The 7th Asia-Pacific Workshop on

STRUCTURAL HEALTH MONITORING

12-15 NOV 2018 | HONG KONG

PROGRAMME

A Message from the Workshop Chairs

Dear colleagues and friends,

On behalf of the International Scientific Committee and Organizing Committee, we extend our warmest welcome to you all for participating in the 7th Asia-Pacific Workshop on Structural Health Monitoring 2018 (APWSHM-2018) in Hong Kong!

Along with its two sister series of workshops (the International Workshop on Structural Health Monitoring (IWSHM) and the European Workshop on Structural Health Monitoring (EWSHM)), APWSHM-2018 will be the seventh version in the series of this biennial event, reviewing the latest research developments and real-world applications of SHM techniques. Previous workshops were held in Yokohama (2006), Melbourne (2008 & 2012), Tokyo (2010), Shenzhen (2014) and Hobart (2016), with outstanding success.

This year, we have received 220 abstracts from 30 countries and regions across the whole world, along with 240 registered workshop participants and industrial exhibitors. 188 abstracts were finally accepted and compiled into an Abstract Book, amongst which 133 were further extended to full-length papers and included in the APWSHM-2018 Proceedings published by NDT.net (Conference Proceedings of APWSHM-2018 (ISBN: 978-3-00-060359-4)). All these figures have indicated that APWSHM-2018 is one of the events in this workshop series with the largest volume of submissions and the most attendees. This, to some extent, reflects the prosperity, intensive research and development of bourgeoning SHM today.

The accepted abstracts are structured into 42 parallel sessions in this 3-day workshop, with specific emphases varying from conventional topics such as guided-wave-based damage detection and optical fibres, through appealing industrial application paradigms, to emerging artificial-intelligence-assisted SHM and nanocomposites-inspired sensors. Seven internationally renowned scholars, globally distributed, are invited to deliver plenary talks, each recapping the very recent development in their respective areas. Featuring dedicated and specific research topics, seven special sessions were insightfully proposed and well organised by high-calibre scholars, embracing

1. Vibration-based Detection
2. SHM for Composites Using Guided Waves
3. Imaging & Phased Array
4. Damage Detection by Fiber Optic Sensors
5. UAV-based SHM
6. SHM for Wind Turbine Structures
7. Mechanics-based SHM & NDT

To honour high-quality, original research work submitted to the workshop, APWSHM-2018 proudly sets up two awards: Best Paper Award (sponsored by *Structural Health Monitoring: An International Journal*) and Best Student Presentation Award (sponsored by *SAGE*).

With our common aspirations, hard work, devoted efforts from the Organising Committee, we have worked hard to make APWSHM-2018 another successful event in this workshop series. The entire committee has been committed to create a platform via this workshop for networking scholars and colleagues in the area of SHM research, bridging academic endeavours and industrial needs, reviewing the state of the art, and inspiring new research and collaborative ideas.

Very importantly, we encourage you, making use of this opportunity, to indulge yourselves in the vibrant atmosphere of ancient Chinese culture and world-class urban life in Hong Kong – Asia's World City, which is unique in the world – a place where East meets the West, with numerous opportunities for you to explore, experience and enjoy.

Last but not least, on behalf of the organizing committee, we thank you all for making great contributions to APWSHM-2018. Your indispensable support to this workshop is of vital importance to its success. Please accept our warm avowals of gratitude! We wish you a very fruitful and enjoyable workshop, as well as an unforgettable and pleasant stay in Hong Kong!

Sincerely yours,

Professor Zhongqing Su, *Conference Chair*
Professor Shenfang Yuan, Conference Co-Chair
Professor Hoon Sohn, Conference Co-Chair

www.polyu.edu.hk/me/apwshm2018/

APWSHM7
2018 HongKong

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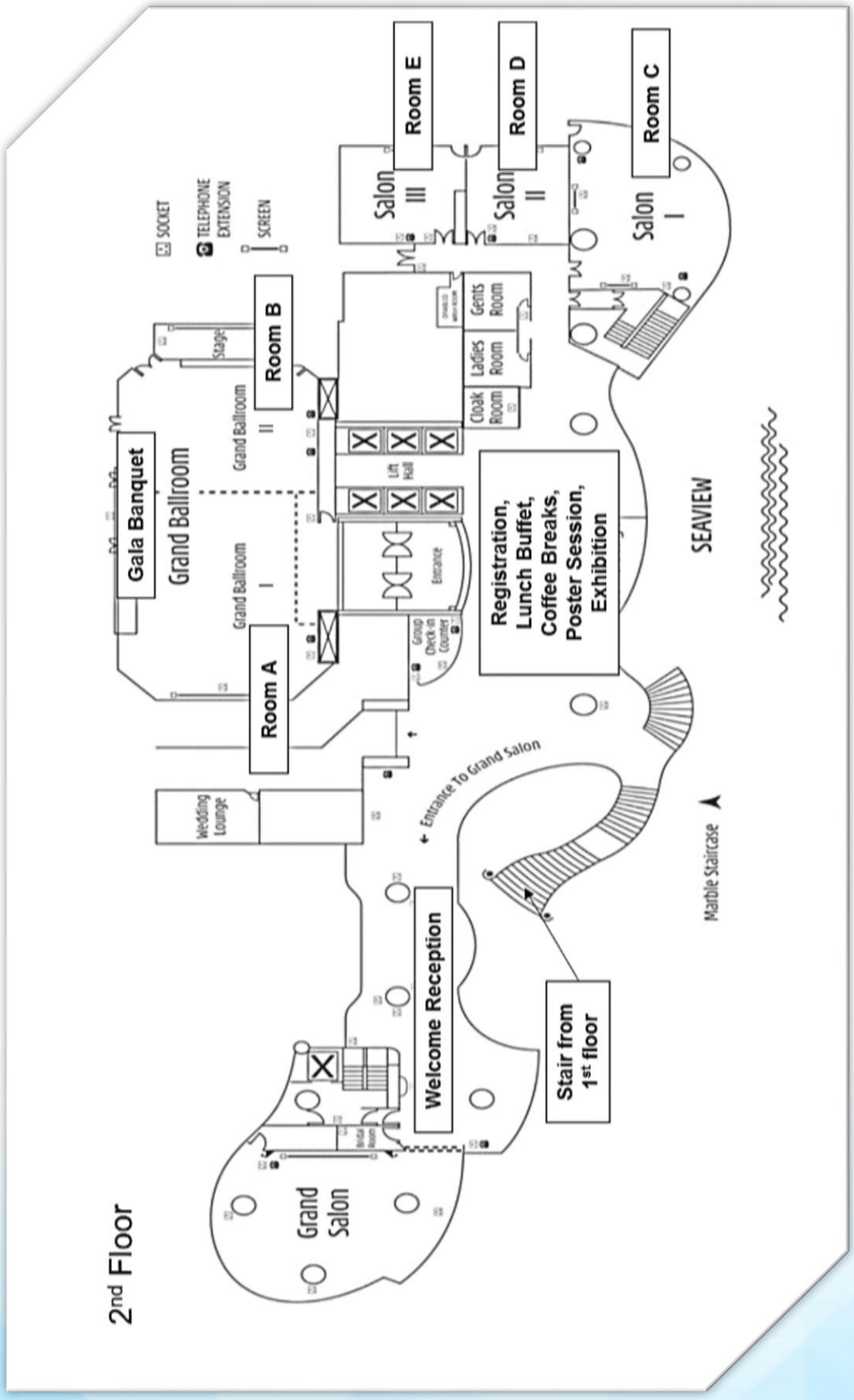
FLOORPLAN


2nd Floor
Grand Salon
Welcome Reception
Stair from 1st floor
Marble Staircase
Entrance To Grand Salon
Wedding Lounge
Room A
Group Check-in Counter
Entrance
Grand Ballroom I
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CONFERENCE AT A GLANCE

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<tr><td>08:00</td><td rowspan="15"></td><td>08:00 Registration</td><td>08:00 Registration</td><td>08:00 Registration</td></tr>
<tr><td>09:00</td><td>08:50 Opening ceremony</td><td rowspan="2">09:00 Plenary lectures</td><td rowspan="2">09:00 Plenary lectures</td></tr>
<tr><td rowspan="2">10:00</td><td>09:10 Plenary lectures</td></tr>
<tr><td>10:30 Coffee break</td><td>10:20 Coffee break</td><td>10:20 Coffee break</td></tr>
<tr><td>11:00</td><td rowspan="2">10:50 Parallel sessions</td><td rowspan="2">10:40 Parallel sessions</td><td rowspan="2">10:40 Parallel sessions</td></tr>
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<tr><td>13:00</td><td>12:10 Lunch</td><td>12:10 Lunch</td><td>12:10 Lunch</td></tr>
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<tr><td rowspan="2">15:00</td><td>13:50 Parallel sessions</td></tr>
<tr><td>15:10 Coffee break</td></tr>
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<tr><td>18:00</td><td rowspan="2">18:00 Welcome cocktail reception
(Registration until 20:00)</td><td>16:45 Workshop adjourn</td></tr>
<tr><td>19:00 Onwards</td><td>18:15 Dinner cruise</td><td>19:00 Gala banquet</td><td></td></tr>
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PARALLEL SESSIONS AT A GLANCE

		Room A	Room B	Room C	Room D	Room E
Tuesday	10:50-12:10	SHM for Infrastructure-1 (Session 1.1)	SHM for Composites-1 (Session 1.2)	Sensors/MEMS/New Sensing Technology-1 (Session 1.3)	Special Session: Vibration-based Detection-1 (Session 1.4)	Advanced Signal Processing-1 (Session 1.5)
	13:50-15:10	SHM for Infrastructure-2 (Session 1.6)	SHM for Composites-2 (Session 1.7)	Sensors/MEMS/New Sensing Technology-2 (Session 1.8)	Special Session: Vibration-based Detection-2 (Session 1.9)	Advanced Signal Processing-2 (Session 1.10)
	15:30-17:10	SHM for Aerospace Structures-1 (Session 1.11)	Special Session: SHM for Composites Using Guided Waves-1 (Session 1.12)	Diagnostics & Prognostics (Session 1.13)	System Integration & Industrial Applications (Session 1.14)	Special Session: Imaging & Phased Array (Session 1.15)
Wednesday	10:40-12:10	SHM for Aerospace Structures-2 (Session 2.1)	Guided Wave-based SHM-1 (Session 2.2)	NDT&E-1 (Session 2.3)	Fiber Optics (Session 2.4)	Acoustic Emission (Session 2.5)
	13:10-15:20	Special Session: Damage Detection by Fiber Optic Sensors (Session 2.6)	Guided Wave-based SHM-2 (Session 2.7)	NDT&E-2 (Session 2.8)	Vision-based SHM & SHM-based Design (Session 2.9)	Special Session: UAV-based SHM (Session 2.10)
	15:40-17:00	SHM for Infrastructure-3 (Session 2.11)	Guided Wave-based SHM-3 (Session 2.12)	NDT&E-3 (Session 2.13)	Special Session: SHM for Wind Turbine Structures (Session 2.14)	Sensors/MEMS/New Sensing Technology-3 (Session 2.15)
Thursday	10:40-12:10	Learning-based Identification (Session 3.1)	Guided Wave-based SHM-4 (Session 3.2)	Special Session: Mechanics-based SHM & NDT-1 (Session 3.3)	Special Session: SHM for Composites Using Guided Waves-2 (Session 3.4)	
	13:10-15:00	Implementation/ Validation/ Certification (Session 3.5)	Metamaterial (Session 3.6)	Special Session: Mechanics-based SHM & NDT-2 (Session 3.7)	SHM for Infrastructure-4 (Session 3.8)	
	15:20-16:40	Simulation (Session 3.9)	Guided Wave-based SHM-5 (Session 3.10)	NDT&E-4 (Session 3.11)	SHM for Infrastructure-5 (Session 3.12)	

PLENARY TALKS

“The Search for Edge States (Boundary Modes) in Mechanical Metamaterials”

13 Nov, 09:10-09:50

Prof. Massimo Ruzzene
Department of Aerospace Engineering
Georgia Institute of Technology, Atlanta, GA 30332, The U.S.A.

Massimo Ruzzene is the Pratt and Whitney Professor of Aerospace and Mechanical Engineering at Georgia Tech. He is author of 2 books, 135 journal papers and about 180 conference papers, and has participated to projects funded by the AFOSR, ARO, ONR, NASA, US Army, US Navy, DARPA, and NSF, as well as numerous companies. His work focuses on solid mechanics, structural dynamics and wave propagation with application to structural health monitoring, metamaterials, and vibration & noise control. M. Ruzzene is a Fellow of ASME, an Associate Fellow of AIAA, and a member of AHS, and ASA.

ABSTRACT

Recent breakthroughs in condensed matter physics are opening new directions in band engineering and wave manipulation. Specifically, challenging the notions of reciprocity, time-reversal symmetry and sensitivity to defects in wave propagation may disrupt ways in which mechanical metamaterials are designed and employed, and may enable totally new functionalities. Non-reciprocity and topologically protected wave propagation will have profound implications on how stimuli and information are transmitted within materials, or how energy can be guided and steered so that its effects may be controlled or mitigated.

The presentation will introduce basic concepts that are based on the analysis of dispersion and its topology, and that govern the onset of localized, interface wave modes. Specifically, spring-mass systems, lattices, and plates with internal resonators will be presented as part of a framework which seeks for mechanical lattices that exhibit one-way, edge- bound, defect-immune, non-reciprocal wave motion. Helical edge waves are shown to be found within lattices that are composed of a set of disks connected through linear springs. Discrete one and two-dimensional spring mass lattices are investigated that support nontrivial bandgaps associated with backscattering suppressed edge waves. Finally, results are shown for a continuous plate with resonators which supports wave motion confined along the interface between two-media characterized by identical dispersion properties, yet different topological invariants.

“Monitoring of Wind Profiles and Wind Effects on Buildings During Typhoons”

13 Nov, 09:50-10:30

Prof. Qiu-Sheng Li
Department of Architecture and Civil Engineering
The City University of Hong Kong, Hong Kong SAR, P.R. China

Dr Qiu-Sheng Li is Chair Professor of Civil Engineering and the director of Architecture and Civil Engineering Research Centre at City University of Hong Kong. He graduated from Shanghai Jiao-Tong University with BEng in 1984 and from Harbin Institute of Technology with MEng in 1987. He obtained his PhD from Monash University in 1996 and his PhD thesis was awarded Professor K.H. Hunt Medal. His research areas include wind engineering, structural dynamics and computational mechanics. He has published four books and over 280 refereed international journal papers. Prof. Li has received several awards for his academic contributions including National Natural Science Foundation of Chinese Outstanding Oversea Scientist Award in 2004 and The First Class Award of the Scientific and Technological Progress from the Ministry of Education of China in 2010.

ABSTRACT

Tropical cyclone is one of the most destructive natural disasters in the world. It caused significant economic losses and heavy causalities, most of which resulted from the damages or collapses of low-rise residential buildings. Hence, there is an urgent need to understand the wind loads generated on low-rise buildings exposed to strong windstorms and to improve building codes to address the design requirements. In response to this need, a full-scale experimental program for investigating the wind effects on low-rise buildings during tropical cyclones was initiated. To date, three instrumented experimental low-rise buildings with flat-roof, gable-roof and gable-roof with overhang, respectively, have been built in the southeast coastal region of China. Since the operation of the program in 2006, field measurements of the wind effects on the three instrumented low-rise buildings have been performed during more than twenty tropical cyclones and representative results of the field measurement program will be reported at APWSHM-2018. Wind characteristics in the atmospheric boundary layer (ABL) and structural performance under extreme wind conditions are of major concern in the design of super-tall buildings in tropical cyclone-prone regions. This paper presents also the analysed results of the long-term observations of wind records collected at numerous meteorological stations in Hong Kong and structural responses measured by structural health monitoring systems installed in a number of super-tall buildings during typhoons. The typhoon-generated wind characteristics over different terrains are presented and discussed. Moreover, the wind-induced responses of the monitored super-tall buildings during typhoons are investigated. The structural dynamics properties and serviceability of the skyscrapers under typhoon conditions are evaluated. This paper investigates the wind characteristics in the ABL during typhoons, and the impact of typhoons on skyscrapers and low-rise buildings for providing useful information for the wind-resistant structural design in tropical cyclone-prone regions.

"Bridge Inspection Utilizing UAVs for Data Acquisition and Deep Learning Algorithms for Damage Identification"

13 Nov, 13:10-13:50

Prof. Hyung-Jo Jung
Department of Civil and Environmental Engineering
Korea Advanced Institute of Science and Technology, Daejeon, Republic of Korea

Dr. Hyung-Jo Jung is a Professor in the Department of Civil and Environmental Engineering at Korea Advanced Institute of Science and Technology (KAIST) and the Director of the Structural Control and Intelligent Systems Laboratory. Since early his academic career, he has focused on structural control using MR dampers and has worked on several emerging research such as structural health monitoring using smart sensor technologies and energy harvesting from ambient and environmental sources (such as vibrations and winds). More recently, he is at the forefront of investigating bridge inspection technologies using unmanned aerial vehicles and artificial intelligence (e.g., deep learning). Dr. Jung has published more than 360 technical papers and conference proceedings. He has received many awards, including the Excellent Basic Research Award from Korea Ministry of Education, Science and Technology, the ICCES Outstanding Young Investigator Award, the Academic Excellence Award of KAIST. Currently, Dr. Jung is serving as an Editor-in-Chief of Smart Structures and Systems (SSS) and an Associate Editor of Journal of Vibration Control (JVC).

ABSTRACT

Bridge structures have suffered from various types of damage (e.g., cracks, corrosion, spalling, efflorescence, etc.) during their lifespan. Thus, it is indispensable to conduct continuous bridge monitoring and timely maintenance to secure public safety and structural reliability. Manpower-based visual inspection is the most widely used method, but it is heavily dependent on the experience of the inspectors, resulting in subjective and unreliable results. It has also costly and time-consuming data collection, and safety issues. In order to address these limitations, the use of unmanned aerial vehicles (UAVs) has received an increasing interests, which is expected to make the inspection process objective, reliable, fast, cost-effective, and safe. Moreover, UAVs can cover the area where it is too hard to reach by inspectors. However, this approach is still in an early stage since there are many unsolved issues for real implementation. In this talk, typical procedures for inspecting bridge structures utilizing UAVs are described. Also, the key technical challenges are identified (e.g., localization of a UAV under the bridge deck, high-resolution image capture, false alarm, etc.) and their possible solutions are discussed by introducing the currently developing techniques, such as the graph-based localization algorithm and image fusion using vision and IR cameras, through interdisciplinary research in Korea. In particular, the automated damage identification process (i.e., classification, localization, and quantification of several damage types) based on deep learning algorithms and its experimental validation results are presented. Finally, future direction of bridge inspection using UAV and deep learning is briefly predicted.

“Stretchable Sensors for Structural Health Monitoring”

14 Nov, 09:00-09:40

Prof. Chun-Hui Wang
School of Mechanical and Manufacturing Engineering
University of New South Wales, Sydney, Australia

Professor Chun Wang is the Head the School of Mechanical and Manufacturing Engineering at UNSW. Previously he held the appointments are the Director of the Sir Lawrence Wackett Aerospace Research Centre at RMIT University between 2009 and 2016, and the Head of Advanced Composites Technologies at the Defence Science and Technology Organisation between 1995 and 2009. He received his PhD from the University of Sheffield in 1991, and bachelor’s degree from Huazhong University Science and Technology in 1985. His research interests include advanced composites materials, adhesive bonding and repairs, structural health prognostics and multifunctional structures. His innovations have been incorporated in world-leading software for fatigue design, engineering manuals for designing structural repairs for advanced fibre composite structures, and international patents for in situ imaging of structural damage. He is an elected Fellow of the Australia’s Academy of Technological Science and Engineering (FTSE).

ABSTRACT

Detection and characterisation of structural damage require transducers and sensors that can function under large deformation beyond the failure limit of structures. Existing sensors, such as metallic foil strain gauges, PZT (lead zirconate titanate) transducers, and optical fibres, have a failure strain around 2% or less. Consequently, sensors are placed away from high-stress regions, the very locations that require structural health monitoring, thus limiting the accuracy of SHM.

This presentation describes some recent progress in the design, modelling and manufacturing of highly stretchable strain sensors based on nano-scale engineered composite materials. By constructing networks of nano-scale conductive materials within polymers of high strain to failure, these new nanocomposites are capable of large strain and high sensitivity. These new sensors are very promising for monitoring cracks and damage in metals, cements, and fibre composites. In addition, these new sensors can monitor movement of human joints and tactile sensors for soft robotics.

“Fiber-optic Sensors & Its Application to Structural Health Monitoring with Model-based/data-driven Approach”

14 Nov, 09:40-10:20

Prof. Hideaki Murayama

Department of Ocean Technology

Graduate School of Frontier Sciences, The University of Tokyo, Tokyo, Japan

Hideaki Murayama is a professor of Graduate School of Frontier Sciences, the University of Tokyo and a member of the Japan Society of Mechanical Engineers, the Society of Naval Architectures of Japan, the Japan Society for Composite Materials, Japan Society of Civil Engineers and Japan Society of Maintenology. He received the B.E., M.E., and Dr.Eng. degrees in the University of Tokyo in 1996, 1998, 2001, respectively. His research work has been focused on structural health monitoring with fiber optic sensors and its application to composite structures. He has developed a distributed sensing technique based on optical frequency domain reflectometry with fiber Bragg gratings (FBG) and achieved the high spatial resolution of less than 1 mm. Japanese research institutes and companies have joined projects to develop a practical system and application of this sensing technique. In addition, he has managed several projects on structural health monitoring of civil structures, such as bridges and railway structures, and on monitoring system for river flow condition by using fiber optic sensor networks.

ABSTRACT

We have developed fiber-optic sensors, especially distributed fiber-optic sensors which are able to measure strain and temperature at arbitrary position along an optical fiber, and have applied them to structural monitoring of ships, airplanes, bridges, and so on. In addition, we have developed techniques to estimate structural conditions, such as deformation, applied load, vibration, based on strain information, which can use be used to assess the structural integrity. These techniques consist of model-based, such as inverse analysis, or data-driven approach, such as statistical processing and AI. In addition, I will show my perspective on digital twin for structural health monitoring in the field of marine engineering.

“Inspection and Monitoring of Pipelines Using Guided Ultrasonic Waves”

15 Nov, 09:00-09:40

Prof. Michael Lowe
Department of Mechanical Engineering
Imperial College London, London, The U.K.

Michael Lowe received a BSc degree from the University of Edinburgh in 1979, and an MSc and PhD in Mechanical Engineering from Imperial College in 1987 and 1993 respectively. Between 1979 and 1989 he worked for WS Atkins (Consultant Engineers, Epsom, UK), specialising in the application and development of numerical methods for the solution of problems in solid mechanics. In 1989 he moved to a research position at Imperial College London, was appointed as an SERC Research Fellow in 1992, and onto the academic staff in 1994. His research is in Non Destructive Testing (NDT), with particular interests in structure-guided ultrasound, wave theory, and analytical and numerical modelling. His teaching interests are in mechanics, stress analysis, mathematics, vibration, and Finite Element modelling. He is Head of the Applied Mechanics Division and Deputy Head of the Department of Mechanical Engineering, with specific management responsibility for the teaching activities of the department. He is a Fellow of the Royal Academy of Engineering (elected 2014), and is a director of Guided Ultrasonics Ltd, a spin-out company which was set up to commercialise the outputs of research in ultrasonic guided waves.

ABSTRACT

Guided Wave Testing (GWT) of pipelines was developed at Imperial College in the 1990s and commercialised 20 years ago, and it is now well established in industrial use. Its main application is the inspection for internal or external corrosion of the pipe walls, exploiting waves that are guided along the pipeline. This provides a very rapid test while achieving 100% coverage of the volume of the pipe wall. The principal use of GWT is as a screening tool: a rapid GWT inspection is used to detect the presence of significant reflectors which are then examined locally in detail using conventional methods of NDE. An alternative use, also well established, is to monitor the pipelines using permanently-installed sensors. This offers the possibility to detect the onset and growth rate of any defects, which is particularly valuable at locations that are safety-critical or where repeat access for inspection is difficult.

The presentation will start with a summary of the development of the GWT method, including the physics of the guided waves and their use to detect defects, the technical challenges and the key achievements that enabled commercialisation and deployment in industry to be possible. It will then show current uses of GWT in both screening and monitoring applications, and discuss ongoing developments being pursued in universities and in industry.

"Development of Metal-packed Bragg Grating Sensors for Harsh Environment Applications"

15 Nov, 09:40-10:20

Prof. Shan-tung Tu

Department of Mechanical and Chemical Engineering

East China University of Science & Technology, Shanghai, China

Shan-Tung Tu Is a professor of Mechanical and Chemical Engineering, East China University of Science and Technology. He received his B.Eng degree in 1982 and Ph.D degree in 1988 from Nanjing University of Technology. Driven by the safety concern of the process and energy equipment, Professor Tu has been trying to develop knowledge in the area of high temperature structural integrity and engineering, including creep, fatigue fracture, structural integrity monitoring and design of high temperature equipment.

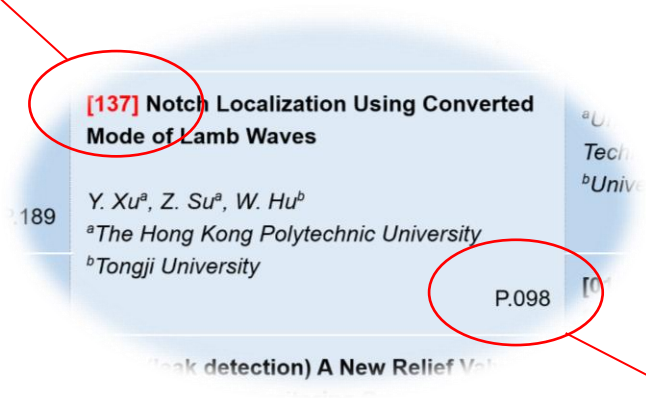
ABSTRACT

Real time monitoring of the structural integrity of components operating under harsh conditions requires the development of novel sensors to measure strain and/or temperature. However, traditional electrical resistance based gauges are not reliable and durable for prolonged measurements under high or cryogenic temperatures, in addition to nonlinearity of thermal-induced apparent strains and susceptibility to electromagnetic interference (EMI). A metal-packaged regenerated fiber Bragg grating (RFBG) sensor is therefore developed using magnetron sputtering and nickel electroplating processes. A RFBG temperature sensor with titanium (Ti)–silver (Ag)–nickel (Ni) multilayer coatings is firstly fabricated. Optical and thermal response tests are performed to evaluate the characteristics of the Ti–Ag–Ni-coated RFBG sensor, which demonstrates a higher sensitivity than that of the bare RFBG for temperatures up to 600 °C, with good repeatability and stability. A metal-packaged RFBG strain sensor is further developed by embedding the multilayer metal-coated RFBG into a steel substrate. The strain response of the sensor mounted onto a flat tensile specimen by spot welding is evaluated by uniaxial tensile tests at constant temperatures ranging from room temperature to 540 °C. Similar tests are performed on a bare RFBG sensor for comparison. The metal-packaged RFBG strain sensor exhibits higher strain sensitivity than that of the bare RFBG sensor, as well as good linearity, stability and repeatability for strain measurements. To cope with the measurement difficulties at cryogenic temperature, a metal-packaged FBG sensors is also developed and tested at cryogenic temperatures down to 79 K. The laboratory experiments show that the metal-packaged sensors offer superior performance over sensors assembled using epoxy bonding. To verify the mechanical reliability of the metal-packaged fiber Bragg grating sensors, the tensile and fatigue strength tests are also carried out. Examples of applications of the sensors under harsh conditions are given, which include the development of real-time monitoring system for clamping force in bolted flange joints operated at high temperatures, remote monitoring of a nuclear safety valve testing facility, and monitoring of the aero engine of unmanned aircraft.

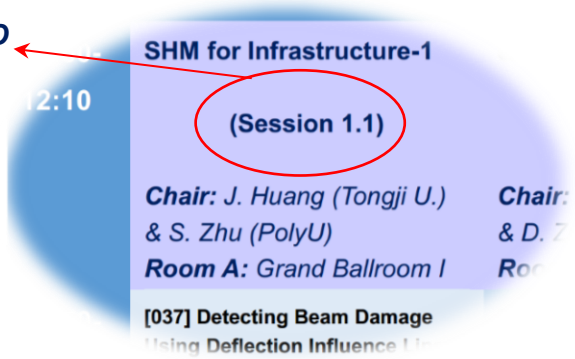
16:00-20:00	**Early Registration** **Location: Second Floor Lobby Area, Grand Ballroom, Harbour Grand Hotel Kowloon**
18:00-20:30	**Poolside Welcome Reception** **Location: Rooftop Pool Area, Grand Ballroom, Harbour Grand Hotel Kowloon**

Understand Your Programme

Paper ID in Proceedings



Session ID



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08:00-16:00	**Registration** **Location: Second Floor Lobby Area**				
08:50-09:10	*MC: Frank Zou* **Opening Ceremony** **Location: Grand Ballroom**				
09:10-10:30	**Plenary 1.** The Search for Edge States (Boundary Modes) in Mechanical Metamaterials (35 min talk + 5 min Q&A) **Prof. Massimo Ruzzene,** Georgia Institute of Technology, **the U.S.A** **Plenary 2.** Monitoring of Wind Profiles and Wind Effects on Buildings During Typhoons (35 min talk + 5 min Q&A) *Chair: M. Todd* *Location: Grand Ballroom* **Prof. Qiu-Sheng Li,** The City University of Hong Kong, **Hong Kong SAR, China**				
10:30-10:50	**Coffee Break / Exhibition**				
10:50-12:10	**SHM for Infrastructure-1** **(Session 1.1)** ***Chair:*** *J. Huang (Tongji U.) & S. Zhu (PolyU)* ***Room A:*** *Grand Ballroom I*	**SHM for Composites-1** **(Session 1.2)** ***Chair:*** *X. Qing (Xiamen U.) & D. Zarouchas (Delft)* ***Room B:*** *Grand Ballroom II*	**Sensors/MEMS/New Sensing Technology-1** **(Session 1.3)** ***Chair:*** *S.D. Luo (Beihang) & A. Güemes (UPM)* ***Room C:*** *Salon I*	**Special Session: Vibration-based Detection-1** **(Session 1.4)** ***Chair:*** *M. Cao (Hohai U.) & C.P. Fritzen (Uni Siegen)* ***Room D:*** *Salon II*	**Advanced Signal Processing-1** **(Session 1.5)** ***Chair:*** *H. Li (HIT) & Y. Lei (Xiamen U.)* ***Room E:*** *Salon III*
10:50-11:10	**[037] Detecting Beam Damage Using Deflection Influence Lines** *Q. Cai[a], S. Zhu[a], Z. Chen[b]* *[a]The Hong Kong Polytechnic University* *[b]Xiamen University* P.008	**[131] Structural State Awareness of Composite Structures by Blending Passive and Active Acoustic-based Health Monitoring Methods** *D.J. Mansvelder, M. Saeedifar, D. Zarouchas* *Delft University of Technology* P.012	**[026] A Large-scale and Flexible Sensor Network System for Impact Monitoring of Aircraft Smart Composite Skin** *L. Qiu[a], S. Yuan[a], Y. Ren[a], X. Deng[a], Y. Huang[b]* *[a]Nanjing University of Aeronautics and Astronautics* *[b]Huazhong University of Science and Technology* P.016	**[161] Sparse Solution Approach to Simultaneous Identification of Structural Damage and Mechanical Loading** *D. Ginsberg, C.P. Fritzen* *University of Siegen* P.020	**[079] Identification of Time-varying Structural Parameters by Integrated Wavelet Multiresolution Analysis and Kalman Filtering with Partial Measurements** *Y. Lei, S. Chen* *Xiamen University* P.024

11:10-11:30	**[061] Novel AI-based Bridge SHM, Its Behavior on Simulated Data Versus Field Deployment** *I. Gonzalez[a], E. Chalouhi[a], C. Gentile[b], R. Karoumi[a]* *[a]KTH Royal Institute of Technology* *[b]Politecnico di Milano* P.009	**[073] The Effect of Electrical Anisotropy on Delamination Detection Sensitivity of Self-sensing Carbon Fiber Composites** *Y. Gao, F. Xu, C. Xu* *Northwestern Polytechnical University* P.013	**[016] Comparative Study on Performance of High Temperature Piezoelectric Materials for Structural Health Monitoring Using Ultrasonic Guided Waves** *A. Dhutti[a], S.A. Tumin[a], T.H. Gan[a,b], J. Kanfoud[a], W. Balachandran[a],* *[a]Brunel University London* *[b]TWI Ltd* P.017	**[206] Damage Identification in Complex Shape Structures Using a Hybrid Evolutionary-based FE Model Updating Approach** *N. F. Alkayem, M. Cao* *Hohai University* P.021	**[202] A Kalman Filter Approach for Sparse Input and State Tracking** *Y. Huang[a], H. Li[a], J. L. Beck[b]* *[a]Harbin Institute of Technology* *[b]California Institute of Technology* P.025
11:30-11:50	**[170] Numerical Investigation of Mode Shape-based Damage Detection Methods for Buildings** *C. Chang, H. Chiang* *National Taiwan University* P.010	**[254] Embedded Capacitance Sensor Array for Structural Health Monitoring of Glass Fibre Reinforced Composites** *R. Yao, Z. Ni, J. Shi, J. Zheng* *Zhejiang University* P.014	**[081] Carbon Nanomaterials Based Embeddable Fiber Sensors for In-situ Structural Health Monitoring of Polymeric Composites** *G. Wang[a,b], S. Luo[b], Y. Wang[b], P. Zhang[b], L. Li[b], Y. Luo[a]* *[a]China University of Geosciences (Beijing)* *[b]Beihang University* P.018	**[207] Bifurcation Characteristic-based Damage Identification for Plates undergoing Large Amplitude Vibration** *D. Li, M. Cao* *Hohai University* P.022	**[045] Lamb Wave Spatial Sampling Signal Optimization Method Based on Signal Model** *B. Liu[a,b], G. Geng[b], Z. Wang[b], L. Jia[b], L. Chen[b], W. Wang[b]* *[a]Shanghai University* *[b]Air Force Logistics College* P.026
11:50-12:10	**[072] Structural Damage Detection-oriented Multi-type Sensor Placement with Multi-objective Optimization: Experimental Investigation** *J. Lin, Y. Xu, S. Zhan* *The Hong Kong Polytechnic University* P.011	**[204] Damage Detection in CFRP/GFRP Composite Bar Using Guided Ultrasonic Waves** *Y. Wu, W. Zhou, G. Xian* *Harbin Institute of Technology* P.015	**[273] A Nanocomposites-based, All-inkjet-printed, Flexible, Ultra-broadband Film Sensor for in-situ Acquisition of Dynamic Disturbance** *P. Zhou, Z. Su, et al.* *The Hong Kong Polytechnic University* P.019	**[035] Study on Instantaneous Frequency Analysis of GPR Signal Using Variational Mode Decomposition** *J. Xu, Q. Ren, M. Cao* *Hohai University* P.023	**[122] A Novel Method for Structural Damage Identification by Using Principal Component Analysis with Moving Space-time Window** *G. Zhang, L. Zhou, Z. Liu, L. Tang* *South China University of Technology* P.027
12:10-13:00	**Lunch Buffet** **Location: Second Floor Lobby Area**				

13:10-13:50 — *Chair: W.K. Chiu*
Location: Grand Ballroom

Plenary 3. Bridge Inspection Utilizing UAVs for Data Acquisition and Deep Learning Algorithms for Damage Identification (35 min talk + 5 min Q&A)

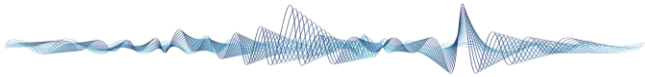
Prof. Hyung-Jo Jung, The Korea Advanced Institute of Science and Technology (KAIST), **Republic of Korea**

13:50-15:10

SHM for Infrastructure-2 (Session 1.6)	SHM for Composites-2 (Session 1.7)	Sensors/MEMS/New Sensing Technology-2 (Session 1.8)	Special Session: Vibration-based Detection-2 (Session 1.9)	Advanced Signal Processing-2 (Session 1.10)
Chair: *Q. Li (CityU) & C. Liu (HIT SZ)*	***Chair:*** *Z. Li (Peking U.) & M. Yuan (Beihang)*	***Chair:*** *L. Qiu (NUAA) & G. Liu (National U. of Defense Technology)*	***Chair:*** *M. Cao (Hohai U.) & L. Yu (Jinan U.)*	***Chair:*** *K. Tsukada (Okayama U.) & W. Li (Xiamen U)*
Room A: *Grand Ballroom I*	***Room B:*** *Grand Ballroom II*	***Room C:*** *Salon I*	***Room D:*** *Salon II*	***Room E:*** *Salon III*
13:50-14:10				
[129] Identifying Voids in Post-tensioning Prestressed Concrete Members by Impact–echo, EEMD and SVM *Q. Han* *Hohai University* P.028	**[099] Capacitance Mapping of Composites** *Gokul Raj R, C.V. Krishnamurthy* *Indian Institute of Technology* P.032	**[191] Carbon-based Printed Strain Sensor Array and Wireless Measuring System for Application to Structural Health Monitoring** *D. Zymelka[a,b], K. Togashi[b,c], T. Yamashita[a,b], S. Takamatsu[d], T. Itoh[b,d], T. Kobayashi[a,b]* *[a]National Institute of Advanced Industrial Science and Technology* *[b]NMEMS Technology Research Organization* *[c]Dai Nippon Printing Co., Ltd.* *[d]The University of Tokyo* P.036	**[209] Singular Component in Modal Teager-kaiser Energy for Identifying Incipient Delaminations in Composite Laminates** *W. Xu, M. Cao* *Hohai University* P.040	**[182] Sparse Regularized Damage Identification from Static Test Data** *L. Wang, Z. Yin, Z. Lu* *Sun Yat-sen University* P.044
14:10-14:30				
[139] How Well Can We Evaluate Post-earthquake Building Safety Using Low-cost MEMS Seismometers *T. Hsu[a], Y. Wu[b]* *[a]National Taiwan University of Science and Technology* *[b]National Taiwan University* P.029	**[112] Propagation Characteristics of Stress Wave in Stiffened Composite Structure during Low-velocity Impact** *Q. Zhu, Y. Wang, H. Sun, X. Qing* *Xiamen University* P.033	**[141] Ultrasonic-guided Wave Sensor for Strands Damage in Anchor Clamp Zone of Messenger Wire** *X. Hong, Y. He, J. Zhou* *South China University of Technology* P.037	**[098] Perturbation Methods for Analysis of the Free Vibration of Thin Plates with Oblique Cracks** *B. Shi[a], M. Cao[a], Z. Wang[b]* *[a]Hohai University* *[b]Nanjing Hydraulic Research Institute* P.041	**[083] Wavelet-based Signal Processing of Large SHM Data** *Y. Xia[a], Y. Ni[b]* *[a]Qingdao University of Technology* *[b]The Hong Kong Polytechnic University* P.045

14:30-14:50	**[181] Rebar Corrosion Assessment Comparison of Different Piezo Configurations in Blended Concrete** *T. Bansal[a], V. Talakokula[a], S.Bhalla[b]* *[a]Bennett University* *[b]Indian Institute of Technology Delhi* P.030	**[089] Damage Localization of the CFRP Composite Plate Based on Neural Network Regression** *Z. Zhao[a], M. Yuan[a,b],S. Dong[a]* *[a]Beihang University* *[b]Collaborative Innovation Center of Advanced Aero-Engine* P.034	**[252] Low-cost Graphene-based Flexible Strain Sensor with a Novel Transfer Method** *B. Chen, Y. Liu, X. Cheng, J. Qiu, G. Liu, K. Lv* *National University of Defense Technology* P.038	**[144] A Novel MOALO-based Algorithm for Structural Damage Detection** *C. Chen, L. Yu* *Jinan University* P.042	**[154] Additional Damping Force Identification of Structures Equipped with Eddy Current Inerter Dampers Based on Kalman Filter** *R. Zhang[a], L. Xie[a], S. Xue[a,b], X. Zheng[a]* *[a]Tongji University* *[b]Tohoku Institute of Technology* P.046
14:50-15:10	**[237] Model Update of Frame Structure Based on Equivalent Interstory Shear Forces** *D. Zhang, H. Li* *Harbin Institute of Technology* P.031	**[056] Detection of Impact Damage in Carbon/Carbon Composite by Ultrasonic Infrared Thermography** *M.Z. Umar[a], V. Vavilov[b], H. Abdullah[a], A.K. Ariffin[a]* *[a]Universiti Kebangsaan Malaysia* *[b]National Research Tomsk Polytechnic University* P.035	**[019] Shaping the Future of Structural Health Monitoring with IOT Sensors** *D. Parsy* *BeanAir GmbH* P.039	**[208] Optimal Speed of a Moving Load for Damage Detection in Bridges** *X. Zhu, M. Cao* *Hohai University* P.043	
15:10-15:30	**Coffee Break / Exhibition** **Location: Second Floor Lobby Area**				
15:30-17:10	**SHM for Aerospace Structures-1** **(Session 1.11)** ***Chair:*** *M. Ruzzene (Georgia Tech) & J. Sierra-Pére (Universidad Pontificia Bolivariana)* ***Room A:*** *Grand Ballroom I*	**Special Session: SHM for Composites Using Guided Waves-1** **(Session 1.12)** ***Chair:*** *W. Ostachowicz (Polish Academy of Sciences) & X. Hong (South China U. of Technology)* ***Room B:*** *Grand Ballroom II*	**Diagnostics & Prognostics** **(Session 1.13)** ***Chair:*** *Z. Mao (UMass Lowell) & F. Zou (PolyU)* ***Room C:*** *Salon I*	**System Integration & Industrial Applications** **(Session 1.14)** ***Chair:*** *P.W. Tse (CityU) & F. Dotta (Embraer)* ***Room D:*** *Salon II*	**Special Session: Imaging & Phased Array** **(Session 1.15)** ***Chair:*** *P. Masson (USherbrooke) & P. Zhu (Guangzhou U.)* ***Room E:*** *Salon III*

15:30-15:50	**[238] Gaussian Process Modeling for Damage Detection in Composite Aerospace Structures by Using Discrete Strain Measurements** *J. Alvarez-Montoya[a], J. Sierra-Pérez[a], M-A Torres-Arredondo[b].* *[a]Universidad Pontificia Bolivariana* *[b]MAN Diesel & Turbo SE* P.047	**[090] Lamb Wave Based Multistage Damage Detection Method for Composite Laminates** *M.S. Hameed, Z. Li* *Peking University* P.051	**[050] Fatigue Prognosis Using the Uncertainty-quantified Failure Forecast Method** *M. D. Todd[a], M. Leung[b], J. Corcoran[b]* *[a]University of California San Diego* *[b]Imperial College* **Invited Talk (30 min)** **P.055**	**[147] Highly Mobile System Platform for Vibration Measurements in Structural Health Monitoring** *G. Morgenthal, J. F. Eick, S. Rau, J. Taraben* *Institute of Structural Engineering, Bauhaus University Weimar* P.059	**[186] Laser-scanning Based Damage Visualization Using Phase-arrayed Local Wave Field Measurements** *J.Y. Jeon[a], H.K. Jung[a], G. Park[a], T. Kang[b], S.W. Han[b]* *[a]Chonnam National University* *[b]Nuclear Convergence Technology Division Korea Atomic Energy Research Institute* P.064
15:50-16:10	**[041] Understanding and Improving Ultrasonic Inspection of the Forging Titanium Alloy** *T. Trancă[a], I. Radu[b]* *[a]Diac Servicii srl Bucuresti* *[b]Zirom SA* P.048	**[024] Health Monitoring of Composite Structural Features via a Time-reversal Imaging Technique** *X. Yu, D. Lisevych, Z. Fan* *Nanyang Technological University* P.052	**[022] Healing Assessment of an Internally Fixated Femur Using Vibration Analysis** *W. K. Chiu[a], B. S. Vien[a], M. Russ[b,c], M. Fitzgerald[b,c]* *[a]Monash University,* *[b]The Alfred Hospital* *[c]National Trauma Research Institute* **Invited Talk (30 min)** **P.056**	**[057] A Model-based Fatigue Damage Estimation Framework of Large Scale Structural Systems** *D. Giagopoulos[a], A. Arailopoulos[a], S. Natsiavas[b]* *[a]University of Western Macedonia* *[b]Aristotle University of Thessaloniki* P.060	**[222] Structural Health Monitoring of Complex-Curved Component by Laser Induced Ultrasonic Phased Array with Adaptive Total Focusing Method** *J. Chen[a], J. Xiao[a], D. Lisevych[a], W. Ng[b], Z. Fan[a]* *[a]Nanyang Technological University* *[b]SMRT Trains Pte Ltd* P.065
16:10-16:30	**[060] Influence of the Low Temperature on the Mechanical Guided Waves in Aluminium Sheets** *T.A Salaoru* *INCAS – National Institute for Aerospace Research "Elie Carafoli"* P.049	**[064] Lamb Wave-based Structural Health Monitoring of Delamination Propagation in Adhesively Bonded Composite Joints** *L. Michalcová, L. Rechcígel, M. Kadlec* *Czech Aerospace Research Centre* P.053		**[253] Regression Model for Cable Tension Identification Based on Vibration Method Using Calibration Test: from Factory to Construction** *D. Yang, D. Lu, W. Zhou* *Harbin Institute of Technology* P.061	**[160] 3D Ultrasound Imaging of Drilling-induced Delamination in Composite Laminates** *P. Zhu[a], Z. Lu[a], S. Wang[a], Y. Li[a], Marcelo A. Sotoa[a,b]* *[a]Guangzhou University* *[b]Universidad Técnica Federico Santa María* P.066



16:30-16:50	**[113] Research on Structural Health Monitoring Method Based on Multi-source Sensing Information Fusion** *L.Sun[a], Y. Wang[a], D. Wu[b], H. Sun[a], X. Qing[a]* *[a]Xiamen University* *[b]China Academy of Launching Vehicle Technology* P.050	**[199] An Analysis of Lamb Wave Propagation Characteristics on Composite Materials with Multi-Stepped Laminates** *Y. Jeon, I. Gong, J. Park* *Korea Aerospace University* P.054	**[014] A Stress Wave-based Health Monitoring Concept on a Novel Osseointegrated Endoprosthesis Design** *B. S. Vien[a], W. K. Chiu[a], M. Russ[b,c], M. Fitzgerald[b,c]* *[a]Monash University,* *[b]The Alfred Hospital* *[c]National Trauma Research Institute* P.057	**[152] Similarity Analysis Approach for Vibration Based Monitoring: an Application on a Train Door Mechanism** *A. G. Stancu, L. Zhou, E. Eren, S. Soua* *The Welding Institute* P.062	**[213] Delay Time Calculations for Testing Transverse Defects of Cylindrical Surface Artefacts with Phased Array Ultrasonic** *X. Jiang[a], J. Jia[a], X. Mao[b], Q. Han[a]* *[a]Hohai University* *[b]Special Equipment Safety Supervision Inspection Institute of Jiangsu Province* P.067
16:50-17:10			**[266] Using Particle Filtering and Guided Wave Based Structural Health Monitoring for On-line Diagnosis and Prognosis of Multiple Crack Growth** *J. Chen, S. Yuan, X. Jin* *Nanjing University of Aeronautics and Astronautics* P.058	**[177] Analysis of High-speed Maglev Vehicle-guidway Force Based on Monitoring Data** *X. Deng, J. Huang, D. Wang, Z. Wu* *Tongji University* P.063	
18:15	**Coach Departure for Wharf from Hotel Main Entry**				
19:00-21:00	**Dinner Cruise** (coach service back hotel will be provided)				

08:00-16:00 — **Registration**
Location: Second Floor Lobby Area

09:00-10:20 — **Plenary 4.** Stretchable Sensors for Structural Health Monitoring (35 min talk + 5 min Q&A)
Prof. Chun-Hui Wang, The University of New South Wales, **Australia**
Plenary 5. Fiber-optic Sensors & Its Application to Structural Health Monitoring with Model-based/data-driven Approach (35 min talk + 5 min Q&A)
Chair: H. Sohn
Location: Grand Ballroom
Prof. Hideaki Murayama, The University of Tokyo, **Japan**

10:20-10:40 — **Coffee Break / Exhibition**
(Poster Session (Location: Second Floor Lobby Area))

10:40-12:10

SHM for Aerospace Structures-2 (Session 2.1)	Guided Wave-based SHM-1 (Session 2.2)	NDT&E-1 (Session 2.3)	Fiber Optics (Session 2.4)	Acoustic Emission (Session 2.5)
Chair: *M. Lowe (Imperial) & N. Takeda (UTokyo)*	***Chair:*** *S.F. Yuan (NUAA) & M. Liu (IHPC A*Star)*	***Chair:*** *David Z. Fan (NTU) & Z. Zhou (Beihang)*	***Chair:*** *H. Murayama (UTokyo) & W. Lienhart (TU Graz)*	***Chair:*** *C. Niezrecki (UMass Lowell) & P. Liu (KAIST)*
Room A: *Grand Ballroom I*	***Room B:*** *Grand Ballroom II*	***Room C:*** *Salon I*	***Room D:*** *Salon II*	***Room E:*** *Salon III*

10:40-11:10

[221] Towards Structural Integrity and Material Quality Assurance of Aerospace Composite Structures *N. Takeda[a,b], S. Minakuch[a]* *[a]The University of Tokyo.* *[b]Japan Aerospace Exploration Agency (JAXA)* **Invited Talk (30 min)** **P.068**	**[188] A Research of Tomography for Wall-thinning Depth Verification by Ultrasonic Guided Wave Structure Analysis Approach** *Y. Lee, Y. Cho* *Pusan National University* **Invited Talk (30 min)** **P.071**	**[220] Enhancing the Ability in Detecting Defects Occurred in Covered Pipe by Using Matching Pursuit and Smooth Empirical Mode Decomposition** *Peter W.T. Tse, J. Rostami* *City University of Hong Kong* **Invited Talk (30 min)** **P.075**	**[030] Fibre Bragg Grating Sensors Application for Structural Health Monitoring of an Organic Rankine Cycle Microturbine Components** *M. Jurek[a,b], T. Kaczmarczyk[a], K. Majewska[a], M. Mieloszyk[a], W. Ostachowicz[a], G. Zywica[a]* *[a]Polish Academy of Sciences* *[b]Rzeszow University of Technology* **Invited Talk (30 min)** **P.079**	**[027] Acoustic Source Localization – Did We Solve This Problem Yet?** *T. Kundu* *University of Arizona* **Invited Talk (30 min)** **P.083**

11:10-11:30	**[217] Reliable Damage Diagnosis of Aircraft Composite Structures Under Time-varying Conditions Based on Gaussian Mixture Model and Path-synthesis Imaging** *Y. Ren, L. Qiu, S. Yuan , F. Fang* *Nanjing University of Aeronautics and Astronautics* P.069	**[033] A Study of Electromechanical Impedance and Guided Wave Techniques for the Sensitivity of Sensors Network in Damage Detection** *K. Balasubramaniam, S.K. Singh, R. Soman, P. Malinowski* *Polish Academy of Sciences* P.072	**[216] Detection Method Using a Dual-channel Magnetic Sensor for Steel Cracks in Complicated Structures** *M. Hayashi[a], Y. Nakamura[a], K. Sakai[a], T. Kiwa[a], I.Tanikura[b], K. Tsukada[a]* *[a]Okayama University,* *[b]Japan Construction Method and Machinery Research Institute* P.076	**[189] Investigation of Temperature Performance of Silica Gel Covered Flexible Array Optical Fiber Temperature Probe** *P. Zhu[a], Y. Wang[a], Y. Li[a], M. Huang[a], M.A. Soto[a,b]* *[a]Guangzhou University* *[b]Universidad Técnica Federico Santa María* P.080	**[104] Localizing Acoustic Emission Sources in Composite Plates with Unknown Wave Velocities** *Y. Yi, J. He* *Beihang University* P.084
11:30-11:50	**[164] Fuzzy Unsupervised-learning Techniques for Diagnosis in a Composite UAV Wing by Using Fiber Optic Sensors** *J. Sierra-Pére, J. Alvarez-Montoya* *Universidad Pontificia Bolivariana* P.070	**[048] Fatigue Crack Detection Under the Vibration Condition Based on Ultrasonic Guided Wave** *Y. Zhu, F. Li* *Shanghai Jiao Tong University* P.073	**[137] Notch Localization Using Converted Mode of Lamb Waves** *Y. Xu[a], Z. Su[a], W. Hu[b]* *[a]The Hong Kong Polytechnic University* *[b]Tongji University* P.077	**[150] Non-Intrusive Pipeline Pressure Monitoring Using an Optical Fiber Patch with Fiber Bragg Gratings Sensors** *N. Roussel[a], G. Laffont[a], Marc Baque[b]* *[a]CEA, LIST* *[b]TOTAL Exploration- Production* P.081	**[105] Research on Recognition and Location of Rail Damage Acoustic Emission Signal Based on Dual Sensors** *X. Zhang, P. Zeng, H. He, W. Zheng , D. Qin, L. Chen* *China Southwest Jiaotong University Railway Development Co. Ltd.* P.085
11:50-12:10		**[040] Reliability of Lamb Wave SHM Systems: Influence of Hydrostatic Pressure and Mechanical Loading** *L. Dorneles[a], H. Haan[a], T. Clarke[a], F. Dotta[b], A. Tamba[b]* *[a]Federal University of Rio Grande do Sul (UFRGS)* *[b]Embraer S.A.* P.074	**[092] A New Relief Valve Inner-leakage Monitoring System Based On Ultrasound Generator** *J. Cao, J. Zhang, X. Yu, S. Tu* *East China University of Science and Technology* P.078	**[032] Temperature and Humidity Influence on Glass Fibre Reinforced Polymer Samples Under NDT and SHM Studies** *K. Majewska[a], M. Jurek[a,b], M. Mieloszyk[a], W. Ostachowicz[a]* *[a]Polish Academy of Sciences* *[b]Rzeszow University of Technology* P.082	**[168] Continuous Monitoring of Tightening Condition of Bolted Composite Joints Using Intrinsic Mode Functions of Acoustic Emission Signals** *Z. Zhang[a,b], Y. Xiao[a], Z. Su[b]* *[a]Tongji University* *[b]The Hong Kong Polytechnic University* P.086
12:10-13:00	**Lunch Buffet** **Location: Second Floor Lobby Area**				

13:10-15:20	**Special Session: Damage Detection by Fiber Optic Sensors** **(Session 2.6)** ***Chair:*** *A. Güemes (UPM) & Q. Han (Hohai U.)* ***Room A:*** *Grand Ballroom I*	**Guided Wave-based SHM-2** **(Session 2.7)** ***Chair:*** *W.K. Chiu (Monash) & A. Eremin (Helmut Schmidt U.)* ***Room B:*** *Grand Ballroom II*	**NDT&E-2** **(Session 2.8)** ***Chair:*** *N. Salowitz (UW–Milwaukee) & K. Ding (China Special Equipment Inspection and Research Institute)* ***Room C:*** *Salon I*	**Vision-based SHM & SHM-based Design** **(Session 2.9)** ***Chair:*** *G. Park (Chonnam National U.) & D. Zhang (HIT)* ***Room D:*** *Salon II*	**Special Session: UAV-based SHM** **(Session 2.10)** ***Chair:*** *H. Sohn (KAIST) & Y.-K. An (Sejong U.)* ***Room E:*** *Salon III*
13:10	**[062] Experimental Validation of a Fiber-Optic Based SHM System** *A. Güemes[a], A. Fernandez-Lopez[a], M. Frovel[b], J.M. Pintado[b]* *[a]UPM* *[b]INTA* **Invited Talk (30 min)** **P.087**	*This 10-min slot is purposely reserved*	**[039] Research on a Transmit-Receive Method of Ultrasonic Array for Planar Defects** *Z. Zhou[a,b], W. Li[a], Y. Li[a]* *[a]Beihang University* *[b]The Collaborative Innovation Center for Advanced Aero-Engine (CICAAE)* **Invited Talk (30 min)** **P.099**	**[080] Advancements in Structural Health Monitoring Using Vision-based and Optical Techniques** *A. Sabato, A. Sarrafi, Z. Mao, C. Niezrecki* *University of Massachusetts Lowell* **Invited Talk (30 min)** **P.105**	*This 10-min slot is purposely reserved*
13:20-13:40		**[108] High Resolution Damage Imaging Based on Linearly-dispersive Signal Construction with Measured Relative Wavenumber Curves** *J. Cai, Z. Zhou, X. Wang* *Nanjing University of Aeronautics and Astronautics* P.093			**[271] Line Laser Thermography for Steel Bridge Coating Thickness Quantification** *S. Hwang, H. J. Lim, H Sohn* *Korea Advanced Institute of Science and Technology* P.111
13:40-14:00	**[065] High Resolution Monitoring of Retaining Walls with Distributed Fibre Optic Sensors and Mobile Mapping Systems** *W. Lienhart, C. Monsberger, S. Kalenjuk* *Graz University of Technology* P.088	**[101] Sequential and Parallel Guided Wave Excitation for Nonlinear Defect Detection** *P. Blanloeuil[a], L.R. Francis Rose[b], M. Veidt[c], C.H. Wang[a]* *[a]University of New South Wales* *[b]Defence Science and Technology Group* *[c]University of Queensland* P.094	**[179] Characterization of Ball-flat Contact Using Ultrasound Reflectometry: from Static to Dynamic** *L. Zhou[a,b], H.P. Brunskill[b], R. Lewis[b]* *[a]The Hong Kong Polytechnic University* *[b]The University of Sheffield* P.100	**[157] Development and Validation of Video Camera as Sensor for Structural Health Monitoring** *Z. Wu[a], X. Peng[b]* *[a]Bentley Systems* *[b]University of Connecticut* P.106	**[270] UAV-mounted Hybrid Image Scanning for Automated Crack Detection in an In-situ Bridge** *K.Y. Jang, Y.K. An* *Sejong University* P.112

14:00-14:20	**[195] Viscoelastic Effect on Fiber Bragg Grating Sensing and Its Relevant Data Process Solution** *H. Zhai[a], Q. Wu[b,a], K. Xiong[a], Nobuhiro Yoshikawa[b]* *[a]Nanjing University of Aeronautics and Astronautics* *[b]The University of Tokyo* P.089	**[145] Quantification of Thickness Loss in Liquid-loaded Pipes Based on Guided Wave Tomography** *J. Rao[a], D. Lisevych[a], M. Ratassepp[a,b], Z. Fan[a]* *[a]Nanyang Technological University* *[b]Tallinn University of Technology* P.095	**[044] Zero-frequency Mode and Its Application in Nondestructive Testing** *X. Sun, Y. Zhao, Y. Liu, N. Hu* *Chongqing University* P.101	**[183] A Stereovision Measurement Method Considering Epipolar Constraint** *B. Shan, X. Huo, H. Wang* *Harbin Institute of Technology* P.107	**[023] Structural Assessment of Large Membrane Structures Using an Unmanned Aerial Vehicle** *W. Chiu[a], T. Kuen[b], F. Courtney[b], J. Kodikara[a], L. Wong[a], and B. Vien[a]* *[a]Monash University* *[b]Melbourne Water Corporation* P.113
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08:00-12:00 — **Registration**
Location: Second Floor Lobby Area

09:00-10:20 — **Plenary 6.** Inspection and Monitoring of Pipelines Using Guided Ultrasonic Waves (35 min talk + 5 min Q&A)
Chair: C. Boller
Location: Grand Ballroom
Prof. Mike Lowe, Imperial College London, **the U.K.**
Plenary 7. Development of Metal-packed Bragg Grating Sensors for Harsh Environment Applications (35 min talk + 5 min Q&A)
Prof. Shan-tung Tu, East China University of Science and Technology, **P.R. China**

10:20-10:40 — **Coffee Break / Exhibition**
Location: Second Floor Lobby Area

10:40-12:10

	Learning-based Identification (Session 3.1)	**Guided Wave-based SHM-4** (Session 3.2)	**Special Session: Mechanics-based SHM & NDT-1** (Session 3.3)	**Special Session: SHM for Composites Using Guided Waves-2** (Session 3.4)
	Chair: *A. González (U. College Dublin) & F. Zou (PolyU)* ***Room A:*** *Grand Ballroom I*	***Chair:*** *S.-T. Tu (ECUST)& K. Wang (U. of Electronic Science and Technology of China)* ***Room B:*** *Grand Ballroom II*	***Chair:*** *F. Li (Peking U.) & D. Giagopoulosa (U. of Western Macedonia)* ***Room C:*** *Salon I*	***Chair:*** *W. Ostachowicz (Polish Academy of Sciences) & P. Masson (USherbrooke)* ***Room D:*** *Salon II*
10:40	**[069] Temperature Compensation of SHM Data and Sensor Self-Diagnosis via Machine Learning**	*This 10-min slot is purposely reserved*	**[055] A Wideband Structural Health Monitoring System Based on Omni-directional SH Wave Piezoelectric Transducers**	*This 10-min slot is purposely reserved*
10:50-11:10	*Y. Qin[a], C. Hsu[b], E. Zhu[b], M. Haile[b], Z. Mao[a]* *[a]University of Massachusetts Lowell* *[b]Army Research Laboratory*	**[028] Bidirectional and Unidirectional Shear Horizontal (SH) Wave Generation with Piezoelectric Transducers for Structural Health Monitoring** *H. Miao[a], H. Zhang[a], L. Xu[a], F. Li[b]* *[a]Southwest Jiaotong University* *[b]Peking University*	*Q. Huan, F. Li* *Peking University*	**[215] Ultrasonic Damage Method in Thick-walled Composite Tubular Structures** *J. Chen, Z. Li, H. Bu, S. Hameed* *Peking University*
	Invited Talk (30 min) **P.136**	P.140	**Invited Talk (30 min)** **P.144**	P.148

11:10-11:30	**[038] A Pressure Vessel Damage Localization Method Based on Deep Learning** *C. Hu, B. Yang* *East China University of Science and Technology* P.137	**[203] Study on Damage Detection Resolution Based on Lamb Wave and TR-MUSIC Algorithm** *A. Zhang, H. Sun, Y. Wang, X. Qing* *Xiamen University* P.141	**[052] Excitation of a Fundamental Shear Horizontal Wave Using a Line Source** *Z. Liao, X. Cai, J. Jia, S. Tu* *East China University of Science and Technology* P.145	**[163] Assessment of Low-velocity Impact Damage in Composite by Combined Harmonic Waves Generated by Guided Wave Mixing** *W. Li[a], M. Deng[b]* *[a]Xiamen University* *[b]Chongqing University* P.149
11:30-11:50	**[068] Acoustic Emission Waveform Classification for Direct Wave Isolation Using Convolutional Neural Networks** *E. Zhu[a], C. Hsu[a], Y. Qin[b], M. Haile[a], Z. Mao[b]* *[a]Army Research Laboratory* *[b]University of Massachusetts Lowell* P.138	**[265] Joint Battery and Structural Health Estimation of Battery-Integrated Structures Using Ultrasonic Guided Waves** *P. Ladpli[a], C. Liu[a], F. Kopsaftopoulos[b], F. Chang[a]* *[a]Stanford University* *[b]Rensselaer Polytechnic Institute* P.142	**[151] Investigation of Nonlinear Effects for Contact-type Interfaces in Vibro-acoustic Modulation Test** *A. Klepka, K. Dziedziech, J. Mrówka, J. Górski* *AGH University of Science and Technology* P.146	**[078] Selective Generation of Guided Modes Along Bar-like Composite Structures** *V. Serey[a,b], M. Bilodeau[a], N. Quaegebeur[a], P. Micheau[a], P. Masson[a], M. Renier[b], M. Castaings[b]* *[a]Université de Sherbrooke* *[b]Université de Bordeaux* P.150
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16:20-16:40		**[171] Numerical Prediction and Experimental Detection of Guided Wave Diffraction Resonance Frequencies in Plate-like Structures** *A. Eremin[a,b], E. Glushkov[a], N. Glushkova[a], R. Lammering[b]* *[a]Kuban State University, Krasnodar* *[b]Helmut Schmidt University/University of the Federal Armed Forces* P.176	**[275] Investigation of Multiple Guided Wave Modes in Bent Plates of Small Radii Excited with Location-optimized Piezoelectric Transducers** *H. Ding, Z. Su* *The Hong Kong Polytechnic University* P.180	**[175] Blind Modal Identification for Truss Structure Based on Reduced Measurements** *J. Chen, N. Guo, C. Xu* *Northwestern Polytechnical University* P.184
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174	**Experimental Modal Analysis of Rod-fastening Rotor under Different Pre-Tension Forces** *C. Zhou[a], Y. Liu[a], L. Zhao[a,b], L. Hu[c], W. Teng[a], C. Zhang[a]* *[a]North China Electric Power University* *[b]SPIC Tianjin Branch* *[c]China University of Mining and Technology*

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231	**Mechanical Behavior Analysis and Fatigue Test of Composite Bridge Deck Pavement Structure with Steel and Ultra-High Ductility Concrete** *H.Y. Liu[a], L. Li[b], H.D. Li[c]* *[a]Research Institute of Highway Ministry of Transport,* *[b]Shandong Provincial Academy of Building Research,* *[c]Zhejiang Sci-Tech University*

AWARDS

Best Paper Award

A full-length paper from the Conference Proceedings is selected by the Best Paper Selection Panel as having the highest quality and innovation. This award is sponsored by *Structural Health Monitoring: An International Journal*.

Chair: Prof. S. Yuan, Nanjing University of Aeronautics and Astronautics, China

Panel members:

Michael Todd, University of California San Diego
Nobuoi Takeda, University of Tokyo
Xinlin Qing, Xiamen University
Christian Boller, Saarland University
Zheng Fan, Nanyang Technological University
Shan-Tung Tu, East China University of Science and Technology
Fangxin Zou, The Hong Kong Polytechnic University
Gyuhae Park, Chonnam National University

Best Student Presentation Award

To honor high-quality, original research work submitted to the workshop and encourage student exposure, APWSHM-2018 proudly sets up “Best Student Presentation Award”. Individual (with full-time university student status) is selected by the Best Student Presentation Award Panel, as making the best oral presentation among all student participants. This award is sponsored by *SAGE*.

Chair: Hoon Sohn, Korea Advanced Institute of Science and Technology, Republic of Korea

Panel members:

Tribikram Kundu, University of Arizona, USA
Wing Kong Chiu, Monash University, Australia
Alfredo Gumues, Universidad Politecnica de Madrid, Spain
Songye Zhu, The Hong Kong Polytechnic University, Hong Kong SAR, China
Patrice Masson, Université de Sherbrooke, Canada
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JOURNAL SPECIAL ISSUES

APWSHM-2018 Conference Proceedings will be published by NDT.net (under creative common license CC BY 4.0). The Proceedings will be indexed by **EI Compendex** (under final evaluation and subjected to final approval).

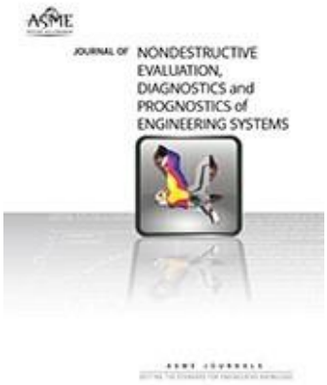
High-quality papers will also be included in **APWSHM-2018 Special Issues** listed as below (call-for-papers will be announced immediately following the conference; only papers that are presented at the conference, either in an oral session or a poster session, will be considered):

Structural Health Monitoring: An International Journal
Publisher: SAGE
Latest IF: 3.798

Structural Health Monitoring publishes peer-reviewed papers that contain theoretical, analytical, and experimental investigations that advance the body of knowledge and its application in the discipline of structural health monitoring. The journal has a broad topical coverage and it serves as a primary reference for the structural health monitoring of aeronautical, mechanical, civil, electrical, and other systems. The multidisciplinary nature of the journal is intended to foster the intersection of different technologies to address the varied needs and applications for structural health monitoring.

Submission Deadline: 28 Feb 2019

Submit your paper at
https://mc.manuscriptcentral.com/shmij



Journal of Nondestructive Evaluation, Diagnostics and Prognostics of Engineering Systems
Publisher: ASME

The Journal of Nondestructive Evaluation, Diagnostics and Prognostics of Engineering Systems (JNDE) is an international archival journal that will cover the many aspects of interdisciplinary work in the field of NDE and SHM and report use of NDE and SHM in a wide range of applications in industry, government sector, and academia. The goal of the journal is to inform readers with state-of-the art developments in NDE, SHM and prognosis, disseminate new ideas on these subjects, and report related valuable applications. It is envisioned that the journal will bring under one umbrella engineering and science disciplines contributing to NDE, SHM and prognosis and feature practical applications of NDE and SHM in many technical fields.

Submission Deadline: 28 Feb 2019

Submit your paper at
https://journaltool.asme.org/home/JournalDescriptions.cfm?JournalID=31

sensors

Sensors — Open Access Journal
Publisher: MDPI
Latest IF: 2.475

Sensors provides an advanced forum for the science and technology of sensors and biosensors. It publishes reviews (including comprehensive reviews on the complete sensors products), regular research papers and short notes. Our aim is to encourage scientists to publish their experimental and theoretical results in as much detail as possible. There is no restriction on the length of the papers. The full experimental details must be provided so that the results can be reproduced.

Submission Deadline: 28 Feb 2019

Submit your paper at
http://www.mdpi.com/journal/sensors/special_issues/APWSHM_2018

Aerospace — Open Access Journal of Aeronautics and Astronautics
Publisher: MDPI
Latest CiteScore: 1.23

Aerospace is an international, peer-reviewed, open access journal (free for readers) devoted to the publication of original papers, review articles, short notes and communications related to all fields of aerospace science, engineering and technology, disclosing theoretical, fundamental and applied results linked to potential applications that are related to research, design, manufacture, operations, control and maintenance of aircraft and spacecraft. Researchers are encouraged to publish the results of their recent theoretical and experimental developments with as much detail as possible. There is no restriction on the length of the papers.

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About Doppler

Company Introduction:

Doppler is a world leading manufacturer provides high performance Nondestructive Testing Instruments & Transducers, and dedicate to build a renowned world brand of ultrasound. Doppler is established in 2008, located in Guangzhou, China, and is certified as National High-tech Enterprise.

Our company is the member of the national NDT Standardization Technical Committee. Our company was invited by the national medical standard of Technical Committee of medical ultrasound to participate in amendment and foundation of national & industry standards

Scope of Application:

The ultrasonic inspection system for detecting the presence, magnitude and position of flaws in materials. Our products are designed to apply for non-destructive testing/inspection on materials like Pipelines Corrosions & Welds Defects/Cracks, GIS Conductor Welds Defects/Cracks, Aerospace Composite Materials Defects & Delaminations, Railway Tracks & Wheel Defects/Cracks, Steel Plates Defects/Cracks etc., such inspections require to use ultrasound technique based equipment/instruments and relevant accessories to accomplish.

Product Range:

In the Medical Field, Doppler has developed high density, high frequency probes, and high power Ultrasound Therapy Machines T3000, T4000, and T5000.

In the Industrial Field, Doppler launched high standard products with strong technical indexes in market, composite Conventional Crystal Probes and high performance composite Phased Array Probes (including linear array, 2D array, Concave, Annular Sectorial and so on), High Frequency Probes and Special High Frequency Probes and TOFD Probes. Doppler independent developed Ultrasonic Equipment: Anyscan30 and Anyscan20 series digital ultrasonic flaw detectors, and Portable Ultrasonic Phased Array Flaw Detector – PHASCAN. The great performance of the hardware, software of instruments have reached or surpassed the international advanced level.

ULTRASONICS

Ultrasonics is the only internationally established journal which covers the entire field of ultrasound research and technology and all its many applications. *Ultrasonics* contains a variety of sections to keep readers fully informed and up-to-date on the whole spectrum of research and development throughout the world. *Ultrasonics* publishes papers of exceptional quality and of relevance to both academia and industry. Manuscripts in which ultrasonics is a central issue and not simply an incidental tool or minor issue, are welcomed.

As well as top quality original research papers and review articles by world renowned experts, *Ultrasonics* also regularly features short communications, a calendar of forthcoming events and special issues dedicated to topical subjects.

Editor in Chief

Prof. Arthur Every

School of Physics, University of the Witwatersrand, South Africa

2017 Impact Factor*

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Test and Measurement

GENERAL INFORMATION

Registration & Information Desk

APWSHM 2018 service desks are located in the foyer on the second floor of the hotel.

Opening Hours

Monday 12 November 2018: 16:00-20:30

Tuesday 13 November 2018: 08:00-21:00

Wednesday 14 November 2018: 08:00-21:30

Thursday 15 November 2018: 08:00-17:00

Staff will be available to offer you on-site assistance and advice.

Registration will remain available at the registration desk until the end of the conference. Full registration includes a conference bag, a name badge, the conference programme, the conference abstract book, a USB stick of the conference proceedings, Vouchers of social activities.

Name Badge

Please wear your conference name badge at all times that allows you to access to the conference locations and social events.

Disabled Access

The entire venue is wheel chair accessible. See and follow the wheelchair symbol sign in the hotel for the location of the lifts.

First Aid

In case of a medical problem, please contact a member of the APWSHM 2018 staff; there is a team trained in first-aid and cardiac first-response on site at all times.

Food Allergies

If you have any questions about the food served at the conference, please contact the staff at the buffet tables, who will be able to advise you regarding the food and any particular requirements you may have.

Smoking Policy

Smoking is strictly forbidden inside public buildings in Hong Kong.

Personal Property

Participants are encouraged to take care of their personal belongings and not to leave them unattended. Neither the organizers nor the staff will be responsible for any loss or damage of the personal property of the participants. Please contact the APWSHM 2018 information desk, in any case, if something is lost.

Lunch and Coffee Breaks

From Tuesday to Thursday, lunch, coffee and refreshments will be served in the exhibition area on the second floor of the hotel.

Free Wi-Fi

Free wireless internet service is available throughout the conference days in all conference venues.

Username: APWSHM2018; Password: APWSHM2018

Oral Presentation

Preparing your presentation

1. Please use Microsoft PowerPoint 97-2007 or 2010 (*.ppt or *.pptx) or Adobe Acrobat Reader (PDF), to guarantee that your presentation will successfully open with on-site PCs.
2. We recommend that you PowerPoint presentation is saved using PPT(X) format.
3. Please note that we cannot guarantee the quality of Apple Macintosh-based presentations; please check in advance (two hours before your session starts) their windows compatibility.
4. Only fonts that are included in the basic installation of MS Windows are available. The use of other fonts not included in Windows can cause the incorrect layout/style of your presentation. Suggested fonts: Arial, Times New Roman, Tahoma.

How to submit your presentation at the workshop

Please identify the session in which your paper is to be presented and make yourself familiar with the location of the presentation room. Go to the appropriate room 15 minutes before the start of the session in which you are to present. Make yourself known to the Chair of the session and to the audio-visual assistant in that room. Load your presentation on to the desktop of the laptop computer that is installed in the room. All presentations will be deleted from the all of the PCs that were used during the workshop.

Poster Presentations

The poster session will take place on Wednesday 14 November 10:20-10:40 and 15:20-15:40. For the authors of posters, please be aware that the poster boards have maximum dimensions of 841 x 1189 mm (size of A0 paper).

SOCIAL PROGRAMME

Registration & Welcome Cocktails

Monday, 12 November 2018
Registration: 16:00-20:00; Welcome Cocktails: 18:00-20:30

All conference participants are cordially invited to a welcome cocktail reception on the evening of Monday (Day 0). Starting at 18:00, the reception will be held either at the hotel rooftop pool area or at the second floor lobby area of the hotel (near registration desk). We strongly encourage you to be present to the reception and network with colleagues. Early registration will be available from 16:00 to 20:00 at the second floor lobby area of the hotel.

Dinner Cruise

Tuesday, 13 November 2018
Coach Departures from Hotel Main Entry at 18:10

Full-registration participants, full student registration participants and accompanying persons are cordially invited to a dinner cruise around the stunning Victoria Harbour. Light buffet, wines and soft drinks will be provided on board. The vibrant and energetic Victoria Harbour is truly Hong Kong's lifeline, and with its constant parade of vessels and breathtaking surrounding scenery, a harbour cruise is a must-do on your trip to Hong Kong. Two 91-seater coaches will depart from the hotel main entry at 18:10 sharp for the Tsim Sha Tsui wharf. Please note that No coach service back to hotel will be provided upon completion of this event. We encourage you to have a waterfront rambling and make your journey to the hotel.

Please be advised the event voucher must be with you throughout the journal.

Gala Banquet

Wednesday, 14 November 2018
Banquet Commences at 19:00

Full-registration participants, full student registration participants and accompanying persons are cordially invited to the Conference Gala Dinner at the GrandBall Room of the hotel. The banquet will commence at 19:00 sharp. A formal Chinese-style dinner will be served, enriched with Chinese traditional entertainments (Lion Dance performances). The "Best Paper Award" will be presented at the banquet.

Please show the event voucher at the entry to the Grandball Room.

COMMITTEES

Conference Chair

Prof. Zhongqing Su

The Hong Kong Polytechnic University

Hong Kong SAR, China

Conference Co-Chairs

Prof. Shenfang Yuan

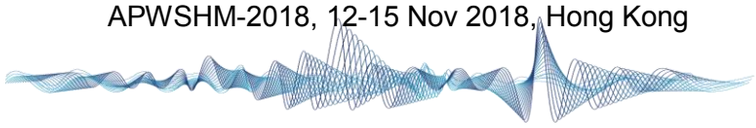
Nanjing University of Aeronautics and Astronautics

Nanjing, China

Prof. Hoon Sohn

Korea Advanced Institute of Science and Technology

Daejeon, Republic of Korea



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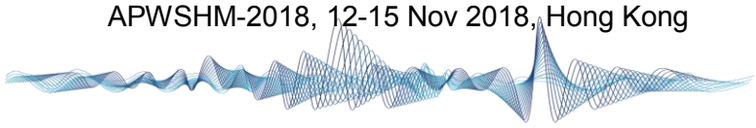

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