Identification of Stiffness-Related Structural Damages

G. Suwala, L. Jankowski, Polish Academy of Sciences, Warsaw, Poland

	A Hall 4+5	B Room 6
	▶ Th.1.A KEYNOTE PRESENTATIONS <i>P. Cawley</i>	
09:00	Th.1.A.1 Function Scale Integration – Embedding Sensors in Materials for Structural Health Monitoring <i>W. Lang, D. Boll, T. Schotzko, Universität Bremen, Germany</i>	
09:40	Th.1.A.2 Structural Health Monitoring of Aerospace Structural Components Using Wave Propagation Based Diagnostics <i>S. Gopalakrishnan, Indian Institute of Science, Bangalore, India</i>	
10:20	Break	
	▶ Th.2.A MATERIALS AND QUALIFICATION <i>M. Salvia</i>	Th.2.B CIVIL <i>F. Casciati</i>
10:50	Th.2.A.1 Simplified Crack Appearance Monitoring at Welded Joints with Stain Gauges <i>M. Vosperrig, M. Reiterer, RED Bernard, Vienna, Austria; M. Vill, Austrian Federal Railways, Vienna, Austria</i>	Th.2.B.1 Unmanned Aircraft Systems for Remote Building Inspection and Monitoring <i>C. Eschmann, Fraunhofer IZFP, Saarbrücken, Germany; C. Boller, C.-M. Kuo, C.-H. Kuo, Saarland University, Saarbrücken, Germany</i>
11:10	Th.2.A.2 Analysis of Nonlinear Vibro-Acoustic Wave Modulations Used for Impact Damage Detection in Composite Structures <i>L. Pieczonka, W.J. Staszewski, T. Uhl, AGH University of Science and Technology, Krakow, Poland; F. Aymerich, University of Cagliari, Italy</i>	Th.2.B.2 Reconfigurable Robotic Platforms for Structural Health Monitoring <i>S.G. Pierce, D. Bennet, J. Biggs, G. Dobie, M. Macdonald, C.N. Macleod, C. McInnes, G. Punzo, R. Summan, CUE, University of Strathclyde, Glasgow, United Kingdom</i>

C Room 5	D Room 4	E Room 3
Th.2.C WIRELESS SENSING <i>T. Uhl</i>	Th.2.D SIGNAL PROCESSING <i>S.D. Fassois</i>	Th.2.E DESIGN AND ANALYSIS <i>C.P. Fritzen</i>
Th.2.C.1 Wireless System for Structural Health Monitoring Based on Lamb Waves <i>U. Lieske, A. Dietrich, B. Frankenstein, L. Schubert, Fraunhofer IZFP, Dresden, Germany</i>	Th.2.D.1 Sequential Structural Health Monitoring and Damage Detection <i>J. Kullaa, Aalto University, Aalto, Finland</i>	Th.2.E.1 Laser-Vibrometric Measurement and Numerical Modeling of Local and Continuous Mode Conversion of Lamb Waves in CFRP Plates <i>C. Willberg, U. Gabbert, G. Mook, Otto-von-Guericke-Universität Magdeburg, Germany; J. Pohl, Hochschule Anhalt, Köthen, Germany</i>
Th.2.C.2 A Low-Power Wireless Sensor Platform for Structural Health Monitoring <i>J. A. Rice, University of Florida, Gainesville, USA; A. Bilbao, D. Hoover, Texas Tech University, Lubbock, USA</i>	Th.2.D.2 Application of Modal Filters for Damage Detection in the Presence of Non-Linearities <i>G. Karaiskos, A. Deraemaeker, G. Tondreau, Univ. Libre de Bruxelles, Brussels, Belgium; E. Figueiredo, Catholic Univ. of Portugal, Rio de Mouro, Portugal; C. Farrar, Los Alamos National Laboratory, Los Alamos, USA</i>	Th.2.E.2 Analysis Methods of Lamb Wave Propagation in Complex Composites <i>A. Szewieczek, C. Heinze, W. Hillger, D. Schmidt, M. Sinapius, DLR, Braunschweig, Germany</i>

	A Hall 4+5	B Room 6
11:30	Th.2.A.3 Estimation of Existing Prestress Level on Bonded Strand Using Impact-Echo Test <i>B.H. Kim, S.J. Cho, Kyungnam University, Changwon, South Korea; I.K. Lee, Expressway & Transportation Res. Inst., Hwaseong, South Korea</i>	Th.2.B.3 Laser Ultrasonic Inspection System Based on Optical Multi-Channel Interferometer <i>V. Gudelev, V. Belyi, N. Kazak, Belarus Akademie der Wissenschaften, Minsk, Belarus; M. Kröning, J. Schreiber, Fraunhofer IZFP, Dresden, Germany</i>
11:50	Th.2.A.4 Lamb Waves in Composite Plates: Tuned Excitation and Diffraction by Obstacles <i>A. Eremin, E. Glushkov, N. Glushkova, Kuban State University, Krasnodar, Russia; R. Lammering, M.N. Neumann, Helmut-Schmidt-Universität, Hamburg, Germany</i>	Th.2.B.4 Location-Based Service (LBS) System Development for Highway Bridge Multiple Hazards Mitigation <i>Y.B. Lin, K.-C. Chang, National Center for Research on Earthquake Eng., Taipei, Taiwan</i>
12:10	Lunch	
	Th.3.A ASTRONAUTICS <i>B. Rocha</i>	Th.3.B SHM APPLICATIONS <i>N.M. Maia</i>
13:30	Th.3.A.1 Online Damage Detection on Metal and Composite Space Structures by Active and Passive Acoustic Methods <i>M. Scheerer, Aerospace & Advanced Composites, Seibersdorf, Austria; T. Cardone, European Space Agency, Noordwijk, The Netherlands</i>	Th.3.B.1 Realization and Testing of an In-Service Vibration Analysis System for Structural Health Monitoring <i>D. Mayer, A. Friedmann, M. Koch, Fraunhofer LBF, Darmstadt, Germany; T. Dornbusch, SWIFT, Reinheim, Germany</i>
13:50	Th.3.A.2 Damage State Evaluation of Aircraft Alloys by Use of Pulsed Eddy Current Testing <i>J. Schreiber, U. Cikalova, S. Hillmann, N. Meyendorf, Fraunhofer IZFP, Dresden, Germany; J. Hoffmann, Wyle Laboratories, Dayton, USA</i>	Th.3.B.2 Online Corrosion/Erosion Monitoring Using Permanently Installed Ultrasonic Sensors – Report on Experience from the Field <i>F. Cegla, P. Cawley, Imperial College, London, United Kingdom; J. Allin, P. Collins, J. Davies, Permasense, Horsham, United Kingdom</i>

C Room 5	D Room 4	E Room 3
Th.2.C.3 Long-Term Wireless Monitoring of Historic Structures - Lessons Learned from Practical Applications <i>M. Krüger, MPA Universität Stuttgart, Germany</i>	Th.2.D.3 Application of Compressed Sensing to 2-D Ultrasonic Propagation Imaging System Data <i>D. Mascarenas, C. Farrar, G. Park, Los Alamos National Laboratory, Los Alamos, USA; S.Y. Chong, J.-R. Lee, ChonBuk National University, Jeonju, South Korea</i>	Th.2.E.3 Frequency-Wavenumber Processing of Laser-Excited Guided Waves for Imaging Structural Features and Defects <i>E.B. Flynn, G.J. Jarmer, G. Park, Los Alamos National Laboratory, Los Alamos, USA; J.-R. Lee, ChonBuk National University, Jeonju, South Korea</i>
Th.2.C.4 An Optimized Electronic Device for Solar Power Harvesting Dedicated to Wireless Sensor Networks <i>V. Le Cam, R. Le Maulf, M. Le Pen, L. Lemarchand, W. Martin, IFSTTAR, Bouguenais, France</i>	Th.2.D.4 The Effect of Attenuation on the Identification of Impact Damage in CFRP Laminates <i>K. Worden, R. Barthorpe, University of Sheffield, United Kingdom; M. Eaton, K. Holford, R. Pullin, Cardiff University, Cardiff, United Kingdom; M.T. Sultan, University Putra Malaysia, Malaysia</i>	Th.2.E.4 Evaluation of an Intrinsic Error Estimator for the Data Fusion of NDT Techniques Used to Identify the Material and Damage Properties of Concrete Structures <i>D. Martini, V. Garnier, M.-A. Ploix, LCND – Aix-Marseille University, Aix-en-Provence, France</i>
Th.3.C MISCELLANEOUS SENSORS <i>S.G. Pierce</i>	Th.3.D SIGNAL PROCESSING <i>J. Rodellar</i>	
Th.3.C.1 Characterization of the Mechanical Influence of Comparative Vacuum Measurement (CVM) Sensors in the Context of Structural Health Monitoring (SHM) Systems <i>M. Perterer, H. Baier, M. Friemel, TU München, Garching, Germany</i>	Th.3.D.1 Damage Assessment of Structures with Uncertainty <i>E. Sevillano, R. Perera, Y.L. Zhou, Technical University of Madrid, Spain</i>	
Th.3.C.2 Development, Validation and Application of a Structural Health Diagnosis Technique Using an Active Sensing Network <i>Z. Su, L. Cheng, Q. Wang, The Hong Kong Polytechnic University, Hong Kong, China</i>	Th.3.D.2 Model Order Reduction vs. Structural Monitoring <i>F. Casciati, L. Faravelli, M. Franchinotti, University of Pavia, Italy; S. Casciati, University of Catania, Siracusa, Italy</i>	

	A Hall 4+5	B Room 6
14:10	Th.3.A.3 SHM Technology for Future Responsive Access to Space <i>S. Beard, H. Chung, D. Zhang, Accellent Technologies, Sunnyvale, USA; B. Glass, D. Hamilton, Lockheed Martin Space Systems, Denver, USA</i>	Th.3.B.3 Design of 2D Phased Array for Monitoring Isotropic Plate-Like Structures Using Lamb Waves <i>L. Ambrozinski, T. Stepinski, T. Uhl, AGH University of Science and Technology, Krakow, Poland</i>
14:30	Th.3.A.4 Health Monitoring of a Weight Efficient Lattice Spacecraft Structural Element with FBGS Sensors <i>M. Frövel, J.G. Carrión, J. Pintado, INTA, Torrejón de Ardoz, Spain; N. Blanco, J. Torres, AMADE, Universitat de Girona, Spain; E. del Olmo, ASTRIUM-EADS, Madrid, Spain</i>	Th.3.B.4 A Permanently Installed Guided Wave System for Pipe Monitoring <i>P. Cawley, A. Galvagni, Imperial College, London, United Kingdom</i>
14:50	Break	
15:20	Th.4.A SHM IN ACTION (PLENARY) <i>C. Boller</i>	
18:30	Boat trip on Elbe River	

	Fr.1.A SHM APPLICATIONS IN TRANSPORTATION <i>M. Todd</i>	Fr.1.B SHM APPLICATIONS <i>T. Stepinski</i>
09:00	Fr.1.A.1 AE-Monitoring for Surface Transport Product (Ships, Trucks and Railway Cars) <i>P. Tscheliesnig, TÜV AUSTRIA SERVICES, Vienna, Austria</i>	Fr.1.B.1 Damage Detection Capabilities of Ultrasonic Phased Arrays and Aparse Arrays in Metallic and Composite Structures <i>M. Scheerer, D. Lager, M. Marischler, Aerospace & Advanced Composites, Seibersdorf, Austria; A. Peldszus, FACC, Ried im Innkreis, Austria; F. Graf, Joanneum Research Forschungsgesellschaft, Graz, Austria</i>

	C Room 5	D Room 4	E Room 3
	Th.3.C.3 Fully Non-Contact Laser Excitation and Reception Ultrasonic Propagation Imaging System with Repeat Scanning Technique <i>J.-R. Lee, D. Dhital, Chonbuk National University, Jeonju, South Korea; C.Y. Park, Agency for Defense Development, Daejeon, South Korea</i>	Th.3.D.3 Damage Identification from Power Spectrum Density Transmissibility <i>Y.L. Zhou, R. Perera, E. Sevillano, Technical University of Madrid, Spain</i>	
	Th.3.C.4 Distributed Fiber Optic Acoustic Emission Sensor (FAESense™) System for Condition Based Maintenance of Advanced Structures <i>E.A. Mendoza, Y. Esterkin, C. Kempen, J. Prohaska, S. Sun, Redondo Optics, Los Angeles, USA; S. Krishnaswamy, Northwestern University, Center for Quality Engineering, Evanston, USA</i>	Th.3.D.4 Error Analysis in Laser Vibrometer Measurements of Lamb Waves <i>M.N. Neumann, R. Lammering, Helmut-Schmidt-Universität, Hamburg, Germany</i>	
	Fr.1.C SENSING IN AERONAUTICS <i>Z. Su</i>	Fr.1.D PCA FOR SIGNAL PROCESSING <i>D. Söffker</i>	
	Fr.1.C.1 Integrated Electronic System for Ultrasonic Structural Health Monitoring <i>P.M. Monje, G. Aranguren, L. Casado, University of the Basque Country, Bilbao, Spain; V. Kokonaj, AERNnova, Madrid, Spain; E. Barrera, M. Ruiz, Technical University of Madrid, Spain</i>	Fr.1.D.1 Damage Detection Using Robust Fuzzy Principal Component Analysis <i>F. Gharibnezhad, L.E. Mujica, J. Rodellar, Technical University of Catalonia, Barcelona, Spain; C.-P. Fritzen, Universität Siegen, Germany</i>	

	A Hall 4+5	B Room 6
09:20	Fr.1.A.2 Monitoring of Railway Traffic as a Part of Integrated SHM System <i>P. Pawlowski, Department of Intelligent Technologies, Poland; P. Kolakowski, K. Sekula, Adaptronica, Lomianki, Poland; A. Swiercz, IFTR PAS, Warsaw, Poland; D. Sala, Polish Academy of Sciences, Warsaw, Poland</i>	Fr.1.B.2 SHM of Floating Offshore Wind Turbines – Challenges and First Solutions <i>H. Friedmann, C. Ebert, P. Kraemer, WÖLFEL, Höchberg, Germany; B. Frankenstein, L. Schubert, Fraunhofer IZFP, Dresden, Germany;</i>
09:40	Fr.1.A.3 Condition Monitoring of a Light Rail Vehicle – from Concept to Implementation <i>B. Firlik, Poznan University of Technology, Poznan, Poland; A. Chudzikiewicz, Warsaw University of Technology, Warsaw, Poland</i>	Fr.1.B.3 NullSpace Damage Detection Method with Different Environmental and Operational Conditions <i>E. Zugasti, J. Anduaga, M.A. Arregui, F. Martinez, Ikerlan IK4, Arrasate-Mondragón, Spain</i>
10:00	Fr.1.A.4 Monitoring Possibility of Sailing Ships' Masts <i>L. Murawski, K. Majewska, M. Mieloszyk, W. Ostachowicz, Polish Academy of Sciences, Gdansk, Poland</i>	Fr.1.B.4 An Overview of Electromechanical Impedance Method for Damage Detection in Mechanical Structures <i>M. Rosiek, A. Martowicz, T. Uhl, AGH University of Science and Technology, Krakow, Poland</i>
10:20	Break	
	Fr.2.A SHM APPLICATIONS IN TRANSPORTATION <i>M. Scheerer</i>	Fr.2.B COMPOSITE MATERIALS SHM APPLICATIONS <i>W. Hillger</i>
10:50	Fr.2.A.1 Integrated Railway Monitoring System for Wireless Crack Detection <i>D. Hentschel, B. Frankenstein, M. Stephan, Fraunhofer IZFP, Dresden, Germany</i>	Fr.2.B.1 Smart CFRP Systems with Embedded FBG for Structural Monitoring and Retrofitting <i>S. Käseberg, K. Holschemacher, HTWK Leipzig, Germany; M.-B. Schaller, GGB, Espenhain, Germany</i>

	C Room 5	D Room 4	E Room 3
	Fr.1.C.2 Comparisons Analytical and Experimental Measurements of Lamb Wave Interaction with Corrosion Damage in Aluminum Plates <i>E.D. Swenson, T. Owens, Air Force Institute of Technology, Wright Patterson AFB, USA</i>	Fr.1.D.2 Damage Size Estimation with Active Piezosensor Network <i>M. Dziendzikowski, K. Dragan, Air Force Institute of Technology, Warsaw, Poland</i>	
	Fr.1.C.3 Guided Waves-Based Damage Detection in Aircraft Component <i>T. Wandowski, P. Malinowski, W. Ostachowicz, Polish Academy of Sciences, Gdansk, Poland</i>	Fr.1.D.3 Damage Detection in Piping Systems Using Pattern Recognition Techniques <i>I. Bueth, C.-P. Fritzen, M.A. Torres-Arredondo, Universität Siegen, Germany; L.E. Mujica, J. Rodellar, Universitat Politècnica de Catalunya, Barcelona, Spain</i>	
	Fr.1.C.4 Comparison of Lamb Wave Interaction with High- and Low-Cycle Fatigue Cracks in Aluminum Plates <i>T. Owens, E.D. Swenson, Air Force Institute of Technology, Wright Patterson AFB, USA</i>	Fr.1.D.4 Principal Component Analysis vs Independent Component Analysis for Damage Detection <i>J. Rodellar, M. Anaya, L.E. Mujica, D.A. Tibaduiza, Technical University of Catalonia, Barcelona, Spain</i>	
	Fr.2.C SENSOR SYSTEMS + GENERAL (SENSORS) <i>F. Ricci</i>	Fr.2.D PHYSICS OF MONITORING <i>A. Zak</i>	
	Fr.2.C.1 Integrated Phased Array Transducer for On-Board Structural Health Monitoring <i>V. Cokonaj, A. Alcaide, A. Cano, S. Corbo, AERnnova, Madrid, Spain; E. Barrera, M. Ruiz, Technical University of Madrid, Spain; G. Aranguren, L. Casado, University of the Basque Country, Bilbao, Spain</i>	Fr.2.D.1 Two Approaches to Identify Inherent Damage in Steel Structures <i>I. Schendel, U. Peil, K. Thiele, T. Wagner, TU Braunschweig, Germany</i>	

	A Hall 4+5	B Room 6
11:10	Fr.2.A.2 Application of Vibrothermography in Nondestructive Testing of Structures <i>M. Szewdo, L. Pieczonka, T. Uhl, AGH University of Science and Technology, Krakow, Poland</i>	Fr.2.B.2 Damage Detection by Load Path Changes in Reinforced Composite Panels Using Local FBGS and Distributed Sensing <i>M. Frövel, J.G. Carrión, J. Pintado, INTA, Torrejón de Ardoz, Spain; E. del Olmo, ASTRIUM-EADS, Madrid, Spain; F. Quera, Universidad de Zaragoza, Spain; A. Fernandez, A. Güemes, Universidad Politécnica de Madrid, Spain</i>
11:30	Fr.2.A.3 Structural Health Monitoring Systems in Difficult Environments – Offshore Wind Turbines <i>P. Faulkner, P. Cutter, A. Owens, Strain-stall UK, Midsomer Norton, Bath, United Kingdom</i>	Fr.2.B.3 Ultrasonic Monitoring of a Carbon Fiber Reinforced Plastic – Steel Composite Beam during Fatigue <i>K.C. Haller, AcousticAgree, Ronneby, Sweden; C. Hedberg, Blekinge Tekniska Högskola, Karlskrona, Sweden; S. Andersson, S.-E. Hellbratt, Kockums, Karlskrona, Sweden; E. Johnson, G. Kjell, SP Techn. Res. Inst. of Sweden, Borås, Sweden</i>
11:50	Fr.2.A.4 Investigation of the Probability of Detection of our SHM System <i>H. Soejima, K. Takahashi, Fuji Heavy Industries, Utsunomiya, Japan; M. Yoshida, RIMCOF, Tokyo, Japan; Y. Okabe, The University of Tokyo, Japan; N. Takeda, The University of Tokyo, Kashiwa-shi, Japan</i>	Fr.2.B.4 Active Thermography Method for Delamination Detection and Localization in Composite Structures <i>M. Mieloszyk, M. Krawczuk, P. Malinowski, W. Ostachowicz, T. Wandowski, Polish Academy of Sciences, Gdansk, Poland</i>
12:10	Lunch	
13:30	Site Visits	

	C Room 5	D Room 4	E Room 3
	Fr.2.C.2 Investigation of Low-Cost Accelerometer, Terrestrial Laser Scanner and Ground-Based Radar Interferometer for Vibration Monitoring of Bridges <i>F. Neitzel, S. Weisbrich, TU Berlin, Germany; M. Lehmann, W. Niemeier, TU Braunschweig, Germany</i>	Fr.2.D.2 Localization of Damage in Beams Using Interferometric Techniques <i>N.M. Maia, J.V. Araujo dos Santos, Technical University of Lisbon, Portugal; H. Lopes, J. Ribeiro, ESTIG, Bragança, Portugal</i>	
	Fr.2.C.3 Lightning Safe Rotor Blade Monitoring Using an Optical Power Supply for Ultrasonic Techniques <i>B. Frankenstein, D. Fischer, B. Weihnacht, Fraunhofer IZFP, Dresden, Germany; R. Rieske, TU Dresden, IAVT, Germany</i>	Fr.2.D.3 Event Detection Using Multisensor Fusion and Filtering Techniques Based on CWT and SVM <i>D. Söffker, L. Al-Shrouf, M.-S. Saadawia, Univ. Duisburg-Essen, Duisburg, Germany; N. Szczepanski, RWE Power, Frechen, Germany</i>	
	Fr.2.C.4 Lessons Learned from the Structural Life Tracking of Rotorcraft Dynamic Components <i>A. Singh, D. Algera, C.-H. Hong, N. Iyyer, Technical Data Analysis, Falls Church, USA; N. Phan, R. Semidey, NAVAIR, Patuxent River, USA</i>	Fr.2.D.4 Inverse Theory of Structure Safety Estimate Basing on Multi-Sensor Monitoring Data <i>V.V. Vengrinovich, Institute of Applied Physics, Minsk, Belarus</i>	

PHYSICAL MONITORING IN GENERAL (VISUAL, MECHANICAL, ACOUSTIC, ELECTRICAL, THERMAL, ETC.)

- P1 Crack Detection in Cast Stainless Steel Valve Utilizing Nonlinear Acoustics**
K.C. Haller, S. Andersson, AcousticAgree, Ronneby, Sweden; H. Martinsen, Ringhals, Väröbacka, Sweden

PRINCIPLES OF SHM-BASED STRUCTURAL MONITORING, DESIGN, AND MAINTENANCE

- P2 Dispersion Properties of Shear Horizontal Waves in a Free Plate with Depth-Dependent Random Density**
C. Du, X.P. Qing, COMAC, Beijing, China; J. Qu, Northwestern University, Evanston, USA

- P3 Bayesian Experimental Design for Damage Detection in a Bolted Frame**
M. Todd, C. Haynes, University of California (UCSD), La Jolla, USA

- P4 Detection and Localization of Local Damage in CFRP by Modal Analysis**
F. Lasagni, C. Morán, FADA-CATEC, La Rinconada, Sevilla, Spain

SENSORS AND SENSOR SYSTEMS (PIEZOELECTRIC, FIBRE OPTIC, ELECTROMAGNETIC, MEMS, NANO AGENTS, ETC.)

- P5 Early Damage Detection of Structural Defects Using Guided Waves**
M. Bartholmai, E. Köppe, J. Prager, BAM, Berlin, Germany

- P6 Online Structural Health Monitoring of Wire Rope by Fiber Optic Low Coherence Interferometric Sensor**
Z. DjinoVIC, M. Stojkovic, Integrated Microsystems Austria, Wiener Neustadt, Austria; M. Tomic, University of Belgrade, Serbia and Montenegro

- P7 Fully Integrated Miniature Multi-Point Fiber Bragg Grating Sensor Interrogator (FBG-Transceiver™) System for Applications where Size, Weight, and Power are Critical for Operation**
E.A. Mendoza, Y. Esterkin, C. Kempen, J. Prohaska, S. Sun, Redondo Optics, Los Angeles, USA

- P8 Optical Fiber Sensor for Prestressed Concrete Structures Bond Behaviors Measurements**
J.M. Lopez-Higuera, I.A. Carrascal, J.A. Polanco, A. Quintela Incera, L. Rodriguez-Cobo, Universidad de Cantabria, Santander, Spain

- P9 Application of Ultrasonic Propagation Imaging System to Surface Crack Visualization in Dissimilar Weld of Control Rod Drive Mechanism Assembly of Nuclear Reactor**
J.-R. Lee, Y. Choi, Chonbuk National University, Jeonju, South Korea

- P10 Experimental Study on Measurement of Strain Distribution on Simply Supported Steel Beam Using FBG Strain Sensors**
J. Lee, Y. Kim, H. Park, Yonsei University, Seoul, South Korea

- P11 Weight Optimization Using Lightweight Data Acquisition Nodes**
D. Heyes, Curtiss-Wright Controls Avionics & Electronics, Dublin, Ireland; D. Buckley, ACRA CONTROL, Dublin, Ireland

- P12 A Laboratorial Prototype of a Weight Measuring System Using Fibre Bragg Gratings Embedded in Silicone Rubber**
C.M. Vasques, C. Frias, R. Oliveira, J. Vieira, A. Vieira, INEGI, University of Porto, Portugal

SHM APPLICATIONS (AEROSPACE, MARINE, RAILWAY, AUTOMOTIVE, PIPELINES, CIVIL ENGINEERING, ENERGY GENERATION AND DISTRIBUTION, PRODUCTION, ETC.)

- P13 Industrial Tests of the SHM System Based on Modal Filtration**
K. Mendrok, W. Maj, T. Uhl, AGH University of Science and Technology, Krakow, Poland

- P14 Development of a Wireless Network with Autonomously Powered and Active Long Range Acoustic Nodes for the Structural Health Monitoring of Bridges**
A. Wilkinson, G. Edwards, K. Tuncbilek, TWI, Cambridge, United Kingdom

- P15 Numerical Studies of a Damage Detection Method for Beam Structures Based on Local Flexibility and Modal Macro-Strain**
T.-Y. Hsu, National Center for Research on Earthquake Eng., Taipei, Taiwan; W.-Y. Liao, National Taiwan University, Taipei, Taiwan

- P16 Accuracy Improvement of Condition Diagnosis of Railway Switches via External Data Integration**
T. Böhm, DLR, Köln, Germany

- P17 Evaluating the Compressive Strength of Concrete Exposed to Elevated Temperatures Using Ultrasonic Pulse Velocity and Artificial Neural Networks**
K. Prasopchaichana, Burapha University, Chonburi, Thailand

- P18 Innovative Methods to Estimate Rotorcraft Gross Weight and Center of Gravity**
N. Apetre, N. Iyyer, S. Sarkar, Technical Data Analysis, Falls Church, USA; P. Kang, N. Phan, NAVAIR, Patuxent River, USA

- P19 Monitoring of Civil Engineering Structures Supported by Vision System**
P. Kohut, K. Holak, T. Uhl, AGH University of Science and Technology, Krakow, Poland

- P20 Progress Towards the Development and Qualification of an All Optical Temperature and Pressure Compensated Fiber Optic Oxygen Sensor for Monitoring Ullage Environment in Aircraft Fuel Tanks**

E.A. Mendoza, Y. Esterkin, C. Kempen, J. Prohaska, S. Sun, Redondo Optics, Los Angeles, USA; J. Goglia, K. Susko, Aviation Safety Facilitators, Elmont, USA

- P21 Acoustic Emission Source Localization on Concrete Structures with Focusing Array Imaging**
V. Giurgutiu, L. Yu, University of South Carolina, Columbia, USA

- P22 Using Embedded Electrical Grid for Active Thermography Diagnostics of Composite Structures**
A. Orlowska, Institute of Fundamental Technological Research, Warsaw, Poland; J. Biczysk, P. Kolakowski, Adaptronica, Lomianki, Poland

- P23 Damage Characterization Based on a Combined Experimental-Simulation Method: An Electromechanical Impedance Approach**
J.C. Viana, P. Antunes, M. Baptista, G. Dias, N. Ferreira, R. Guimaraes, J. Silva, Critical Materials, Guimaraes, Portugal

- P24 Damage Detection and Localization by Interpretation of Inner Electrical Resistivity Measurements**
M.A.A. Anndif, N.H. El-Ashkar, M.I.S. Elmasry, AASTMT, Abu Qir, Alexandria, Egypt

- P25 Damage Detection Index Based on Hypothesis Testing for the Difference in Population Means**
L.E. Mujica, F. Pozo, J. Rodellar, M. Ruiz, Technical University of Catalonia, Barcelona, Spain; A. Güemes, Universidad Politecnica de Madrid, Spain

SIGNAL PROCESSING
(FFT, WAVELET, PCA, FEATURE
EXTRACTION, PATTERN
RECOGNITION, ETC.)

- P26 Detection of Impact Damage in Composites under Complex Environment Using Guided Waves**
J. Tang, Z. Wu, G. Yan, Nanjing Univ. of Aeronautics and Astronautics, Nanjing, China
- P27 Vibration-Based Symptoms in Condition Monitoring of a Light Rail Vehicle Suspension**
B. Firlík, M. Tabaszewski, Poznan University of Technology, Poznan, Poland
- P28 Substructure Isolation Method for Online Local Damage Identification Using Time Series**
J. Holnicki-Szulc, L. Jankowski, Polish Academy of Sciences, Warsaw, Poland; J. Hou, J. Ou, Dalian University of Technology, Dalian, China
- P29 Comparison of Radiographic Image Processing Algorithms**
K. Stoev, AECL Chalk River Lab., Chalk River, Canada
- P30 Seeded Fault Testing and Fault Detection in Helical Gears Using Vibration Analysis**
S. Mirhadizadeh, S. Kaczmarczyk, P. Picton, R. Albany-Ward, University of Northampton, United Kingdom
- P31 Classification of Damage through Isomap-Based Dimensional Scaling Technique**
B.-H. Koh, Dongguk University, Seoul, South Korea; M. Jeong, KISTI, Daejeon, South Korea
- P32 An Algorithm for 3D Vibration Measurement Using One Laser Scanning Vibrometer**
K. Park, D. Kim, H. Song, GIST, Gwangju, South Korea

STRUCTURAL SIMULATION (STRESS
& STRAIN, MODAL, ACOUSTICS,
ELECTROMAGNETICS, THERMAL,
NEURAL NETWORKS, ETC.)

- P33 Damage Identification Using Sub-Structuring and Optimal Modal Reduction Techniques**
Y. Goldfeld, S. Ouaknin, Technion-Israel, Haifa, Israel
- P34 Diagnostic System for Damage Monitoring of Helicopter Fuselage**
C. Sbarufatti, M. Giglio, A. Manes, Politecnico di Milano, Italy
- LATE REGISTRATIONS
- P35 Monitoring of Smart Composite Materials by Optical Fiber Sensors: From Fabrication to Mechanical Characterization**
Z. Chapeleau, M. Drissi-Habti, IFSTTAR, Bouguenais, France
- P36 Intelligent AE and PECT based Structural Health Monitoring System for Wind Turbine Blade**
O.M. Bouzid, L. Cheng, G. Tian, Newcastle University, Newcastle, United Kingdom