CONTENTS

WELCOME MESSAGE

The IV ECCOMAS Thematic Conference on Smart Structures and Materials (SMART'09), held in Porto, Portugal, July 13-15, 2009, brings together researchers from around the world representing several fields of study in this area. The expertise will span a broad range of disciplines including basic research on smart structures and materials, structural identification and health monitoring, micro-electromechanical systems, electrostructured fluids and smart machines, adaptive composites, piezoelectric microstructures, active control of structures and practically oriented application in aerospace, mechanical, civil engineering, biomedical engineering, etc.

The SMART'09 proceedings cover numerous case studies and results of new research on 14 different topics. Compared to previous SMART events, the total number of papers scheduled for presentation has significantly increased to 146, proving the need for an international sharing in the field of smart structures and materials. The abstracts and the full contributions, including 19 Invited Lectures and 127 technical papers from about 30 countries, are assembled in the book of abstracts and in the CD-ROM Proceedings, which will serve as a valuable reference on the recent developments in this challenging area.

In order to widen the contribution of all participants, the conference format shall comprise plenary and parallel sessions, so that all papers are orally presented. The conference venue, located at the Campus of the Faculty of Engineering of the University of Porto (FEUP), will provide sufficient space for the conference activities, including the Technical Exhibition.

The historical and most important in the Northern region of Portugal city of Porto has a mild climate and offers the necessary infrastructures for success of the event. Besides, the old town, the outstanding bridges, the caves, the typical streets, the churches and old monuments that Porto displays, a variety of scenic places can be found in the North region, such as Guimarães, Ponte de Lima, Viana do Castelo and Braga, and in particular along the extraordinary Douro Valley, where the famous Porto wine comes from.

The answer of the SMART community has been quite good, and three excellent days of presentations and fruitful discussions can be expected. Therefore, we are really pleased to welcome you at FEUP, and we expect that you really enjoy your visit to Porto.

Porto, July 2009   *Álvaro Cunha and J.Dias Rodrigues*

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Suleman, A., Portugal
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Wereley, N. M., USA

GENERAL INFORMATION

Venue

The conference will be held at the Campus of the Faculty of Engineering of the University of Porto (FEUP), located at R. Dr. Roberto Frias, in Porto.

Dates

The conference will take place in the period 13-15 July 2009 (Monday to Wednesday).

Secretariat

The registration and information desk will be open in the following periods:
Monday, July 13	8.00-19.00
Tuesday, July 14	8.00-19.00
Wednesday, July 15	8.00-19.00

Internet

Access to Internet is provided at the Participants Living Room, called "Sala de Actos".

FEUP also provides wireless access to Internet, based on the Web Login system.

This service has no specific requirements of hardware or software, allowing the access to any equipment with wireless capacity and an Internet browser. The conference participants can connect to the SSID guest-e-U announced by FEUP, introducing the following credentials in a login page and accessing the Internet:

Login: smart09
Password: feup09

Owing to the nature of this service, the Internet connection is restricted to http and https protocols.

Coffee-breaks

Coffee will be served daily, during the morning and afternoon breaks, at the Auditorium ground floor or in the garden.

Lunches

During the three days of conference, the lunch will be served at the Grill of FEUP Cantine.

Conference Reception

The Conference Reception will take place at *Círculo Universitário do Porto*, on the 13th July at 18h45.

Conference Dinner

The Conference Dinner will be held at *Caves Real Companhia Velha*, on the 14th July at 20h.

Buses

The Organizing Committee will provide a bus service for the Conference Reception and Conference Dinner.

Identity Cards

The participants will receive identity cards, which must be always visible during the conference.

These cards refer the name, affiliation and country of each participant, and include also one of the following codes:

> OC – Organizing Committee
> SC – Scientific Committee
> SE – Secretariat
> FR – Full Registration
> ST – Student
> SP – Sponsor
> EX – Exhibitor
> FE – FEUP student

Scientific Committee meeting

A meeting of the Scientific Committee will take place on July 14th at "Sala de Actos" at 13h.
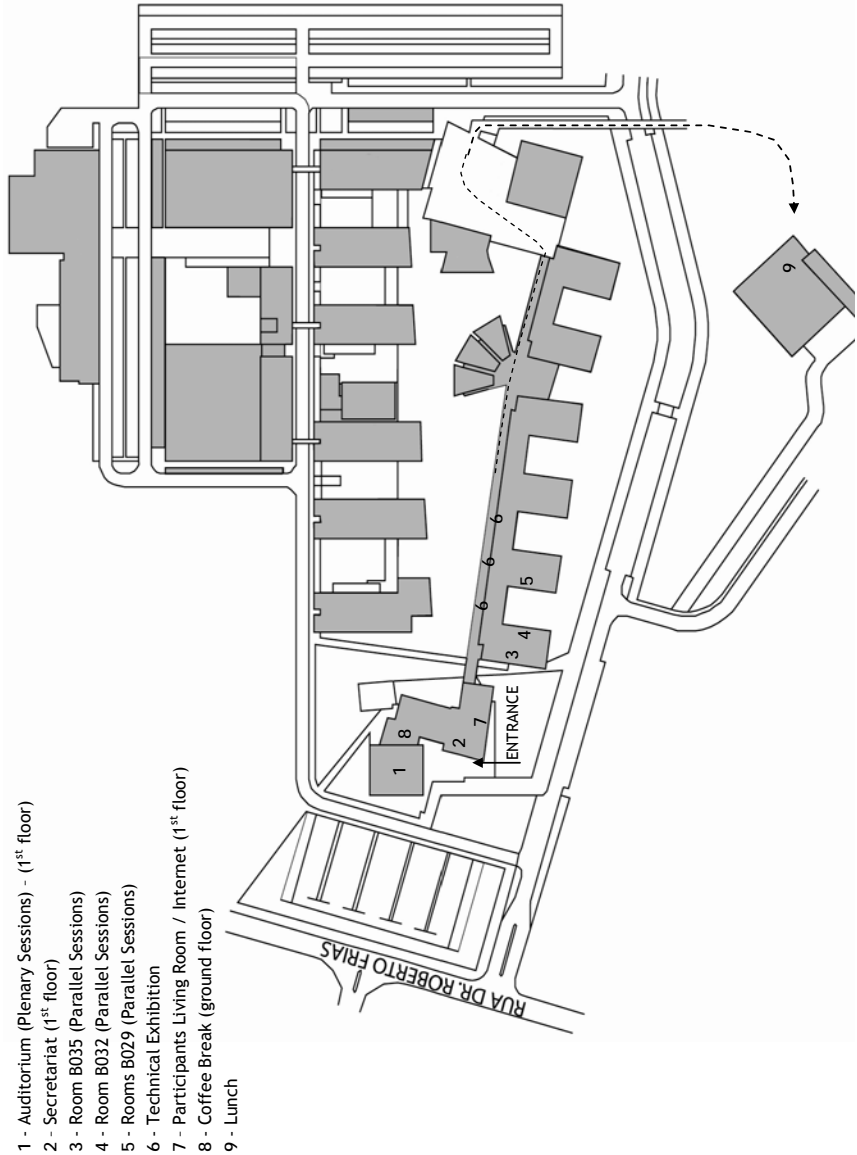
PROGRAMME ORGANIZATION

Programme format

In order to allow the oral presentation of all papers, the Conference Programme comprises, in each half day (morning or afternoon), 1 Plenary Session and 3 Parallel Sessions. There will be also Opening and Closing Sessions.

The Opening and Closing Sessions and the Plenary Sessions will take place at the Auditorium. The Parallel Sessions will be developed in the Auditorium and in three smaller rooms: Rooms B032, B035 and B029.

Day 1	13th July		Day 2	14th July
08:00-09:00	Registration			
09:00-09:30	Opening Cerimony		09:00-11:00	Plenary session
09:30-11:00	Plenary session			
11:00-11:30	Coffee-break		11:00-11:30	Coffee-break
11:30-13:00	Parallel sessions		11:30-13:00	Parallel sessions
13:00-14:30	Lunch		13:00-14:30	Lunch
14:30-16:00	Plenary session		14:30-16:00	Plenary session
16:00-16:30	Coffee-break		16:00-16:30	Coffee-break
16:30-18:15	Parallel sessions		16:30-18:00	Parallel sessions
18:30	Bus – Reception		18:15	Bus – Banquet
19:00	Reception at Círculo Universitário		20:00	Banquet

Day 3	15th July
09:00-10:30	Plenary session
10:30-11:00	Coffee-break
11:00-13:00	Parallel sessions
13:00-14:30	Lunch
14:30-16:00	Plenary session
16:00-16:30	Coffee-break
16:30-17:45	Parallel sessions
17:45	Closing Cerimony

Plan of FEUP

1 - Auditorium (Plenary Sessions) - (1st floor)
2 - Secretariat (1st floor)
3 - Room B035 (Parallel Sessions)
4 - Room B032 (Parallel Sessions)
5 - Rooms B029 (Parallel Sessions)
6 - Technical Exhibition
7 - Participants Living Room / Internet (1st floor)
8 - Coffee Break (ground floor)
9 - Lunch

Conference topics

The allocation of the papers to the Plenary and Parallel Sessions was made taking into account the following sequence of Conference Topics:

1. Sensors and Structural Identification
2. Active Materials and Actuators
3. Structural Health Monitoring and Signal Processing
4. MEMS and Structural Control
5. Vibration and Shape Control
6. Adaptive Crashworthiness
7. Composite Modeling
8. Biomimetic Autonomous Underwater Vehicles
9. Software Tools and Optimal Design
10. Identification of Materials Properties
11. Nanotechnologies
12. Industrial Applications
13. Demonstrators
14. Structural Analysis and Behaviour and other topics

INFORMATION FOR AUTHORS

Presentation files

Authors must deliver their powerpoint presentations to the technical staff of SMART'09 present in each room (Auditorium, B035, B032 or B029), at least during the 30 minutes before the corresponding session.

The author that will present each paper must be at the room defined at the Technical Programme 15 minutes before the beginning of the session, in order to participate in a brief meeting with the session chairs.

TECHNICAL PROGRAMME

MONDAY, 13 JULY – MORNING

9:00-9:30 Opening Cerimony (Auditorium)

FEUP Dean,	Carlos Costa
Head of Civil Eng. Dept. FEUP,	J. Ferreira Lemos
Head of Mech. Eng. Dept. FEUP,	A. Torres Marques
Chair of the Organizing Committee, FEUP,	Álvaro Cunha
Co-Chair, FEUP,	J. Dias Rodrigues
Co-Chair, IST,	C. Mota soares
Co-Chair, Polish Academy of Sciences,	Holnicki-Szulc

9:30-11:00 | Invited Lectures / Plenary Session (Auditorium)

Chair: W. Ostachowicz

Radar-based measurement of deflections on bridges and large structures: advantages, limitations and possible applications
C. Gentile

Distributed sensing of strain and temperature under complex conditions
A. Güemes

Solid-state actuators with inherent sensory capabilities
H. Janocha & K. Kuhnen

11:30-13:00 | Papers / Parallel Session (Auditorium) – Topic 1

Chair: H. Janocha

Wireless sensor network design and performance validation for measurements in aircraft strength ground testing
J. Wu, S. Yuan, Z.L. Wang & Y Wang

Novel sensing head geometry based on smart composite with embedded FBGs for strain and temperature discrimination
O. Frazão, C. Frias, A. Vieira, L, Amaral, I. Dias, J. M. Baptista & A. T. Marques

Fiber Bragg Gratings application for strain measurements of Terfenol-D based composites
P. Gasior, J. Kaleta, D. Lewandowski & R. Mech

Ballistic impact monitoring of glass fibers composites by Fiber Bragg Grating Sensors
V. Antonucci, M. Giordano, A. Laudati & A. Cusano

Distributed fiber optical measurement system for localization of loss-induced perturbation
V. Spirin, S. Miridonov, E. Mitrani, S. Durazo & M. Castro

11:30-13:00 | Papers / Parallel Session (Room B032) – Topic 5

Chair: G. Feltrin

Research on structural control at VIBEST / FEUP
C. Moutinho, A. Cunha & E. Caetano

On the characterization of damping of tuned liquid column dampers
L. Ramos & A. Cunha

Performance of SISO active control strategies for floor vibrations
I. M. Díaz & P. Reynolds

Vibration control of cable-stayed bridges using shear type MR damper
G. Heo, J. Jeon & C. Kim

Vibration nonlinear control of beam systems acted upon by nonlinear devices
F. Bourquin, M. Debbabi & F. Maceri

11:30-13:00 | Papers / Parallel Session (Room B035) – Topic 4

Chairs: U. Gabbert, F. Claeyssen

Small impact drive motors based on amplified piezoelectric actuators
C. Belly, F. Claeyssen, T. Porchez & R. Le Letty

Semi-active control of magneto-rheological dampers with negative stiffness
S. Bhowmik & J. Høgsberg

Biologically-inspired morphing wing actuation
T. Adams, N. Iwabuchi, L. Benner, B. Edwards, S. Webb, J. Fulton, R. Kirk & F. G. Yuan

Optimization of location and size of piezoelectric actuators for manipulators with flexible non-prismatic links based on the maximization of dissipated control energy
V. Bottega, R. Pergher, A. Molter & J.S.O. Fonseca

Optimal Control for Musculoskeletal System
V. Bottega & R. Pergher

11:30-13:00 | Papers / Parallel Session (Room B029) - Topics 8, 9

Chair: C. Mota Soares

An autonomous surface vehicle insas for maintenance and surveillance applications
S. Silva, S. Cunha, A. Matos & N. Cruz

Computational framework for simulation and design of adaptive lightweight structures
M. Fischer, K.-U. Bletzinger & R. Wüchner

Combining FEM simulations and infrared thermography for optimising the activation system of shape-memory polymer based devices
A. Díaz Lantada, P. Lafont, H. Lorenzo-Yustos, J. Muñoz-García, J. L. Muñoz Sanz, J. Echavarri Otero, J. M. Munoz-Guijosa

Optimization design of composite steel-concrete structures under fire conditions
A. Landesmann, J. Câmara Neto & E. de Miranda Batista

Topology optimization of piezoelectric sensors arrays applied to modal filters design
Carlos C. Pagani Jr. & Marcelo A. Trindade

MONDAY, 13 JULY – AFTERNOON

14:30:-16:00 | Invited Lectures / Plenary Session (Auditorium)

Chair: A Preumont

Information extraction in structural health monitoring with wireless sensor networks
G. Feltrin, J. Meyer, R. Bischoff & O. Saukh

Wind turbine blade research at Risø DTU
M. McGugan & B.F. Sørensen

Morphing Aircraft: Materials, Mechanisms and Systems
J. Vale, L. Falcão, A. Gomes, F. Lau & A. Suleman

16:30:-18:15 | Project ADVICE / Parallel Session (Auditorium)

Chair: F. Lani

Autonomous Damage and Vibration Control Systems: Overview of the ADVICE project and its interest for aeronautics
D. Dumas, F. Lani, A. Nawrocki, J. Loyer, S. Grand, T. Monnier & M. Lallart

Efficient piezoelectric energy harvesting and management for self-powered sensors
M. Lallart, T. Monnier, C. Richard, P. Delatte, A. Saib, T. Kezai & P. Gérard

Communication and networking strategies for autonomous actuators and sensors
H. Boulkenafet, T. Kezai, P. Gerard, D. Flandre, M. Lallart & C. Richard

Numerical simulations of a vibrating composite panel to predict its behavior for damage detection using Lamb Waves
D. Dumas, F. Lani, K. Alexiou & T. Monnier

Validation of an autonomous vibration and damage control system on a composite panel
Stéphane Ménio, Jérome Loyer, Sylvain Claimand, Jean-Michel Perrochat, Serge Grand, Kimon Alexiou & David Dumas

Semi-passive damping solutions for autonomous vibration control systems on aircrafts
E. Castro, F. Martin de la Escalera, M. Lallart, C. Richard, T. Monnier

16:30-18:15 | Papers / Parallel Session (Room B032) - Topics 2, 3

Chair: J.A. Güemes

Actuation modeling of ionic liquid-swollen ionic polymer transducers
N.C. Goulbourne & J.D. Davidson

Imaging analysis techniques for vibration monitoring in civil structures
S. Silva, J. Bateira & E. Caetano

Extraction of modal parameters through wavelet transform
C. Belmonte, E. Caetano, A. Cunha & P.P. Diotallevi

Design and installation of an electric based monitoring system applied to a centenary metallic bridge
Bruno J. A. Costa, C. Félix & J.A. Figueiras

Monitoring of an old metallic bridge by using of electric and optic technologies
Bruno J. A. Costa, Carlos F. Rodrigues, A.O. Dimande, J.A. Figueiras & A. Cunha

Weighing of trains in motion as a part of health monitoring system for a railway bridge
P. Kołakowski, K. Sekuła, D. Sala, A. Świercz & A. Orłowska

16:30-18:15 | Papers / Parallel Session (Room B035) - Topics 1, 4, 5

Chair: J. Holnicki-Szulc

Increasing dynamic stiffness of MIMO compliant structures by active control from auxiliary structure
M. Nečas & M. Valášek

Carbon fibre reinforced polymer as piezoresistive sensor
M.T. Silva, S. Jalali & R.M. Ferreira

Textile sensors for cardiac monitoring
A. Rente, R. Salvado & P. Araújo

Structural parameter estimation of two bridges from site data using Kalman filters and stochastic subspace algorithm
P. Banerji & S. Chikermane

Networked structural control with wireless sensing and actuation using H_∞ output feedback
H.R. Karimi, M. Zapateiro & N. Luo

Semiactive suspension for aircraft landing vibration absorption
M. Zapateiro, N. Luo & H.R. Karimi

16:30-18:15 | Papers / Parallel Session (Room B029) - Topic 7

Chair: E. Carrera

Experimental investigations of piezoelectric shear force actuated smart composites
P. Berik, H. Rapp & R. Wörndle

Piezoelectric laminated beam modelling including 3D effects. Application to control of vibrations and actuation
A. Fernandes, C. Maurini & J. Pouget

Design of piezoelectric actuator networks for framed structures utilizing Kirchhoff's plate theory with varying bending stiffness
D. Huber, M. Zellhofer, M. Krommer & H. Irschik

On-line identification of delamination – simulation and experiment
A. Orłowska & P. Kołakowski

Exact Elasticity Solution for the Density Functionally Gradient Beam with General Boundary Condition
A.R. Daneshmehr , S. Momeni & S. Salimi

Layerwise finite element analysis of laminated cylindrical shell with piezoelectric rings
MR. Saviz & M. Shakeri

TUESDAY, 14 JULY – MORNING

9:00-11:00 | Invited Lectures / Plenary Session (Auditorium)

Chair: M.I. Friswell

Mechanical to electrical energy conversion enhancement and self-powered wireless applications
D. Guyomar & M. Lallart

Identification, monitoring and control of bridges and special structures
A. Cunha, E. Caetano, F. Magalhães & C. Moutinho

Ageing of multi-riveted metallic panels and their options foracoustic wave based condition monitoring
C. Boller & M. R. Mofakhami

Active optics for large segmented mirrors: scale effects
A. Preumont, R. Bastaits & G. Rodrigues

11:30-13:00 | Papers / Parallel Session (Auditorium) – Topic 3

Chair: M. McGugan

Design strategies of energy harvesting devices with piezoelectric transducers
W. Kaal, S. Herold & M. Kurch

An approach for structural health monitoring with smart sensor networks based on the random decrement method
D. Mayer, M. Kauba & A. Friedmann

Structural health monitoring of thin-walled structures by optical measurement techniques
R. Lammering & M. Neumann

Data management strategy for structural health monitoring system using smart sensors
A. Mita, S. Ogawa, H. Kameda & H. Sato

Structural health assessment of a building with passive dampers using three-dimensional vibration modes
Y. Nakamura & A. Mita

11:30-13:00 | Papers / Parallel Session (Room B032) – Topic 5

Chair: F. Weber

Passive control systems for the improvement of dynamical behaviour of tower cranes
J. de Sebastián, C.M. Casado, A. Lorenzana & A.V. Poncela

Gust load reduction concept in wind turbines
J. Grzędziński & A. Mróz

Passive vibration control with shunted modal piezoelectric transducers
C. M. A. Vasques & J. Dias Rodrigues

Low-cost and light-weight deformable mirrors for high order adaptive optics
G. Rodrigues, R. Bastaits & A. Preumont

Feasibility investigations for a decentralized vibration control concept with embedded control nodes using the Filtered-x-Least-Mean-Squares algorithm
M. Kauba, S. Herold & D. Mayer

11:30-13:00 | Papers / Parallel Session (Room B035) – Topic 10

Chair: Y. Furuya

Development of New Iron-based Galfenol (Fe-Ga-X) magnetostrictive alloys and their applications for smart by-wire steering system for automobile technology
Y. Furuya, T. Takahashi, T. Okazaki, C. Saito & .M. Shimada

Characterisation of NiTi Shape Memory Alloy coating for tribological applications
T.A.A. Bakar, J.Stokes, M.S.J.Hashmi, M.Rahman & D.P.Dowling

Relationships between compressive and tensile stresses of magnetorheological fluids
S. A. Mazlan, I. Ismail & A. G. Olabi

Conventional and contact-less triggering of shape memory polyalkenamers
J.M. Cuevas, L. German, M. Iturrondobeitia, J.M. Laza, J. Alonso, J. L. Vilas & L.M. León

Characterization of smart MARFOS NiTi shape memory alloys
F. Neves, F. M. Braz Fernandes, F. Neves, I. Martins, J. B. Correia, M. Oliveira, E. Gaffet, N. Boucharat, M. Lattemann, J. Suffner & H. Hahn

11:30-13:00 | Papers / Parallel Session (Room B029) – Topics 11, 13

Chair: D. Guyomar

PCL/MWCNT nanocomposites as nanosensors
A. Grozdanov, A. Buzarovska, M. Avella, M.E. Errico & G. Gentile

Large field induced strain in carbon nano-filled composite polyurethane (PU)
M. Kanda, K. Yuse, B. Guiffard & D. Guyomar

Nanotube and nanocomposite mechanics: A guide to the perplexed
H.D. Wagner & X.-M. Sui

Quantitative guidelines for modifying periodic ordered nanostructures: shape-evolution and shape- control during precipitation of inorganic precursors and urea
S. Bakardjieva, V. Štengl & J. Šubrt

Rapid prototyping and rapid tooling technologies for developing shape memory polymer-based devices
A. Díaz Lantada, P. Lafont, H. Lorenzo-Yustos, J. Muñoz-García, J. L. Muñoz Sanz, J. Echavarri Otero & J. M. Munoz-Guijosa

TUESDAY, 14 JULY – AFTERNOON

14:30:-16:00 | Invited Lectures / Plenary Session (Auditorium)

Chair: C. Boller

Guided wave propagation methods in composite structures for damage identification
W. Ostachowicz & P. Kudela

Cable damping with friction and combined viscous-friction dampers
F. Weber, C. Boston, G. Feltrin & M. Motavalli

The prospects for morphing aircraft
M.I. Friswell

16:30-18:00 | Papers / Parallel Session (Auditorium) - Topic 3

<u>Chairs</u>: C. Gentile, J. Rodellar

Modern remote structural health monitoring: an overview of available systems today
T. Spuler, G. Moor & R. Berger

Short-term Automated Monitoring of the Danube Bridge in Sinzing
T. Spuler, G. Moor & R. Berger

Structural health monitoring using wireless sensor networks
S. Deix, M. Ralbovsky, R. Stütz & S. M. Wittmann

Contribution plots on PCA based indices for damage identification on structures
L.E. Mujica, M. Ruiz, A. Güemes & J. Rodellar

Monitoring and sub-structuring of large massive structures
S. Casciati

16:30-18:00 | Papers / Parallel Session (Room B032) – Topic 5

<u>Chair</u>: A. Preumont

Vibration reduction of structural-acoustic coupled system by piezoelectric semi-passive techniques
W. Larbi, J.-F. Deü & R. Ohayon

Vibration control of a rotor by magnetic shape memory actuators
K. Majewska, A. Żak & W. Ostachowicz

Adaptive wing for small aircraft applications
M. Mieloszyk, T. Wandowski, A. Żak, M. Krawczuk & W. Ostachowicz

Stochastic modeling of active-passive piezoelectric networks for structural vibration control
H.F.L. Santos & M.A. Trindade

Bounded vibration controls of distributed-parameter systems with applications to a beam on viscoelastic supports
M. Mahinzaeim, D.C. Swailes & J.M. Hale

16:30-18:00 | Papers / Parallel Session (Room B035) – Topic 10

<u>Chair</u>: J. Dias Rodrigues

Modeling the frequency and temperature dependent constitutive relation for damping materials
R.A.S. Moreira, J.D. Corte-Real & J.Dias Rodrigues

Micro material property measurement of nickel (99.9%) thin film using vision strain measuring module
H.-J. Lee, N.-K. Lee, G.-A. Lee, J.-H. Song, S.-M. Bae, H.-W. Lee & A-R. Han

Optimal location of piezoelectric patches and identification of material properties in laminated composite structures
A.L. Araújo, C.M. Mota Soares, H. Friedmann, J. Röhner & F.-O. Henkel

An experimental study of the electro-thermomechanical behavior of linear NiTi shape memory actuators
L. F. A. Rodrigues, J. B. Simões, C. J. De Araújo & J. F. Coutinho Neto

Mechanical properties of magnetorheological elastomers
A. Boczkowska & S.F. Awietjan

16:30-18:00 | Papers / Parallel Session (Room B029) – Topic 14

<u>Chair</u>: H.H. Hilton

Temperature impact on MR devices behaviour
J. Bajkowski, M. Bajkowski, W. Grzesikiewicz & R. Zalewski

On the use of SMA for impact absorption: numerical implementation of RL model including thermal effects
M. Collet, M. Ouisse, E. Foltête & C. Lexcellent

Novel protocols of matching optimized designer aero-servocontrols with engineered viscoelastic material properties
H.H. Hilton, D.H. Lee & C.G. Merrett

One dimensional finite element implementation of a thermomechanics multimechanism constitutive equation for shape memory alloys
C. J. Gomes

A perfluorinated polyether-based magneto-rheological fluid in a prosthetic knee
K. H. Gudmundsson, F. Jonsdottir, F. Thorsteinsson & O. Gutfleisch

WEDNESDAY, 15 JULY– MORNING

9:00-10:30 | Invited Lectures / Plenary Session (Auditorium)

Chair: U. Gabbert

Dynamic architecture vs. structural control
F. Casciati, L. Faravelli & R. Al Saleh

Sensors and actuators for active structural acoustic and active vibration feedback control
P. Gardonio

Adaptive impact absorption – the concept, innovative solutions, applications
J. Holnicki-Szulc, C.Graczykowski, G.Mikułowski, A.Mróz & M.Ostrowski

11:00-13:00 | Papers / Parallel Session (Auditorium) – **Topic 3**

Chairs: C. Boller, R. Lammering

The Uniovi Benchmark
J.L. Zapico-Vallea, M.P. González-Martíneza, M. García-Diégueza & J. Abad-Blasco

A migration model for impact localization on carbon-fiber-reinforced plastic plates
A. Ungethuem & R. Lammering

Dynamic stress monitoring with ultrasonic technique
J. Szelążek, P. Gutkiewicz & S. Mackiewicz

On development of PZT array based structural health monitoring scanning system and its experimental research on UAV wing box
L. Qiu, S. Yuan, Q. Wang, Y. Sun & W. Yang

Baseline-free damage imaging method for lamb wave based structural health monitoring
Q. Wang & S. Yuan

Leak detection in a pipeline by cepstrum analysis of a pressure transient
J.D. Shucksmith, S.B.M. Beck, W.J. Staszewski, J.B. Boxall & A. Seth

Laboratory tests on damage detection in Unmanned Aerial Vehicles composite sheating
M. Jurek, P. Nazarko & L. Ziemiański

11:00-13:00 | Papers / Parallel Session (Room B032) – Topic 5

Chair: P. Gardonio

On a pneumatic adaptive landing gear system for a small aerial vehicle
G. Mikułowski, P. Pawłowski, C. Graczykowski, R. Wiszowaty & J. Holnicki-Szulc

Electrical resistance measurements in shape memory alloy actuators for the position control of flexible systems - application to the case of an aluminum beam
W.M. Lima, C.J. de Araújo, W.A.V. Valenzuela & J.S. da Rocha Neto

PID controller project and analysis using shape memory alloys actuators
C.T. Faria, H.G. Borduqui, V.R. Franco & V. Lopes Jr

Noise control of plates featuring periodic arrays of shunted piezoelectric patches
F. Casadei, M. Ruzzene & L. Dozio

Improvement of dimensional accuracy and machine service life in sheet metal forming by control systems based on MR fluids
P. Regazzo & A. Ghiotti

Power controller for small – scale magnetorheological dampers
M. Rosół & B. Sapiński

Shunt damping of vibrating structures – design and implementation
T. Uhl & M. Rosiek

11:00-13:00 | Papers / Parallel Session (Room B035) – Topics 10, 12

Chair: W. Ostachowicz

Anisotropic solutions applied to a smart damper
T.A.N. Silva, C.R. Leal, A. Rodrigues, M.F. Bento & J.M.C. Travassos

Rheological model for special granular structures (SGS)
R. Zalewski

Numerical simulation of anisotropic magneto-rheological fluids
M. Barski

Characterization of the dynamic mechanical behavior of magnetoelastomers for vibration damping applications
Z. Major & B. Schrittesser

Phase transformation yield surfaces for anisotropic shape memory alloys and surfaces transport
R.M. Laydi, K. Laverhne-Taillard, E. Gibeau & C. Lexcellent

Application of quartz made SAW devices as strain sensors: practical aspects
G. Obieta & M. Martínez-Esnaola

11:00-13:00 | Papers / Parallel Session (Room B029) – Topic 14

<u>Chair</u>: T. Kundu

Temporary repair of concrete beams by embedded shape memory alloy actuators
F. Daghia, A. Giammarruto, R. Carli & G. Pascale

Discrepancy between test and FE analysis for dynamic characteristics of tall buildings
S.H. Cho

Natural seismic protection peculiarities of historical "Walled Obelisk" structure in Istanbul: modeling and numerical approach
A.A. Kasimzade, S. Tuhta & S. Bal

A linear-in-parameter modified Bouc-Wen model
L. Acho & F. Pozo

Energy flow approach to analysis of progressive collapse
S. Szyniszewski

Smart device for extracting environmental energy providing continuous control of sun light
J. Cavalheiro

2-D approximation of multilayered composite structures with piezoelectric actuators – problems of optimal design
P. Kędziora

WEDNESDAY, 15 JULY– AFTERNOON

14:30-16:00 | Invited Lectures / Plenary Session (Auditorium)

<u>Chair</u>: F. Casciati

Classical and advanced computational plate/shell models for piezoelectric laminated structures
E. Carrera, S. Brischetto & M. Cinefra

Active noise control of thin-walled structures
U. Gabbert, J. Lefèvre & S. Ringwelski

Ultrasonic guided wave for structural health monitoring
T. Kundu

16:30-17:45 | Papers / Parallel Session (Auditorium) – Topics 3, 6

<u>Chair</u>: M.I. Friswell

Novelty detection and damage evaluation in laboratory models
P. Nazarko & L. Ziemianski

An experimental study of damage propagation in smart structures
V.R. Franco, A.A. Cavalini Junior, C.G. Gonsalez & V. Lopes Junior

Wireless 3D magnetic field digitizer for inspection of parts constructed using smart magnetic materials
J. Kaleta & P. Wiewiórski

Configurable thermal-induced triggers for crashworthiness applications
D.M. Dimas, A. Alves, N. Peixinho, D. Soares & C. Vilarinho

16:30-17:45 | Papers / Parallel Session (Room B032) – Topic 5

<u>Chair</u>: C. Moutinho

Advanced piezoelectric sensor for shape control
M.Smrž & M. Valášek

Active vibration control of a clamped composite plate subjected to blast loading by using genetic algorithm
H. Uyanık

Vibration characteristics of a steel frame using piezoelectric crystals as dampers
M.S. Rakesh & Ashok Kumar

Theoretical analysis of cantilever box beam excited by patches of piezoelectric actuators
M. Alhazmi & H. Ghulman

16:30-17:45 | Papers / Parallel Session (Room B035) – Topic 12

<u>Chair</u>: F. Magalhães

Vibration control of offshore platforms using magneto-rheological dampers
L.A. Lamont, L. El Chaar & M. Karkoub

Monitoring technologies: progressing from theory to application
T.B. Messervey, D. Zangani & S. Casciati

Use of magnetorheological elastomer materials in an adaptive vibration absorber for a propeller shaft
W.J. Choi, Y.P. Xiong & R.A. Shenoi

Die castings with integrated PZT-modules – fabrication and functionalities
M. Rübner, C. Körner & R.F. Singer

16:30-17:45 Papers / Parallel Session (Room B029) – Topic 14

Chair: C. Vasques

The Dipole Contouring Method as a tool for magnetic field distribution in premagnetization zone in SMART actuator
J. Kaleta & P. Wiewiórski

Three-dimensional elasticity solution of functionally graded piezoelectric cylindrical panel under dynamic loading
M. Shakeri & M.R. Sedighi

The effect of various boundary conditions on phase transformation in shape memory alloy cylindrical panels
M. Shakeri, R. Mirzaeifar & M. Sadighi

Static behavior of functionally graded cylindrical shell with piezoelectric ring
M.H. Yas, K. Garmsiri, M.Shakeri & M. Khanjani

17:45 Closing Session (Auditorium)
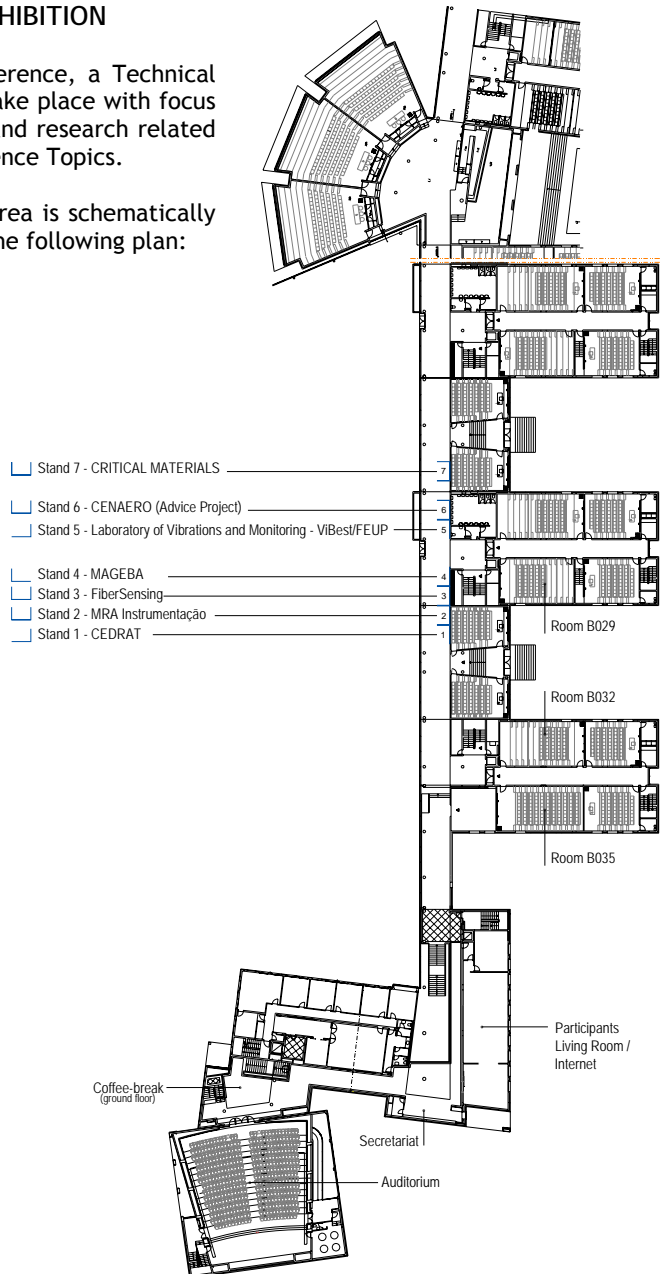
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TECHNICAL EXHIBITION

During the conference, a Technical Exhibition will take place with focus on equipments and research related with the Conference Topics.

The Exhibition area is schematically represented in the following plan:

Stand 7 - CRITICAL MATERIALS

Stand 6 - CENAERO (Advice Project)
Stand 5 - Laboratory of Vibrations and Monitoring - ViBest/FEUP

Stand 4 - MAGEBA
Stand 3 - FiberSensing
Stand 2 - MRA Instrumentação
Stand 1 - CEDRAT

Room B029

Room B032

Room B035

Participants Living Room / Internet

Coffee-break
(ground floor)

Secretariat

Auditorium

EXHIBITORS

STAND 1
CEDRAT Technologies

The CEDRAT Group offers a wide range of standard off the shelve mechatronic products including piezoelectric & magnetic actuators, motors, mechanisms and transducers with corresponding drivers & controllers. These mechatronic products are used for various scientific and industrial applications requiring features such as: micro & nano positioning, the generation of vibrations, micro-scanning, fast & precise motion control, active control of vibrations, energy harvesting.
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Contact: Frank Claeyssen
Address: 15 Chemin de Malacher – Inovallée
          38246 Meylan cedex - France

Tel: +33 (0)4 76 90 50 45
Fax: +33 (0)4 56 38 08 30
E-mail: actuators@cedrat.com
www.cedrat.com

STAND 2
MRA Instrumentação, SA

MRA INSTRUMENTAÇÃO belongs to the ALAVA INGENIEROS S.A. group. This company offers commercial services in Spain and Portugal for over 300 high quality Electronic Instrumentation firms, supplying integral solutions for Measurement, Recording, Processing, Calibration and Simulation of electrical and physical parameters.
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Contact: Eng. Carlos Aroeira
Address: Taguspark, Ed. Ciência II,1B, 2740-120 Porto Salvo, Portugal

Tel: +351 214 217 472
Fax: +351 214 218 188
E-mail: mra@mra.pt
www.mra.pt

STAND 3
FiberSensing

FiberSensing is a world leader in the development and production of advanced monitoring systems based on the optical fiber Bragg grating (FBG) technology, for advanced monitoring applications, in Civil and Geotechnical Engineering, Aeronautics, Aerospace and Energy Industries.
It offers the most complete portfolio of products (FBG sensors, measurement units, software packages) and of complete solutions for monitoring, such as: custom development of OEM Systems, turn-key solutions and monitoring projects.
Founded in 2004 as a spin-off from R&D Institute INESC Porto, the company is proud of having addressed more than one hundred monitoring projects around the world and delivered thousands of sensors and measurement units.

Contact: José Monteiro, Maria João Gonçalves
            jose.monteiro@fibersensing.com or maria.goncalves@fibersensing.com
Address: R. Vasconcelos Costa, 277 - 4470-640 Maia, Portugal

Tel: 351 229 613 010
Fax: 351 229 613 020
E-mail: sales@fibersensing.com
www.fibersensing.com

STAND 4
MAGEBA

Mageba is a leading international manufacturer of products for the bridge construction industry, supplying bearings, expansion joints, shock absorbers and structural health monitoring solutions. The Swiss enterprise was founded in 1963 and has its head office in Bülach, Zurich, with production facilities in Bülach (Switzerland), Fussach (Austria), Shanghai (China) and Kolkata (India), and a network of over forty offices and distributors around the world. Thousands of bridges worldwide are equipped with mageba products, including the following landmark structures: - Vasco da Gama Bridge, Portugal – Pot bearings and modular expansion joints; - Oeresund Bridge, Denmark/Sweden – Pot bearings; - Run Yang Bridge, China – record-breaking modular expansion joints with 27 gaps; - Convention & Exhibition Centre, Hong Kong – World record pot bearings (209,000 kN). Mageba offers a range of automated structural health monitoring systems, both short- and long-term. Reference projects include: - Ponte Nanin, Switzerland – long-term monitoring, used to ensure safely of bridge and users, with automatic reporting of changes in condition (e.g. due to earth movements); - Steinbachtal Bridge, germany – medium-term monitoring to record number, speed and weight of behicles crossing the bridge during construction of an adjacent motorway; - Danube Bridge in Sinzing, Germany – short-term monitoring of a bridge to record its movements and thus understand and solve a problem of accelerated wear of sliding parts; - Incheon Grand Bridge, South Korea – Monitoring to record data relating to the performance of the bridge's unusually large and complex expansion joints, which allow longitudinal movement of up to 2,000mm. The company has been certified to ISO 9001 since 1991.

Contact: Mrs. Susanne Bolliger
Address: mageba sa
            Solistrasse 68, 8180 Bülach, Switzerland

Tel: +41-44-872 40 50
Fax: +41-44-872 40 59
E-mail: mageba@mageba.ch
www.mageba.ch

STAND 5
Laboratory of Vibrations and Monitoring – ViBest / FEUP

The Laboratory of Vibrations and Structural Monitoring (ViBest) is a facility / research unit of the Civil Engineering Department of FEUP that provides support to the performance of experimental and numerical works in the context of the development of research, consultancy and teaching activities in the field of Structural Dynamics, aiming in particular the experimental characterization of vibratory phenomena, the analysis, identification, monitoring and control of the structural behaviour under different types of dynamic loads.

Contact: Prof. Álvaro Cunha
Address: Faculty of Engineering of University of Porto (FEUP)
R. Dr. Roberto Frias, 4200-465 Porto, Portugal

Tel: +351 912541102
Fax: +22 508 1835
E-mail: acunha@fe.up.pt
www.fe.up.pt/vibest

STAND 6
CENAERO (ADVICE Project)

"Cenaero, Research Center in Aeronautics, is a Belgian CAE solutions provider specialized in aeronautics, space, transport and energy sectors. Cenaero develops state-of-the-art CAE expertise on a day-to-day basis as well as commitments in long-term R&D projects. Cenaero provides both advanced engineering consulting services and dedicated high-tech engineering software.
Our major references include Airbus, Snecma, Techspace Aero, ESA, Renault, PSA, CNES, DCNS, Goodrich, Alstom Transport.
Cenaero coordinates the ADVICE project that has as objective to design, model, develop and validate a wireless network of self-powered devices used for simultaneous vibration damping and detection of damage. ADVICE gathers industrial partners, reputed research groups and innovative SMEs."

Contact: Roger Cocle
Address: Rue des Frères Wright, 29 6041 Gosselies, Belgium

Tel: +32 71 91 93 30
Fax: +32 71 91 93 31
E-mail: info@cenaero.be
www.cenaero.be

STAND 7
CRITICAL MATERIALS

Critical Materials is a technology provider for the monitoring and diagnosis of critical applications of intelligent materials. Founded in 2008 and headquartered in Guimarães, Portugal, it aims for the international markets.

The company is committed to provide technology for the "nervous system and bio-brain" of critical applications of advanced materials for the Aerospace and Defence industries. It is the connection within the triangle of materials-hardware-software.

Critical Materials' product portfolio comprises a Virtual Structural Health Analysis System – a system for the monitoring and evaluation of critical structural sub-systems based on the virtualization of the relevant physical behaviour of the specific component.

Contact: Alípio da Torre
Address: SPINPARK - Centro de Incubação de Base Tecnológica
        AVEPARK - Zona Industrial da Gandra | Apartado 4152
        4806-909 Caldas das Taipas, Guimarães - Portugal

Tel: +351 253 421 032
Fax: +351 253 421 033
E-mail: alipio-j-torre@critical-materials.com
www.critical-materials.com