inter-noise 2018 | 26–29 AUGUST

# Impact of Noise Control Engineering

MARRIOTT DOWNTOWN
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HOSTED BY:

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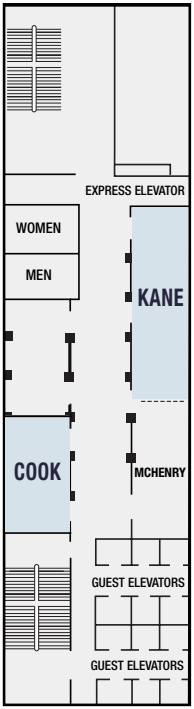
ASME-NCAD

ON BEHALF OF:

i-ince

# HOTEL FLOOR PLANS

## 3RD FLOOR



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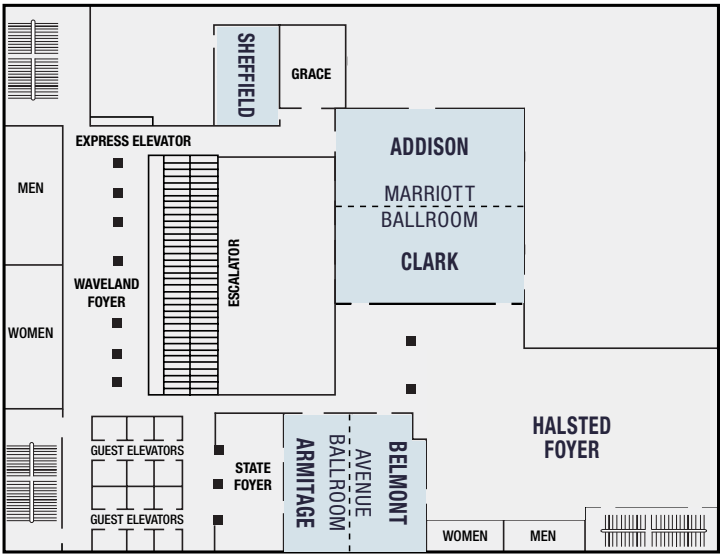


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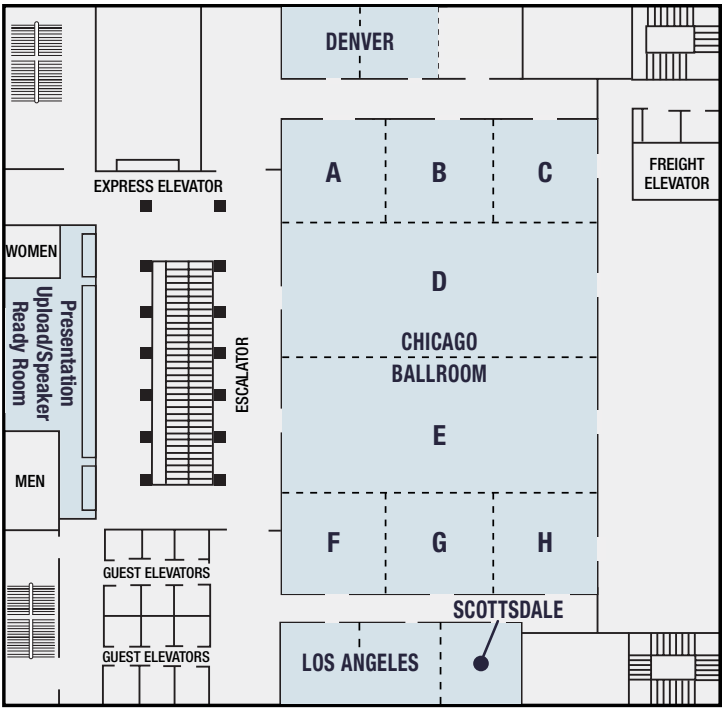

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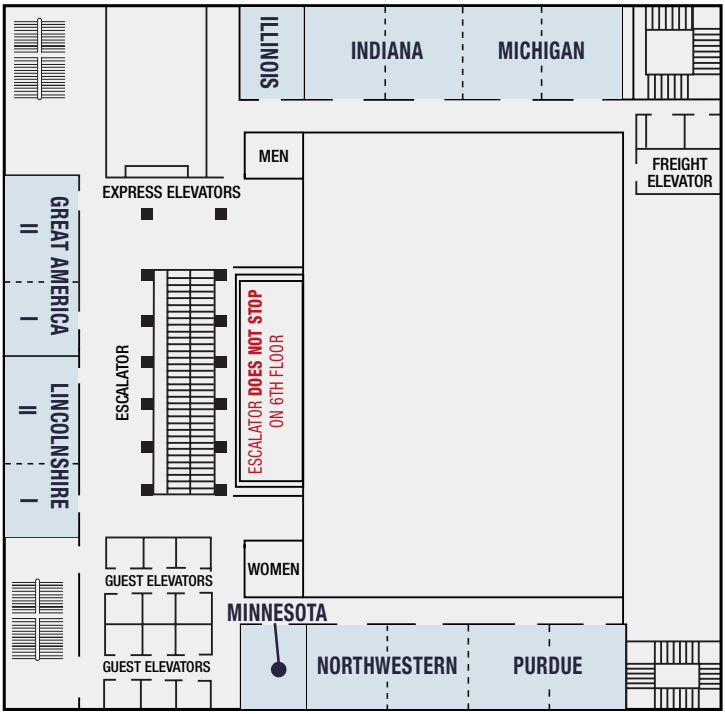


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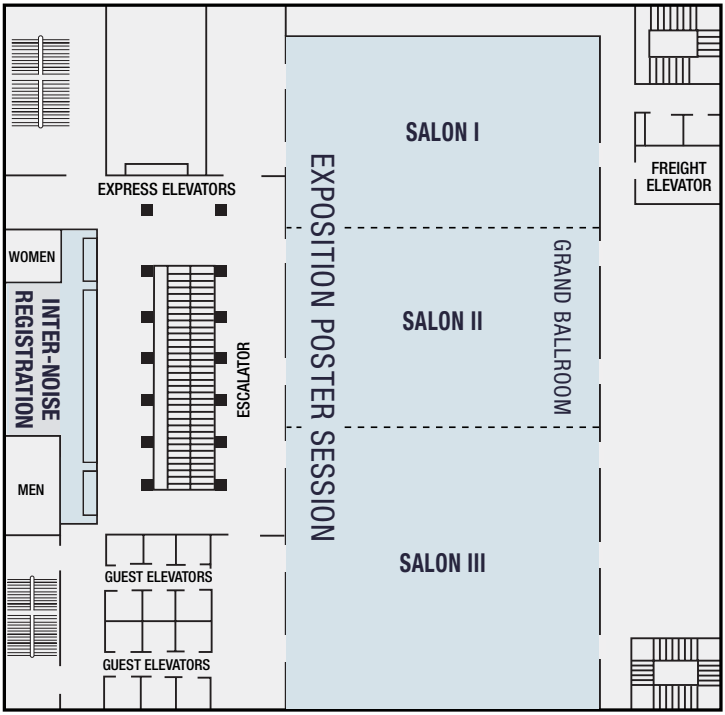

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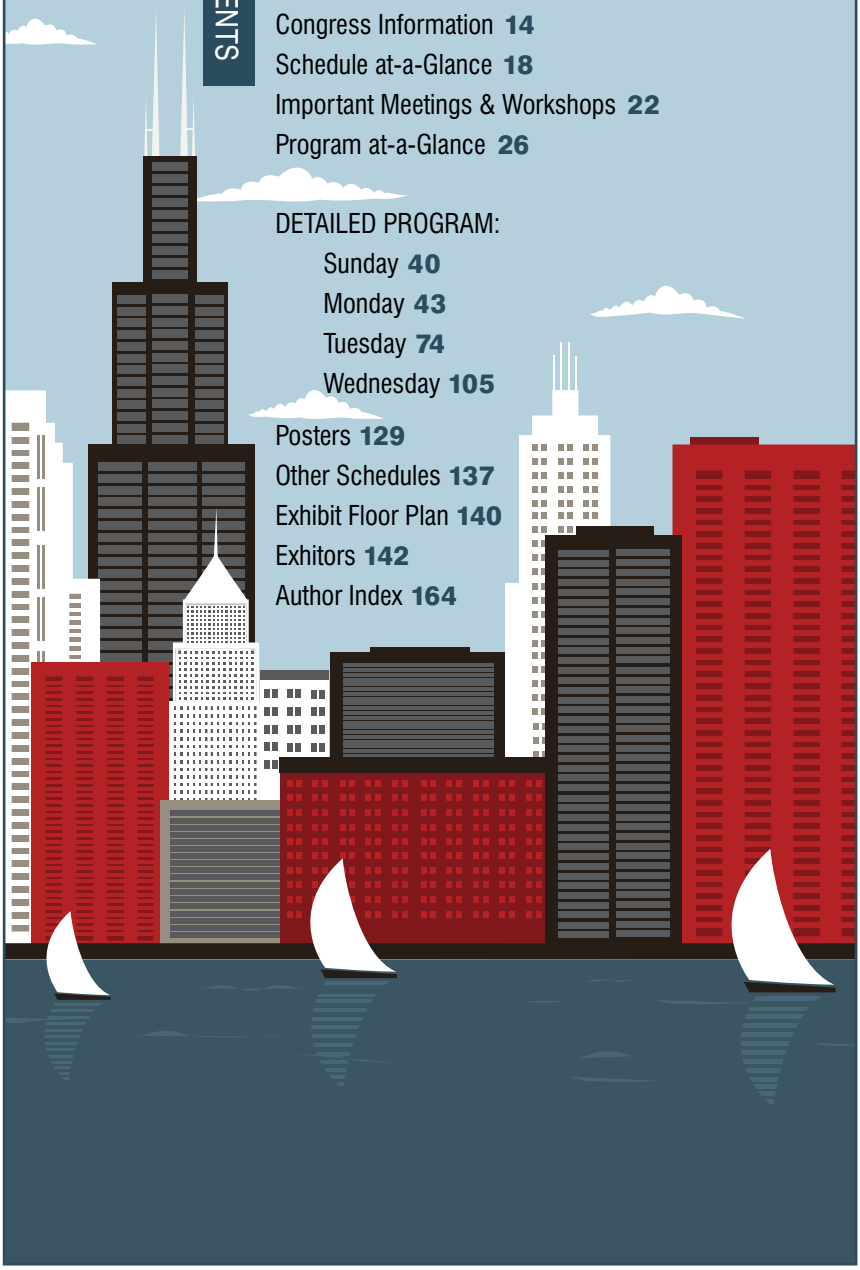

# WELCOME

*from the* CONFERENCE CO-PRESIDENTS and TECHNICAL CO-CHAIRS

**Lord Rayleigh** lucidly wrote the following at the beginning of the landmark *Theory of Sound*.

*The sensation of sound is a thing sui generis, not comparable with any of our other sensations. No one can express the relation between a sound and a colour or a smell. Directly or indirectly, all questions connected with this subject must come for decision to the ear, as the organ of hearing; and from it there can be no appeal. But we are not therefore to infer that all acoustical investigations are conducted with the unassisted ear. When once we have discovered the physical phenomena which constitute the foundation of sound, our explorations are in great measure transferred to another field lying within the dominion of the principles of Mechanics. Important laws are in this way arrived at, to which the sensations of the ear cannot but conform.*

With these words, Rayleigh laid the groundwork for his monumental work and our work in noise control.

***Welcome to INTER-NOISE 2018***, the 47th International Congress and Exposition on Noise Control Engineering. The topics in this congress encapsulate much of what Lord Rayleigh envisioned 130 years ago. Though the theory has matured, there is still much work to do in topics ranging from psychoacoustics, transportation noise, numerical simulation, and many other areas. The theme of INTER-NOISE 2018 is *The Impact of Noise Control Engineering*. Noise levels are measurably lower in much of the world than they would be without our efforts. Nevertheless, noise is still intrusive and there is much work to be done. The aim of this conference is to facilitate the transfer of our research into lower noise levels or more pleasant sound quality for our friends and neighbors.

With that in mind, we have 688 papers (630 oral presentation and 58 poster presentations). That includes a stellar lineup of plenaries and keynotes from well-known experts on topics like perception-based engineering, structure-borne sound in buildings, passive noise control, numerical simulation modeling, and aircraft noise. There will also be over 75 exhibitors showing us the latest technologies.

Welcome also to Chicago and endless restaurant and shopping options. Nearby attractions include world famous museums like the Art Institute, Field Museum, and Museum of Science and Industry. You can take one of the many boat tours to learn about the outstanding architecture. There is music and entertainment everywhere. Also, be sure to see iconic locations like the Navy Pier, Willis Tower, and the Cloud Gate (more commonly known as The Bean).

We would especially like to thank all the delegates from all over the world for coming to Chicago. We are also grateful to the session track organizers, session organizers, and session chairs. Thanks also to the contributors. We were overwhelmed by the number of excellent papers and know that we are already assured of a successful event thanks to you.

We hope you thoroughly enjoy INTER-NOISE 2018 and your time in Chicago. Above all, take what you learn and make an impact.

**Charles Moritz**
Congress President

**David W. Herrin**
Technical Program Co-Chair

**Joseph Cuschieri, PE**
Congress Co-President

**Teik C. Lim**
Technical Program Co-Chair

# ASME NCAD

**The Noise Control and Acoustics Division** (NCAD) **of ASME** (American Society of Mechanical Engineers) was formed during the ASME Winter Annual Meeting on March 16, 1980. NCAD is the 32nd Technical Division of the ASME. The objective of NCAD is to establish a program within ASME that will encourage, focus and further the development and application of noise control and acoustics principles to mechanical engineering. The Division serves ASME members who represent various disciplines within ASME as well as other organizations. The Division provides a balance between the theoretical studies of acoustics and its applications in terms of noise control engineering. Currently, there are almost 500 primary members.

NCAD routinely participates in ASME's International Mechanical Engineering Conference and Exhibit (IMECE). Every three years the Annual Conference for NCAD is held in conjunction with INCE-USA, which for this year is INTERNOISE 2018. In addition to the papers presented on behalf of NCAD there are several awards that are presented at the annual conference. The Rayleigh Lecture award is given to an individual who has made pioneering contributions to the sciences as well as application to industry. This year Professor Roger Ohayon is giving the lecture on *Computational Vibroacoustics in Low-and Medium Frequency Bands*. NCAD also sponsors a Tutorial. This will be given by Professor Charlie Zheng on *Time-Domain Simulation of Multi-Physics Sound Propagation in Complex Media and Environment*. A significant monetary award is also given to the best student-authored technical paper presented at the conference. The Division also awards the Per Bruel Gold Medal for Noise Control and Acoustics in recognition of eminent achievement and extraordinary merit in the field of noise control and acoustics. The achievement includes useful applications of the principles of noise control and acoustics to the art and science of mechanical engineering. This medal, established in 1987, honors Dr. Per Bruel who pioneered the development of sophisticated noise and vibration measuring and processing equipment. A monetary award of $1500 is given with the award.

NCAD is managed by a Group Leadership Team (GLT) and Technical Committees. The GLT is maintained by five members that serve a five-year term. The Technical Committees represent the many interests of mechanical engineers in the field of noise control and acoustics and are crucial to the long-range success of the Division. The three branches of the technical committees are Phononic Crystals and Metamaterials, Structural Acoustics and Noise Control, and Aero/Hydro Acoustics. The Phononic Crystals committee is relatively new but is our fastest growing subject area. The committee is interested in phononic crystals and metamaterials that are engineered to achieve exceptional control primarily via wave-based mechanisms. The Structural Acoustics and Noise Control Technical Committee provides a special forum for the free exchange of stimulating ideas and to disseminate the state-of-the-art technology of structural acoustics and related topics. The focus of this committee is on areas related to mechanical wave propagations in structures and interactions between mechanical waves and surrounding media, such as air and water, to radiate noise. It also serves to increase the understanding on noise generation mechanisms and to broaden noise control applications for various industries, including but not limited to automotive, off-highway vehicle, aircraft, mining, and consumer electrics industries. The last committee, Aero/Hydro Acoustics, seeks to increase the understanding of mechanisms related to both sound and vibrations due to turbulent excitation, fluid-solid interaction, fluid-acoustic interaction, machinery, and any other mechanism that produces sound. The committee is also interested in propagation mechanisms through all types of fluids. Each of these Technical Committees cover a wide range of ideas and applications that are of interest to the academic community as well as industry.

*For more information about NCAD please see:* https://community.asme.org/noise_control_acoustics_division/default.aspx or our Facebook page: https://www.facebook.com/NCAD-Noise-Control-and-Acoustics-Division-211722612197712/

# WELCOME
*from the* PRESIDENT of I-INCE

**Dear Delegates and Accompanying Persons:**

It is with great honor and pleasure that I welcome you on behalf of the International Institute of Noise Control Engineering, I-INCE, to the 47th International Congress and Exposition on Noise Control Engineering. This Congress is organized by the Institute of Noise Control Engineering of the USA.

The INTER-NOISE Congress aims to disseminate information on the field of noise control engineering and to promote progress in both technological approaches and problem awareness. The first INTER-NOISE Congress was held in Washington, DC in 1972 and has met in cities around the world since then, demonstrating that noise control is truly international.

I-INCE was formally established in 1974 as a non-profit association according to Swiss civil law and formally announced at the 3rd INTER-NOISE Congress in Washington, DC. Today, I-INCE comprises 48 member societies, 8 sustaining and 1 institutional member. Both the Institute and the Congress series have become indispensable elements of international noise control activities. The encouragement of young professionals is vitally important and I-INCE funds a number of Young Scientists Grants to assist with participation at each Congress. I-INCE has also initiated a Young Professionals Workshop, with the first being offered in conjunction with this congress. I-INCE supports Symposia and Technical Study Groups on relevant topics. In addition, *NoiseNews International*, jointly published with INCE-USA, is a web-based magazine produced 4 times per year with both news and articles specifically relevant to noise control engineering. You can find more information about the I-INCE activities on our website **www.i-ince.org**.

This 2018 INTER-NOISE Congress has a session dedicated to **Bill Lang**, one of the I-INCE founding fathers. His enthusiasm and dedication over the decades to the goals of I-INCE and noise control in general has contributed substantially to the success of our organization.

We meet this year in Chicago, Illinois, a high population density multicultural city. So it is very appropriate to have the congress theme of ***Impact of Noise Control Engineering***. Over the next few days you have the opportunity to hear presentations from local and international participants who are developing methods to manage and control noise and sound. However, the technical sessions are only a part of what is available through this Congress and we hope that you gain much from the opportunities provided by the informal discussions with colleagues during the coffee/lunch breaks and the social activities. As well, there are opportunities to see the latest products from the range of exhibitors at the technical exhibition.

However, as well as participating in the congress we hope you spend some time enjoying the city of Chicago and its multiple museums and offerings.

On behalf of I-INCE and all those participating in the Congress, I would like to thank INCE-USA, the Organizing and Scientific Committees and the many supporting people and institutions for their enormous efforts to bring INTER-NOISE 2018 to this stage. It is also important, on behalf of all those involved with the organization, to thank all the delegates for your contribution to the technical sessions. This is truly a joint effort and we all hope that you have a most successful Congress.

Sincerely,

**Marion Burgess**
President, International INCE

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## Congress Venue

**Chicago Marriott Downtown Magnificent Mile**

540 N. Michigan Avenue
Chicago, IL 60611
USA

1-312-836-0100

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**Complimentary WiFi access is available in all meeting rooms.** Look for the INTER-NOISE network.

The password is **IN2018**.

To NOT effect WiFi speed, we appreciate you using conference WiFi ONLY for checking email and using the mobile app.

## Certificates of Attendance

**Certificates of Attendance** will be available on **Wednesday**, 29 August at the registration desk on the 7th Floor.

## Mobile App

The Congress mobile app is available through the **App Store** OR **Google Play**.

Search for: **internoise** OR **IN2018**

## Mobile Phones

Delegates are requested to use mobile phones with consideration of others. *Please be sure to turn off your phone during session talks.*

## Language

The official language of the Congress is **English**.

## Identification Badges

Congress name badges will be provided upon arrival at the registration desk. *Congress name badges are required to be worn for all scientific sessions, events and for admission to the exposition hall.*

## Congress Proceedings

Proceedings will be provided on a **USB** flash drive in your Congress bag.

## Important Information & Telephone Numbers

**Emergency Assistance**
DIAL 911

**Chicago Police Department**
1-312-746-6000 *(Non-Emergency)*

**Chicago Fire Department**
1-312-745-3705 *(Non-Emergency)*

**Northwestern Memorial Hospital**
251 East Huron Street
*(Less than 2 Miles from the Hotel)*

1-312-926-2000 *(General)*
1-312-926-5188 *(Emergency Room)*

**Walk-In Clinic**
Northwestern Immediate Care Center
—River North
635 N. Dearborn St.

Hours: 08:00–18:00

**Hotel In-House Doctor**
1-773-734-1944 *(24 hr. Service)*

**24 Hr. Doctor Service** *(Outside of Hotel)*
1-800-362-8677

**Jeffrey Dugas, MD**
1-312-255-1580 *(Limited Service)*

**Dr. Morris** *(Dental)*
1-312-642-3370

**24 Hr Pharmacy** *(Walgreen's)*
1-312-664-8686

## Evacuation

In the event that an evacuation is deemed necessary, an announcement is made over the public address system advising all guests/patrons and employees to evacuate the hotel.

**The Hotel has Four Main Fire Escape Stairwells:**

— Two stairwells exit out onto Rush Street
— One stairwell exits out onto Ohio Street
— The fourth stairwell exits out to Michigan Avenue

In the Lobby area you can also exit onto Rush Street or Michigan Avenue.

The hotel has a reassemble location at Grand and Lower Michigan Avenues. This area is covered and offers freedom of movement.

*Hotel management will be updating everyone on conditions and further safe relocation, if necessary.*

## Hotel Emergency Contacts

In the event that you need assistance in a security or medical emergency, the following in-house extensions should be called:

**Security Department** – 5011 OR 4761

**At Your Service Operators** – "0"

**George McDade**, Director of Loss Prevention
George.McDade@marriott.com
1-312-836-6132

The loss prevention department is on duty 24 hours a day, 7 days a week. All officers are trained in minor First Aid and CPR.

## Hotel Guest Room Q&A

**1. What time is the hotel check in and check out?**

**Check-In:** 16:00
**Check-Out:** 12:00

Express Checkout information if applicable Mobile Check-In and Check-Out through Marriott App.

**2. Does each room have wireless internet access and how much does it cost?**

All attendees registered at the hotel have free wireless internet access in sleeping rooms.

**3. Does the hotel have a business center and what does it have in it?**

**Yes.** The hotel has a business center open 24 hours a day with PCs, Printers, Copying, Scanning.

## Hotel Dining

**HARVEST RESTAURANT**
2nd Floor (Ext. 6334)

Features contemporary and classic American food prepared with farm fresh ingredients from the Midwest.

**HOURS:**

**Full Breakfast**
Mon-Fri: 06:30–11:00
Sat & Sun: 07:00–11:00

**Buffet Breakfast**
Available until 10:45

**Lunch**
11:00–14:00

**Limited Express Lunch**
11:00–11:30

**Dinner**
17:00–22:00

**RUSH STREET PANTRY**
Located off the Main Lobby
**OPEN DAILY** *(24 Hours)*

### RUSH BAR & LOUNGE
(Ext. 4796)

Experience the illuminated sculpture, media wall with six plasma HDTVs and 24 beer taps from which to choose.

**HOURS:** 11:00–21:00
*(Lunch & Dinner Daily)*

### CLUB LOUNGE

For Marriott Rewards gold and platinum members.

**HOURS:**

**Breakfast**
Mon-Fri: 06:00–09:30

**Hors d'Oeuvres**
Sun-Thurs: 17:30–19:30

**Dessert**
Sun-Thurs: 19:30–22:00

## Airport & Hotel Transportation

The airports DO NOT offer free shuttle services. To assist with your transportation needs, the following information is provided:

### AIRPORTS

**Chicago O'Hare International Airport**
1-312-686-2200

Located 19 miles northwest of Chicago's downtown area. Airport information booths are located on upper terminal level and outside the meeting area in the international facility.

**Midway Airport**
1-312-767-0500

Located approximately 12 miles southwest of downtown Chicago, this airport has one terminal building. The terminal building houses all passenger services including a restaurant, information booths and car rentals.

### TAXI

From **O'Hare** to downtown Chicago
**Travel Time:** One Hour or Less
**Estimated Cost:** $40.00–$45.00

From **Midway** to downtown Chicago
**Travel Time:** 40 Minutes
**Estimated Cost:** $30.00–$35.00

*Taxis are available at both airports 24 hours.*

### VAN TRANSPORTATION

**Go Airport Express**
1-773-247-1200
Open until 23:30
www.airportexpress.com

There is a Go Airport Express booth near baggage claim at door E at O'Hare, and at door 3 at Midway. Boarding at the baggage claim area to downtown Chicago.

From **O'Hare** to downtown Chicago
**Cost:** $51.00 *(Round Trip/Per Person)*
$30.00 *(One Way/Per Person)*

From **Midway** to downtown Chicago
**Cost:** $26.05 *(One Way/Per Person)*

**Schedule:** 06:00–18:00 *(Daily)*
*Departs Hotel every half hour*

**Travel Time:** Allow 45-60 Minutes

### ELEVATED TRAIN/SUBWAY

**Chicago Transit Authority (CTA)**
1-800-972-7000 or 1-312-836-7000

From **O'Hare** to downtown Chicago
**Cost:** $2.50 *(Each Way)*

**Location:** Train terminal is located beneath terminal 4

**Travel Time:** Allow 60 Minutes *(approx.)*

**Schedule:** *Trains run every 5-10 minutes day and evenings. Every 30 minutes from 01:00–05:00*

To **O'Hare** from Downtown Chicago

— Enter the subway and board the **Southbound** train to second stop, **Washington Street**.

— Get off and go down the stairs and through the **Dearborn Street** tunnel.

— Go up the stairs to the platform and board the **O'Hare Blue Line** train.

**Rates and schedules are subject to change. Times are approximate.*

## PARKING

*Rates and Hours are subject to change.*

**Hotel Valet**
541 North Rush Street

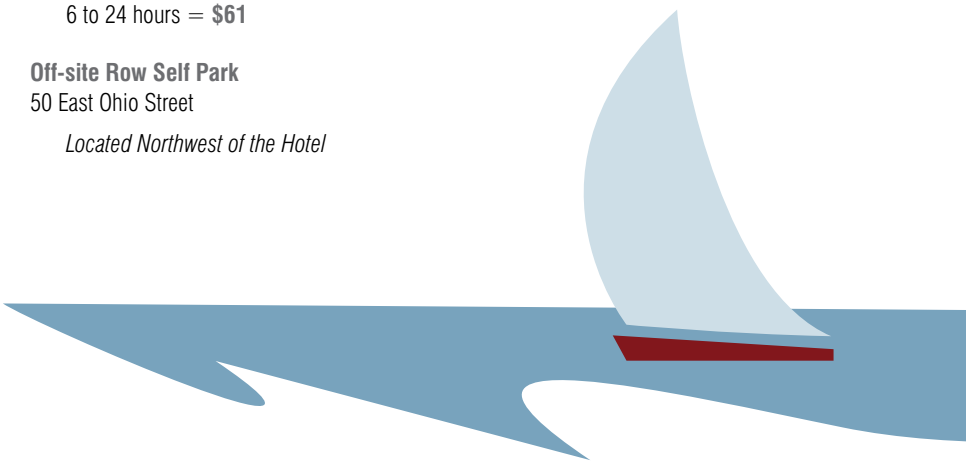
*Available at the Marriott Hotel*
Overnight with in & out Access **$61**/night

**Hotel Short Term**
Up to 6 hours = **$37**
6 to 24 hours = **$61**

**Off-site Row Self Park**
50 East Ohio Street

*Located Northwest of the Hotel*

| Overnight with in & out Access | **$46/night** |
|---|---|
| Less than 30 Mins. | **$5** |
| 30 Mins. to 1 Hr. | **$10** |
| 1 Hr. to 1.5 Hrs. | **$16** |
| 1.5 Hrs. to 2 Hrs. | **$22** |
| 2 Hrs. to 2.5 Hrs. | **$27** |
| 2.5 Hrs. to 3 Hrs. | **$32** |
| 3 Hrs. to 4 Hrs. | **$35** |
| 4 Hrs. to 8 Hrs. | **$39** |
| 8 Hrs. to 12 Hrs. | **$45** |
| 12 Hrs. to 48 Hrs. | **$48** |
| Early Morning Special *(Mon-Fri between 05:00–09:00, Out by 19:00)* | **$15** |




## SATURDAY, 25 AUGUST

| | | FLOOR | ROOM |
|---|---|---|---|
| 08:00 – 11:30 | ***Congress Selection Committee*** | *6* | *Northwestern/Ohio State* |
| 12:00 – 13:00 | I-INCE & INCE-USA Board Lunch | *4* | *Marriott Ballroom* |
| 13:00 – 17:30 | ***INCE-USA Committee Meetings*** | *6* | *Indiana, Lincolnshire, Michigan* |
| 13:00 – 18:30 | ***I-INCE Board Meeting*** | *6* | *Northwestern* |
| 18:00 – 19:00 | ***INCE-USA & I-INCE Board Reception*** | *4* | *Marriott Ballroom* |
| 19:15 – 21:45 | INCE-USA & I-INCE Board Dinner | | *Offsite* |

## SUNDAY, 26 AUGUST

| | | | |
|---|---|---|---|
| 07:30 – 09:30 | ***Pre-Future Congress Technical Planning Meeting*** | *4* | *Addison* |
| 07:30 – 17:30 | ***INCE-USA Board of Directors Meeting*** | *4* | *Avenue Ballroom* |
| 08:00 – 12:00 | ***I-INCE TSG Meeting*** | *3* | *Cook* |
| 08:00 – 12:00 | Short Course #1: **INCE Fundamentals Exam Prep Course** | *6* | *Illinois* |

| SUNDAY, 26 AUGUST (CONTINUED) | | | |
|---|---|---|---|
| 08:00 – 16:00 | **PUBLIC OUTREACH WORKSHOP** | *7* | *Grand Ballroom 1* |
| 08:00 – 17:00 | Short Course #2: **Noise Control in Ducts** | *6* | *Minnesota* |
| 08:00 – 17:00 | **INCE Certification Exam** | *5* | *Scottsdale* |
| 10:00 – 15:00 | **I-INCE Practice School for Young Professionals** | *5* | *Denver* |
| 10:00 – 18:00 | Registration Open | *7* | *Registration Counter* |
| 12:00 – 13:00 | I-INCE Board, INCE-USA Board and I-INCE Practice School Lunch | 5 | *Chicago A/B/C* |
| 13:00 – 17:00 | **INCE Fundamentals Exam** | *6* | *Illinois* |
| 13:00 – 17:00 | Presentation Upload/Speaker Ready Room | *5* | *Registration Counter* |
| 13:30 – 15:30 | ISO Working Group | *3* | *Cook* |
| 13:30 – 15:30 | **I-INCE General Assembly** | *4* | *Marriott Ballroom* |
| 16:30 – 18:00 | ***Opening Ceremony and Plenary Session*** | *5* | *Chicago Ballroom* |
| 18:00 – 20:00 | ***Welcome Reception*** | *7* | *Grand Ballroom* |
| 19:00 – 20:00 | Student Training | *5* | *Denver* |
| 19:30 – 21:30 | Chairs Dinner *(Invitation Only)* | *4* | *Addison* |

## MONDAY, 27 AUGUST

| | | | |
|---|---|---|---|
| 07:00 – 18:00 | Registration Open | *7* | *Registration Counter* |
| 07:00 – 08:00 | Student Breakfast *(Ticket Required)* | *6* | *Indiana* |
| 07:00 – 18:00 | Presentation Upload/Speaker Ready Room | *5* | *Registration Counter* |
| 07:30 – 08:30 | Accompanying Persons Breakfast *(Ticket Required)* | *10* | *O'Hare* |
| 08:00 – 09:00 | **KEYNOTE LECTURES** | *5* | *Chicago D and Chicago E* |
| 08:00 – 09:00 | NCAD Tutorial | *3* | *Kane* |
| 08:30 – 09:00 | Accompanying Person – City Tour Bus Boarding | | *Lobby, Ohio St. Entrance* |
| 09:00 – 10:00 | **Technical Committee on Product Noise Comparison** | *3* | *Cook* |
| 09:00 – 11:00 | VASTCON Technical Working Group Meeting | *2* | *Streeterville* |
| 09:00 – 11:30 | Accompanying Person – City Tour | | |
| 09:00 – 18:00 | **TECHNICAL SESSIONS** | *4* | *Addison, Clark, Armitage, Belmont* |
| | | *5* | *Chicago A-H, Denver, Los Angeles* |
| 10:00 – 11:00 | Refreshment Break | *5* | *Foyer* |

| MONDAY, 27 AUGUST (CONTINUED) | | | |
|---|---|---|---|
| 12:00 – 13:30 | NCEJ Editorial Staff Meeting | *3* | *Cook* |
| 12:00 – 16:30 | **EXHIBIT HALL SET-UP** | *7* | *Grand Ballroom* |
| 13:00 – 14:00 | ***NCAD Group Leadership Team Meeting*** *(Private)* | *2* | *Streeterville* |
| 13:40 – 16:15 | **I-INCE Young Professionals Workshop** | *4* | *Belmont* |
| 14:00 – 15:00 | ***NCAD General Meeting*** *(Open to the Public)* | *3* | *Kane* |
| 15:00 – 16:20 | Refreshment Break | *5* | *Foyer* |
| 16:15 – 16:30 | **I-INCE Young Professionals Award Presentations** | *4* | *Belmont* |
| 16:30 – 18:00 | **I-INCE Social Networking Event** *(Invitation Only)* | *4* | *Halstead Foyer* |
| 16:30 – 18:00 | **RAYLEIGH LECTURE** | *4* | *Clark* |
| 17:30 – 19:30 | ***Exposition Opening Reception*** | *7* | *Grand Ballroom* |
| 19:30 – 22:00 | ***TAB Meeting*** *(Invitation Only)* | *6* | *Indiana* |

## TUESDAY, 28 AUGUST

| | | | |
|---|---|---|---|
| 07:00 – 08:00 | INCE Certification Info Session and Networking Breakfast | *6* | *Indiana* |
| 07:00 – 17:00 | Registration Open | *7* | *Registration Counter* |
| 07:00 – 17:00 | Presentation Upload/Speaker Ready Room | *5* | *Registration Counter* |
| 08:00 – 09:00 | **KEYNOTE LECTURES** | *5* | *Chicago D and Chicago E* |
| 08:00 – 09:30 | Accompanying Persons Breakfast *(Ticket Required)* | *10* | *O'Hare* |
| 09:00 – 12:00 | **POSTER SESSION** | *7* | *Grand Ballroom* |
| 09:00 – 17:00 | **EXHIBITS OPEN** | *7* | *Grand Ballroom* |
| 09:00 – 18:00 | **TECHNICAL SESSIONS** | *4* | *Addison, Armitage, Belmont, Clark* |
| | | *5* | *Chicago A-H, Denver, Los Angeles* |
| 10:20 – 10:40 | Refreshment Break | *7* | *Grand Ballroom* |
| 12:20 – 13:20 | Women in Noise Control Engineering Lunch | *6* | *Indiana* |
| 13:00 – 16:20 | **WILLIAM LANG MEMORIAL SESSION** | *4* | *Armitage* |
| 13:30 – 17:30 | **POSTER SESSION** | *7* | *Grand Ballroom* |
| 14:40 – 16:00 | Refreshment Break | *7* | *Grand Ballroom* |

| | | | |
|---|---|---|---|
| | TUESDAY, 28 AUGUST (CONTINUED) | | |
| 16:20 – 17:30 | ***William Lang Memorial Coffee/Tea Reception*** | *4* | *Armitage* |
| 18:30 | Bus Departs for Congress Banquet | | *Lobby, Ohio St. Entrance* |
| 19:00 – 22:00 | ***Congress Banquet*** *(Ticketed Event)* | | *Museum of Science and Industry* |
| | **WEDNESDAY, 29 AUGUST** | | |
| 07:00 – 10:00 | Registration Open | *7* | *Registration Counter* |
| 07:00 – 12:00 | Speaker Ready Room | *5* | *Registration Counter* |
| 08:00 – 09:30 | Accompanying Persons Breakfast *(Ticket Required)* | *10* | *O'Hare* |
| 08:00 – 12:00 | **EXHIBITS OPEN** | *7* | *Grand Ballroom* |
| 08:00 – 18:00 | ***IT Committee Meeting*** | *4* | *Sheffield* |
| 09:00 – 15:00 | **TECHNICAL SESSIONS** | *4* | *Addison, Armitage, Belmont, Clark* |
| | | *5* | *Chicago A-H, Denver, Los Angeles* |
| | | *6* | *Indiana, Northwestern* |
| 09:00 – 12:00 | **POSTER SESSIONS** | *7* | *Grand Ballroom* |
| 09:20 – 10:40 | Refreshment Break | *7* | *Grand Ballroom* |
| 12:00 – 16:00 | **EXHIBIT TEAR DOWN** | *7* | *Grand Ballroom* |
| 13:00 – 18:00 | ***ITE Technical Committee Meeting*** | *3* | *Cook* |
| 13:40 – 15:20 | **INCE-USA Award Recognition Ceremony** | *5* | *Chicago D/E* |
| 13:40 – 15:40 | ***Future Congress Technical Planning Committee Meeting*** | *5* | *Denver* |
| 14:40 – 15:30 | Refreshment Break | *5* | *Foyer* |
| 15:30 – 16:30 | **PLENARY SPEAKER AND I-INCE LECTURE** | *5* | *Chicago D/E* |
| 16:30 – 17:30 | ***Closing Ceremony*** | *5* | *Chicago D/E* |
| 17:30 – 18:30 | ***Closing Reception*** *Hosted by Inter-Noise 2019 in Madrid* | *7* | *Grand Ballroom 3* |
| 18:30 – 20:00 | ***I-INCE Board Meeting*** | *5* | *Los Angeles* |
| 20:30 – 22:30 | I-INCE Board Dinner | *Offsite* | |
| | **THURSDAY, 30 AUGUST** | | |
| 08:00 – 18:00 | ***ITE Technical Committee Meetings*** | *3* | *Cook* |
| 07:45 – 8:00 | Bus Departs for Technical Tours | *Lobby, Ohio St Entrance* | |
| 09:30 – 14:30 | ***Technical Tours*** | *Columbia College Riverbank Acoustical Lab* | |

## Sunday, 26 August

**Pre-Future Congress Technical Planning Meeting**
07:30 – 09:30
**Location:** 4th Floor, Addison

**INCE-USA Board of Directors Meeting**
07:30 –17:30
**Location:** 4th Floor
Avenue Ballroom

**I-INCE TSG Meeting**
08:00 – 12:00
**Location:** 3rd Floor, Cook

**INCE Fundamentals Exam Prep Course & Optional Exam**
08:00 – 12:00 Prep Course
13:00 – 17:00 Optional Exam
**Location:** 6th Floor, Illinois

**Public Outreach Workshop**
08:00 -16:00
**Location:** 7th Floor
Grand Ballroom 1

**Noise Control in Ducts**
08:00 – 17:00
**Location:** 6th Floor, Minnesota

**INCE Certification Exam**
08:00 – 17:00
**Location:** 5th Floor, Scottsdale

**I-INCE Young Professionals Practice School**
*(Invitation Only)*
10:00 – 15:00
**Location:** 5th Floor, Denver

**ISO Working Group**
13:30 – 15:30
**Location:** 3rd Floor, Cook

**General Assembly of I-INCE**
13:30 – 15:30
**Location:** 4th Floor, Marriott Ballroom

The General Assembly of the International Institute of Noise Control Engineering is comprised of one representative from all member societies. Designated representatives from each full member society will be asked to vote on issues concerning the governance of I-INCE. *All INTER-NOISE 2018 attendees are welcome to attend.*

## Monday, 27 August

**NCAD Tutorial**
08:00 – 09:00
**Location:** 3rd Floor, Kane

**Technical Committee on Product Noise Comparison**
09:00 – 10:00
**Location:** 3rd Floor, Cook

**VASTCON Techinical Working Group Meeting**
09:00 – 11:00
**Location:** 2nd Floor, Streeterville

**NCEJ Editorial Staff Meeting**
12:00 – 13:30
**Location:** 3rd Floor, Cook

**NCAD Group Leadership Team Meeting**
*(Private)*
13:00 – 14:00
**Location:** 2nd Floor, Streeterville

**I-INCE Young Professionals Workshop**
13:40 – 16:30
**Location:** 4th Floor, Belmont

**NCAD General Meeting**
*(Open to the Public)*
14:00 – 15:00
**Location:** 3rd Floor, Kane

**Rayleigh Lecture**
16:30 – 18:00
**Location:** 4th Floor, Clark

**Technical Advisory Board (TAB) Dinner**
*(Reservation Required)*
19:30 – 22:00
**Location:** 6th Floor, Indiana

## Tuesday, 28 August

**INCE Certification Information Session**
07:00 – 08:00
**Location:** 6th Floor, Indiana

## Wednesday, 29 August

**IT Committee Meeting**
08:00 – 18:00
**Location:** 4th Floor, Sheffield

**I-INCE Board Meeting**
18:30 – 20:00
**Location:** 5th Floor, Los Angeles

**ITE Technical Committee Meeting**
13:00 – 18:00
**Location:** 3rd Floor, Cook

**INCE-USA Award Recognition Ceremony**
13:40 – 15:20
**Location:** 5th Floor, Chicago D/E

**Future Congress Technical Planning Committee Meeting**
13:40 – 15:40
**Location:** 5th Floor, Denver

## Thursday, 30 August

**ITE Technical Committee Meeting**
08:00 – 18:00
**Location:** 3rd Floor, Cook

# Accompanying Persons Events

*(Must be Registered)*

## Sunday, 26 August

**Opening Plenary**
16:30 – 18:00
**Location:** 5th Floor
Chicago Ballroom

**Welcome Reception**
18:00 – 20:00
**Location:** 7th Floor
Grand Ballroom

## Monday, 27 August

**Breakfast**
*(Ticket Required)*
07:30 – 08:30
**Location:** 10th Floor, O'Hare

**City of Chicago Bus Tour**
*(Ticket Required)*
09:00 – 11:00
**Bus Meeting Time:** 08:45
**Bus Meeting Location:**
Lobby, Ohio St. Entrance

**Exposition Opening Reception**
17:30 – 19:30
**Location:** 7th Floor
Grand Ballroom

## Tuesday, 28 August

**Breakfast**
*(Ticket Required)*
08:00 – 09:30
**Location:** 10th Floor, O'Hare

**Congress Banquet**
*(Ticket Required)*
19:00 – 22:00
**Location:** Museum of Science and Industry
**Bus Meeting Time**: 18:30
**Bus Meeting Location:**
Lobby, Ohio St. Entrance

## Wednesday, 29 August

**Breakfast**
*(Ticket Required)*
08:00 – 09:30
**Location:** 10th Floor, O'Hare

**Cooking Class with Hotel Chef**
*(Ticket Required, Limited Space Available)*
09:00 – 10:00
**Location:** Meet in Halstead Foyer
4th Floor

Join the Marriott chef for a unique experience… home focused cooking in a professional kitchen! Work with the Chefs of the Chicago Marriott Downtown to pick up some great pointers to take home with you for your next meal or dinner party! The class will consist of hands-on learning on how to make a fun and fresh bruschetta appetizer, followed by a fresh piece of fish on a bed of a summer veg salad. The chef will show you different ways to prepare and cook fish at home and some presentation ideas you can easily do for friends and family. Beverages and coffee will be offered along with all the delicious food you will create! Chicago Marriott Downtown works with many local partners and is based off of a scratch kitchen concept to truly bring all guests a unique experience while on property. Skills of fish preparations, knife cutting, searing and grilling, along with plate presentations will be covered in this course with plenty of hands-on and interactive time to ask questions and learn some interesting tips to put in your culinary repertoire. *Let's get cooking!*

**Closing Ceremony**
16:30 – 17:30
**Location:** 5th Floor, Chicago Ballroom D/E

**Closing Reception**
17:30 – 18:30
**Location:** 7th Floor, Grand Ballroom 3


NO Photos OR
Recordings of
Sessions are
Permitted

# Program at-a-Glance

## PLEASE NOTE:

Cell Phones **MUST** be Silenced during Presentations. Photos and Video Recordings are **PROHIBITED**!

*THANK YOU for Your Cooperation!*

| SUNDAY 26 AUG | 08:00 | 08:20 | 10:00 | 10:20 | 11:40 | 12:00 | 13:00 | 13:20 | 14:40 | 15:00 | 15:20 | 15:40 | 16:00 | 16:40 | 17:00 | 17:40 | 18:00 | 19:00 | 19:30 | 20:00 | 21:30 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Addison & Clark** FLOOR: **4** | | | | | | | | I-INCE General Assembly | | | | | | | | | | | | | |
| **Chicago A/B/C** FLOOR: **5** | | | | | | | | | | | | | **Opening Ceremony and Plenary Session** | | | | | | | | |
| **Chicago D/E/F/G/H** FLOOR: **5** | | | | | | | | | | | | | | | | | | | | | |
| **Denver** FLOOR: **5** | | | I-INCE Young Professionals Practice School | | | | | | | | | | | | | | | Student Training | | | |
| **Miami/ Scottsdale** FLOOR: **5** | INCE-USA Board Certification Exam | | | | | | | | | | | | | | | | | | | | |
| **Illinois** FLOOR: **6** | | INCE-USA Fundamentals Exam Preparation Course | | | | | INCE-USA Fundamentals Optional Exam | | | | | | | | | | | | | | |
| **Minnesota** FLOOR: **6** | Short Course: Noise Control in Ducts | | | | | | | | | | | | | | | | | | | | |
| **Grand Ballroom 1** FLOOR: **7** | Public Outreach Workshop | | | | | | | | | | | | | | | | | | | | |
| **Grand Ballroom 2/3** FLOOR: **7** | | | | | | | | | | | | | | | | | **Welcome Reception** | | | | |
| **Addison** FLOOR: **4** | | | | | | | | | | | | | | | | | | | **Chair's Dinner** *(Invitation Only)* | | |

| MONDAY 27 AUG | 07:00 | 07:30 | 08:00 | 08:20 | 08:40 | 09:00 | 09:20 | 09:40 | 10:00 | 10:20 | 10:40 | 11:00 | 11:20 | 11:40 | 12:00 | 12:20 | 12:40 | 13:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Addison** FLOOR: **4** | | | | | | **14.1** Advances in Numerical Methods and Simulation | | | | | **14.1** Advances in Numerical Methods and Simulation | | | | | | | |
| **Clark** FLOOR: **4** | | | | | | **2.1** Technical Advances in Active Control of Sound and Vibration | | | | **2.1** Advances in Active Control of Sound and Vibration | | | | | | | | |
| **Armitage** FLOOR: **4** | | | | | | **18.1** Advances in Tire Noise | | | | | **18.1** Advances in Tire Noise | | | | | | | |
| **Belmont** FLOOR: **4** | | | | | | **9.3** Flow Induced Noise and Vibration—Computationals Methods | | | | | **9.3** Flow Induced Noise and Vibration—Computationals Methods | | | | | | | |
| **Halstead Foyer** FLOOR: **4** | | | | | | | | | | | | | | | | | | |
| **Chicago A** FLOOR: **5** | | | | | | **7.1** Advances in Community Noise | | | | | | **7.2** Urban Sound Planning | | | | | | |
| **Chicago B** FLOOR: **5** | | | | | | **3.1** Technical Advances in Aircraft Noise | | | | **3.1 + 3.5** Advances in Aircraft Noise & Airport Noise | | | | | | | | |
| **Chicago C** FLOOR: **5** | | | | | | **17.1** Soundscape, Health and Quality of Life | | | | **17.1 + 17.3** Soundscape, Health & Quality of Life & Psychoacoustic Evaluation of Environmental Noise/Soundscape | | | | | | | | |
| **Chicago D** FLOOR: **5** | | | **Keynote Lecture** | | | **5.2** Impact & Structureborne Noise in Bldgs | | | | **5.2** Impact and Structureborne Noise in Bldgs | | | | | | | | |

| MONDAY | 07:00 | 07:30 | 08:00 | 08:20 | 08:40 | 09:00 | 09:20 | 09:40 | 10:00 | 10:20 | 10:40 | 11:00 | 11:20 | 11:40 | 12:00 | 12:20 | 12:40 | 13:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Chicago E** FLOOR: **5** | | | **Keynote Lecture** | | | **5.6** Bldg Acoustic Measurement | | | | | **5.6** Bldg Acoustic Measurement | | | | | | | |
| **Chicago F** FLOOR: **5** | | | | | | | **5.4** HVAC Equipment and System Noise | | | | **5.4** HVAC Equipment and System Noise | | | | | | | |
| **Chicago G** FLOOR: **5** | | | | | | **1.2** Acoustic Metamaterials | | | | | | **1.2** Acoustic Metamaterials | | | | | | |
| **Chicago H** FLOOR: **5** | | | | | | **22.1** Advances in Vibro-Acoustics | | | | **22.1** Advances in Vibro-Acoustics | | | | | | | | |
| **Denver** FLOOR: **5** | | | | | | **15.3** Noise & Vibration Mitigation Measures | | | | | | **15.3** Noise & Vibration Mitigation Measure | | | | | | |
| **Los Angeles** FLOOR: **5** | | | | | | **11.2** Muflers and Silencers | | | | | | **11.0** Industrial Noise | | | | | | |
| **Indiana** FLOOR: **6** | Student Breakfast | | | | | | | | | | | | | | | | | |
| **Michigan** FLOOR: **6** | | | | | | | | | | | | | | | | | | |
| **Reg Desk** FLOOR: **7** | **Registration Open** 07:00 – 18:00 | | | | | | | | | | | | | | | | | |

| MONDAY 27 AUG | 13:20 | 13:40 | 14:00 | 14:20 | 14:40 | 15:00 | 15:20 | 15:40 | 16:00 | 16:20 | 16:40 | 17:00 | 17:20 | 17:30 | 17:40 | 18:00 | 19:30 | 22:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Addition** FLOOR: **4** | | **14.1** Advances in Numerical Methods and Simulation | | | | | | | **14.1** Advances in Numerical Methods and Simulation | | | | | | | | | |
| **Clark** FLOOR: **4** | | **2.3** Algorithems for Active Control and Speech Enhancement | | | | | | | | **Rayleigh Lecture** | | | | | | | | |
| **Armitage** FLOOR: **4** | | | **18.2** Pavement Noise | | | | **18.3** Tire and Road Noise - Tire Acoustic Cavity Noise | | | | | | | | | | | |
| **Belmont** FLOOR: **4** | | Young Professionals Workshop | | | | | | | Presentation to Awardees of the I-INCE YP Attendance Grants by Marion Burgess Young Professionals Workshop | | | | | | | | | |
| **Halstead Foyer** FLOOR: **4** | | | | | | | | | Young Professionals Networking | | | | | | | | | |
| **Chicago A** FLOOR: **5** | | **7.2** Urban Sound Planning | | | | | **16.5** Information Technology Equipment Noise | | | | | | | | | | | |
| **Chicago B** FLOOR: **5** | **3.5** Airport Noise | | | | | | **3.5** Airport Noise | | | | | | | | | | | |
| **Chicago C** FLOOR: **5** | | | **17.4** Soundscape in Architecture and Urban Planning | | | | **17.4** Soundscape in Architecture and Urban Planning | | | | | | | | | | | |
| **Chicago D** FLOOR: **5** | | **5.2** Impact and Structureborne Noise in Bldgs. | | | | | | **5.2** Impact and Structureborne Noise in Bldgs. | | | | | | | | | | |

| MONDAY | 13:20 | 13:40 | 14:00 | 14:20 | 14:40 | 15:00 | 15:20 | 15:40 | 16:00 | 16:20 | 16:40 | 17:00 | 17:20 | 17:30 | 17:40 | 18:00 | 19:30 | 22:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Chicago E** FLOOR: **5** | | **5.12** Measurement Methods in Bldg/Room Acoustics | | | | | **5.12** Measurement Methods in Bldg/Room Acoustics | | | | | | | | | | | |
| **Chicago F** FLOOR: **5** | | **20.1** Advances in Underwater/ Maritime Acoustics | | | | | **20.1 + 3.2** Advances in Underwater/Maritime Acoustics + Aircraft Interior Noise | | | | | | | | | | | |
| **Chicago G** FLOOR: **5** | | **1.4** Porous Materials Measurement and Modeling | | | | | | **1.4** Porous Materials Measurement and Modeling | | | | | | | | | | |
| **Chicago H** FLOOR: **5** | | | **22.2** Acoustic Black Holes | | | | | **22.3** Application of Virbo-Acoustic Methods to Noise Control Treatment | | | | | | | | | | |
| **Denver** FLOOR: **5** | | **15.4** High Speed Rail Noise and Vibration | | | | | | | | **15.5** Light Rail Noise and Vibration | | | | | | | | |
| **Los Angeles** FLOOR: **5** | | **11.2** Muflers and Silencers | | | | | **11.4** Industrial Noise Simulation | | | | | | | | | | | |
| **Indiana** FLOOR: **6** | | | | | | | | | | | | | | | | | **TAB Dinner** | |
| **Michigan** FLOOR: **6** | | | | | | | | | | | | | | | | | | |
| **Reg Desk** FLOOR: **7** | **Registration Open** 07:00 – 18:00 | | | | | | | | | | | | | | | Registration/Office | | |
| **Grand Ballroom** FLOOR: **7** | | | | | | | | | | | | | | Exposition Opening Reception | | | | |

| TUESDAY 28 AUG | 07:00 | 07:30 | 08:00 | 08:20 | 08:40 | 09:00 | 09:20 | 09:40 | 10:00 | 10:20 | 10:40 | 11:00 | 11:20 | 11:40 | 12:00 | 12:20 | 12:40 | 13:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Addison** FLOOR: **4** | | | | | | **16.1** Product Sound Quality | | | | | **16.1** Product Sound Quality | | | | | | | |
| **Clark** FLOOR: **4** | | | | | | **7.3** Noise Mapping | | | | | **7.3** Noise Mapping | | | | | | | |
| **Armitage** FLOOR: **4** | | | | | | **19.4** Barriers | | | | | **19.4** Barriers | | | | | | | |
| **Belmont** FLOOR: **4** | | | | | | **9.2** Flow Induced Noise & Vibration—Computational Methods | | | | | **9.2** Flow Induced Noise & Vibration —Computational Methods | | | | | | | |
| **Chicago A** FLOOR: **5** | | | | | | **2.2** Application of Active Control | | | | | **2.0** Active Control of Sound and Vibration | | | | | | | |
| **Chicago B** FLOOR: **5** | | | | | | **12.3** Signal Processing | | | | | **12.3** Signal Processing | | | | | | | |
| **Chicago C** FLOOR: **5** | | | | | | **17.6** Apps, Social Media and Virtual Reality as Soundscape Evaluation Tools | | | | **17.6** Apps, Social Media and Virtual Reality as Soundscape Evaluation Tools | | | | | | | | |
| **Chicago D** FLOOR: **5** | | | **Keynote Lecture** | | | | **20.2** Ships and Offshore Noise and Vibration | | | **20.2** Ships and Offshore Noise and Vibration | | | | | | | | |

| TUESDAY | 07:00 | 07:30 | 08:00 | 08:20 | 08:40 | 09:00 | 09:20 | 09:40 | 10:00 | 10:20 | 10:40 | 11:00 | 11:20 | 11:40 | 12:00 | 12:20 | 12:40 | 13:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Chicago E** FLOOR: **5** | | | **Keynote Lecture** | | | | **5.3** HVAC Noise Control Methods and Standards | | | | **5.3** HVAC Noise Control Methods and Standards | | | | | | | |
| **Chicago F** FLOOR: **5** | | | | | | **21.1** Advances in Vehicle NVH | | | | | **21.2** Body Structure NVH | | | | | | | |
| **Chicago G** FLOOR: **5** | | | | | | | **1.3** Microperfrated Panels | | | | **1.3** Microperfrated Panels | | | | | | | |
| **Chicago H** FLOOR: **5** | | | | | | **22.4** Vibro-Acoustic Experiments | | | | | **22.4** Vibro-Acoustic Experiments | | | | | | | |
| **Denver** FLOOR: **5** | | | | | | **12.2** Acoustical Holography/Beamforming | | | | **12.2** Acoustical Holography/Beamforming | | | | | | | | |
| **Los Angeles** FLOOR: **5** | | | | | | | **11.3** Large Silencers | | | | **11.3** Large Silencers | | | | | | | |
| **Indiana** FLOOR: **5** | INCE Board Cert Info/Breakfast 50 ppl | | | | | | | | | | | | | | | Women in Eng Lunch | | |
| **Grand Ballroom** FLOOR: **7** | | | | | | **Exhibits Open**: 09:00 – 17:00<br>**Poster Session**: 09:00 – 12:00<br>**Poster Session**: 13:30 – 17:30 | | | | | | | | | | | |

| TUESDAY 28 AUG | 13:20 | 13:40 | 14:00 | 14:20 | 14:40 | 15:00 | 15:20 | 15:40 | 16:00 | 16:20 | 16:40 | 17:00 | 17:20 | 17:40 | 18:00 | 19:00 | 19:30 | 21:30 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Addison** FLOOR: **4** | **16.1 + 16.2** Product Sound Quality & Power Tool Noise | | | | | | | **16.2** Power Tool Noise | | | | | | | | **Congress Banquet Chicago Museum of Science and Industry** | | |
| **Clark** FLOOR: **4** | **7.3 + 12.1** Noise Mapping + Advances in Measurement Methods | | | | | | | | **12.1** Advances in Measurement Methods | | | | | | | | | |
| **Armitage** FLOOR: **4** | | **24.0** William Lang Memorial Session | | | | | | | | William Lang Reception | | | | | | | | |
| **Belmont** FLOOR: **4** | | | **9.2** Flow Induced Noise & Vibration—Computational Methods | | | | | | | | | | | | | | | |
| **Chicago A** FLOOR: **5** | | **2.2** Application of Active Control | | | | | | **5.11** Predictions and Prediction Methods in Bldg/Room Acoustics | | | | | | | | | | |
| **Chicago B** FLOOR: **5** | | **12.3** Signal Processing | | | | | | | **5.5** Bldg Acoustics Case Studies | | | | | | | | | |
| **Chicago C** FLOOR: **5** | | **17.6** Apps, Social Media and Virtual Realit as Soundscape Evaluation Tools | | | | | **17.5** Indoor Soundscape | | | | | | | | | | | |
| **Chicago D** FLOOR: **5** | | **5.7** Façade and Envelop Sound Isolation | | | | | **5.7** Façade and Envelop Sound Isolation | | | | | | | | | | | |

| TUESDAY | 13:20 | 13:40 | 14:00 | 14:20 | 14:40 | 15:00 | 15:20 | 15:40 | 16:00 | 16:20 | 16:40 | 17:00 | 17:20 | 17:40 | 18:00 | 19:00 | 19:30 | 21:30 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Chicago E** FLOOR: **5** | | **3.4** UAV Noise | | | | **3.4** UAV Noise | | | | | | | | | | | | |
| **Chicago F** FLOOR: **5** | | **21.3** Powertrain NVH | | | | | | **21.4** Aerodynamic and Flow Induced Vehicle Noise | | | | | | | | | | |
| **Chicago G** FLOOR: **5** | | **1.3** Microperfrated Panels | | | | | **10.3** Noise Policies and Regulations | | | | | | | | | | | |
| **Chicago H** FLOOR: **5** | | **22.4 + 22.5** Vibro-Acountic Experiments + Vibro-Acoustics of Composite Panels | | | | | | | **22.7** Mid and high Frequency Numerical Methods in Vibro-Acoustics | | | | | | | | | |
| **Denver** FLOOR: **5** | | **6.1** Classic Papers | | | | | | **6.1** Classic Papers | | | | | | | | | | |
| **Los Angeles** FLOOR: **5** | | **11.5** Mining Noise | | | | | **11.6** Gear Noise | | | | | | | | | | | |
| **Indiana** FLOOR: **6** | | | | | | | | | | | | | | | | | | |
| **Grand Ballroom** FLOOR: **7** | **Exhibits Open**: 09:00 – 17:00<br>**Poster Session**: 13:30 – 17:30 | | | | | | | | | | | | | | | | | |

| WEDNESDAY 29 AUG | 07:00 | 07:30 | 08:00 | 08:20 | 08:40 | 09:00 | 09:20 | 09:40 | 10:00 | 10:20 | 10:40 | 11:00 | 11:20 | 11:40 | 12:00 | 12:20 | 12:40 |
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| **Addison** FLOOR: **4** | | | **19.3** Traffic Noise | | | | | | | | **19.3** Traffic Noise | | | | | | |
| **Clark** FLOOR: **4** | | | **12.1** Advances in Measurement Methods | | | | | | **12.1 + 12.4** Advances in Measurement Methods + Environmental Management through Monitoring | | | | | | | | |
| **Armitage** FLOOR: **4** | | | **13.5** Health Effects of Occupational Noise | | | | | | | | | **19.6** Transport Sound Simulation and Environmental Impact | | | | | |
| **Belmont** FLOOR: **4** | | | | **3.3** Aircraft Exterior Noise | | | | | | **3.3** Aircraft Exterior Noise | | | | | | | |
| **Chicago A** FLOOR: **5** | | | **5.11** Predictions and Prediction Methods in Bldg/Room Acoustics | | | | | | **5.11** Predictions and Prediction Methods in Bldg/Room Acoustics | | | | | | | | |
| **Chicago B** FLOOR: **5** | | | **5.5** Bldg Acoustics Case Studies | | | | | | | **5.5** Bldg Acoustics Case Studies | | | | | | | |
| **Chicago C** FLOOR: **5** | | | **13.1** Health Effects of Environmental Noise | | | | | **13.2** Health Effects of Aircraft Noise | | | | | | | | | |
| **Chicago D/E** FLOOR: **5** | | | | | | | | | | | | | | | | | |

| WEDNESDAY | 07:00 | 07:30 | 08:00 | 08:20 | 08:40 | 09:00 | 09:20 | 09:40 | 10:00 | 10:20 | 10:40 | 11:00 | 11:20 | 11:40 | 12:00 | 12:20 | 12:40 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Chicago F** FLOOR: **5** | | | **21.5** Vehicle Passive Noise Control | | | | | | | | **16.7** Psychoacoustics in Noise Evaluation | | | | | | |
| **Chicago G** FLOOR: **5** | | | **1.1** Advances in Acoustic Materials | | | | | | | **1.1** Advances in Acoustic Materials | | | | | | | |
| **Chicago H** FLOOR: **5** | | | **22.7** Mid and High Frequency Numerical Methods in Virbo-Acoustics | | | | | | | | **22.9** Inverse Approaches in Vibro-Acoustics | | | | | | |
| **Denver** FLOOR: **5** | | | **7.4** Wind Turbine Noise | | | | | | | **7.4** Wind Turbine Noise | | | | | | | |
| **Los Angeles** FLOOR: **5** | | | | | | **5.8** Acoustic Regulations, Enforcement and Classification for New, Existing and Retrofitted Bldgs | | | | **5.8** Acoustic Regulations, Enforcement and Clasification for New, Existing and Retrofitted Bldgs | | | | | | | |
| **Indiana** FLOOR: **6** | | | **11.7** Case Studies | | | | | | | | | | | | | | |
| **Northwestern** FLOOR: **6** | | | | | **8.1** Advances in Construction Noise | | | | | | | | | | | | |
| **Grand Ballroom** FLOOR: **7** | | | **Exhibits Open**: 08:00 – 12:00<br>**Poster Session**: 09:00 –12:00 | | | | | | | | | | | | | | |

| WEDNESDAY 29 AUG | 13:00 | 13:20 | 13:40 | 14:00 | 14:20 | 14:40 | 15:00 | 15:20 | 15:30 | 16:00 | 16:30 | 17:00 | 17:30 | 18:00 | 18:30 | 19:00 |
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| **Addison** FLOOR: **4** | | | **19.5** Perception of Electric and Hybrid Vehicles | | | | | | | | | | | | | |
| **Clark** FLOOR: **4** | | **12.4** Environmental Management through Monitoring | | | | | | | | | | | | | | |
| **Armitage** FLOOR: **4** | | | **19.6** Transport Sound Simulation and Environmental Impact | | | | | | | | | | | | | |
| **Belmont** FLOOR: **4** | | **3.3** Aircraft Exterior Noise | | | | | | | | | | | | | | |
| **Chicago A** FLOOR: **5** | | | | | | | | | | | | | | | | |
| **Chicago B** FLOOR: **5** | | | | | | | | | | | | | | | | |
| **Chicago C** FLOOR: **5** | | | | | | | | | | | | | | | | |
| **Chicago D/E** FLOOR: **5** | | | **INCE-USA Award Recognition Ceremony** | | | | | | **Plenary Lecture** | | **Closing Ceremony** | | | | | |

| WEDNESDAY | 13:00 | 13:20 | 13:40 | 14:00 | 14:20 | 14:40 | 15:00 | 15:20 | 15:30 | 16:00 | 16:30 | 17:00 | 17:30 | 18:00 | 18:30 | 19:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Chicago F** FLOOR: **5** | **16.7** Psychoasoustics in Noise Evaluation | | | | | | | | | | | | | | | |
| **Chicago G** FLOOR: **5** | | | | | | | | | | | | | | | | |
| **Chicago H** FLOOR: **5** | | | **22.9** Inverse Approaches in Vibro-Acoustics | | | | | | | | | | | | | |
| **Denver** FLOOR: **5** | | | | | | | | | | | | | | | | |
| **Los Angeles** FLOOR: **5** | | | | | | | | | | | | | | | | |
| **Indiana** FLOOR: **6** | | | | | | | | | | | | | | | | |
| **Northwestern** FLOOR: **6** | | | | | | | | | | | | | | | | |
| **Grand Ballroom** FLOOR: **7** | **Exhibits Open**: 08:00 – 12:00 **Poster Sessions**: 09:00 – 12:00 | | | | | | | | | | | | **Closing Reception** | | | |

# DETAILED PROGRAM
# SUNDAY, 26 AUG

| SUNDAY 26 AUG | 08:00 | 08:20 | 10:00 | 10:20 | 11:40 | 12:00 | 13:00 | 13:20 | 14:40 | 15:00 | 15:20 | 15:40 | 16:00 | 16:40 | 17:00 | 17:40 | 18:00 | 19:00 | 20:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Addition & Clark** FLOOR: **4** | | | | | | | | I-INCE General Assembly | | | | | | | | | | | |
| **Chicago A/B/C** FLOOR: **5** | | | | | | | | | | | | | **Opening Ceremony and Plenary Session** | | | | | | |
| **Chicago D/E/F/G/H** FLOOR: **5** | | | | | | | | | | | | | | | | | | | |
| **Denver** FLOOR: **5** | | | I-INCE Young Professionals Practice School | | | | | | | | | | | | | | | Student Training | |
| **Miami** FLOOR: **5** | INCE Board Certification Exam | | | | | | | | | | | | | | | | | | |
| **Illinois** FLOOR: **6** | | INCE Fundamentals Exam Preparation Course | | | | | INCE Fundamentals Optional Exam | | | | | | | | | | | | |
| **Minnesota** FLOOR: **6** | Short Course: Noise Control in Ducts | | | | | | | | | | | | | | | | | | |
| **Grand Ballroom 1** FLOOR: **7** | Public Outreach Session | | | | | | | | | | | | | | | | | | |
| **Grand Ballroom 2/3** FLOOR: **7** | | | | | | | | | | | | | | | | | **Welcome Reception** | | |

# SUNDAY, 26 AUGUST

**16:30 – 17:00** | FLOOR: **5** | ROOM: **Chicago Ballroom**

**17:00 – 18:00**

**Plenary Speaker** | **Barry Gibbs**

Acoustical Research Unit, University of Liverpool School of Architecture, Fellow

## 4002 | Structure-Borne Sound in Buildings: Application of Vibro-Acoustic Methods to Measurement and Prediction

Chair | J. Stuart Bolton

Barry Gibbs is Professorial Fellow within the Acoustics Research Unit of the University of Liverpool School of Architecture. His main research interest is structure-borne sound. Machines generate vibration transmission paths, which contribute to the sound pressure in buildings and other structures. The transmission is complicated, but engineers and consultants require practical methods for prediction and control. He is developing such methods and investigating the uncertainty resulting from simplifying measurement procedures and calculations. He has authored and co-authored over 90 papers in peer-reviewed international journals and almost 200 conference papers. He was founding Editor of the journal Building Acoustics, now into its third decade. He has been Keynote Speaker at conferences in Brazil, Hong Kong, Singapore, as well as the U.K. He is a Fellow of the Institute of Acoustics, of the Acoustical Society of America, and of the International Institute of Acoustics and Vibration. He was President of the International Institute of Acoustics and Vibration in 2002-2004. In 2015, he was awarded the Institute of Acoustics R W Stephens Medal for outstanding contributions to acoustics research and education. He will be President of the Institute of Acoustics in 2018-20.

# DETAILED PROGRAM
# MONDAY, 27 AUG

| MONDAY 27 AUG | 07:00 | 07:30 | 08:00 | 08:20 | 08:40 | 09:00 | 09:20 | 09:40 | 10:00 | 10:20 | 10:40 | 11:00 | 11:20 | 11:40 | 12:00 | 12:20 | 12:40 | 13:00 |
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| **Addison** FLOOR: **4** | | | | | | **14.1** Advances in Numerical Methods and Simulation | | | | | **14.1** Advances in Numerical Methods and Simulation | | | | | | | |
| **Clark** FLOOR: **4** | | | | | | **2.1** Technical Advances in Active Control of Sound and Vibration | | | | **2.1** Advances in Active Control of Sound and Vibration | | | | | | | | |
| **Armitage** FLOOR: **4** | | | | | | **18.1** Advances in Tire Noise | | | | | **18.1** Advances in Tire Noise | | | | | | | |
| **Belmont** FLOOR: **4** | | | | | | **9.3** Flow Induced Noise and Vibration—Computationals Methods | | | | | **9.3** Flow Induced Noise and Vibration—Computationals Methods | | | | | | | |
| **Halstead Foyer** FLOOR: **4** | | | | | | | | | | | | | | | | | | |
| **Chicago A** FLOOR: **5** | | | | | | **7.1** Advances in Community Noise | | | | | | **7.2** Urban Sound Planning | | | | | | |
| **Chicago B** FLOOR: **5** | | | | | | **3.1** Technical Advances in Aircraft Noise | | | | **3.1 + 3.5** Advances in Aircraft Noise & Airport Noise | | | | | | | | |
| **Chicago C** FLOOR: **5** | | | | | | **17.1** Soundscape, Health and Quality of Life | | | | **17.1 + 17.3** Soundscape, Health & Quality of Life & Psychoacoustic Evaluation of Environmental Noise/Soundscape | | | | | | | | |
| **Chicago D** FLOOR: **5** | | | **Keynote Lecture** | | | **5.2** Impact & Structureborne Noise in Bldgs | | | | **5.2** Impact and Structureborne Noise in Bldgs | | | | | | | | |

| MONDAY | 07:00 | 07:30 | 08:00 | 08:20 | 08:40 | 09:00 | 09:20 | 09:40 | 10:00 | 10:20 | 10:40 | 11:00 | 11:20 | 11:40 | 12:00 | 12:20 | 12:40 | 13:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Chicago E** FLOOR: **5** | | | **Keynote Lecture** | | | **5.6** Bldg Acoustic Measurement | | | | | **5.6** Bldg Acoustic Measurement | | | | | | | |
| **Chicago F** FLOOR: **5** | | | | | | | **5.4** HVAC Equipment and System Noise | | | | **5.4** HVAC Equipment and System Noise | | | | | | | |
| **Chicago G** FLOOR: **5** | | | | | | **1.2** Acoustic Metamaterials | | | | | | **1.2** Acoustic Metamaterials | | | | | | |
| **Chicago H** FLOOR: **5** | | | | | | **22.1** Advances in Vibro-Acoustics | | | | **22.1** Advances in Vibro-Acoustics | | | | | | | | |
| **Denver** FLOOR: **5** | | | | | | **15.3** Noise & Vibration Mitigation Measures | | | | | | **15.3** Noise & Vibration Mitigation Measure | | | | | | |
| **Los Angeles** FLOOR: **5** | | | | | | **11.2** Mufflers and Silencers | | | | | | **11.0** Industrial Noise | | | | | | |
| **Indiana** FLOOR: **6** | Student Breakfast | | | | | | | | | | | | | | | | | |
| **Michigan** FLOOR: **6** | | | | | | | | | | | | | | | | | | |
| **Reg Desk** FLOOR: **7** | **Registration Open** 07:00 – 18:00 | | | | | | | | | | | | | | | | | |

| MONDAY 27 AUG | 13:20 | 13:40 | 14:00 | 14:20 | 14:40 | 15:00 | 15:20 | 15:40 | 16:00 | 16:20 | 16:40 | 17:00 | 17:20 | 17:40 | 18:00 | 19:30 | 22:00 |
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| **Addison** FLOOR: **4** | | **14.1** Advances in Numerical Methods and Simulation | | | | | | | **14.1** Advances in Numerical Methods and Simulation | | | | | | | | |
| **Clark** FLOOR: **4** | | **2.3** Algorithems for Active Control and Speech Enhancement | | | | | | | | **Rayleigh Lecture** | | | | | | | |
| **Armitage** FLOOR: **4** | | | **18.2** Pavement Noise | | | | **18.3** Tire and Road Noise - Tire Acoustic Cavity Noise | | | | | | | | | | |
| **Belmont** FLOOR: **4** | | Young Professionals Workshop | | | | | | | Presentation to Awardees of the I-INCE YP Attendance Grants by Marion BurgessYoung Professionals Workshop | | | | | | | | |
| **Halstead Foyer** FLOOR: **4** | | | | | | | | | Young Professionals Networking | | | | | | | | |
| **Chicago A** FLOOR: **5** | | **7.2** Urban Sound Planning | | | | | **16.5** Information Technology Equipment Noise | | | | | | | | | | |
| **Chicago B** FLOOR: **5** | **3.5** Airport Noise | | | | | | **3.5** Airport Noise | | | | | | | | | | |
| **Chicago C** FLOOR: **5** | | | **17.4** Soundscape in Architecture and Urban Planning | | | | **17.4** Soundscape in Architecture and Urban Planning | | | | | | | | | | |
| **Chicago D** FLOOR: **5** | | **5.2** Impact and Structureborne Noise in Bldgs | | | | | | **5.2** Impact and Structureborne Noise in Bldgs | | | | | | | | | |

| MONDAY | 13:20 | 13:40 | 14:00 | 14:20 | 14:40 | 15:00 | 15:20 | 15:40 | 16:00 | 16:20 | 16:40 | 17:00 | 17:20 | 17:40 | 18:00 | | 19:30 | 22:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Chicago E** FLOOR: **5** | | **5.12** Measurement Methods in Bldg /Room Acoustics | | | | | **5.12** Measurement Methods in Bldg/ Room Acoustics | | | | | | | | | | | |
| **Chicago F** FLOOR: **5** | | **20.1** Advances in Underwater/ Maritime Acoustics | | | | | **20.1 + 3.2** Advances in Underwater/Maritime Acoustics + Aircraft Interior Noise | | | | | | | | | | | |
| **Chicago G** FLOOR: **5** | | **1.4** Porous Materials Measurement and Modeling | | | | | | **1.4** Porous Materials Measurement and Modeling | | | | | | | | | | |
| **Chicago H** FLOOR: **5** | | | **22.2** Acoustic Black Holes | | | | | **22.3** Application of Virbo-Acoustic Methods to Noise Control Treatment | | | | | | | | | | |
| **Denver** FLOOR: **5** | | **15.4** High Speed Rail Noise and Vibration | | | | | | | | **15.5** Light Rail Noise and Vibration | | | | | | | | |
| **Los Angeles** FLOOR: **6** | | **11.2** Mufflers and Silencers | | | | | **11.4** Industrial Noise Simulation | | | | | | | | | | | |
| **Indiana** FLOOR: **6** | | | | | | | | | | | | | | | | | **TAB Dinner** | |
| **Michigan** FLOOR: **6** | | | | | | | | | | | | | | | | | | |
| **Reg Desk** FLOOR: **7** | **Registration Open** 07:00 – 18:00 | | | | | | | | | | | | | | | Registration/Office | | |

# MONDAY, 27 AUGUST

**08:00 – 09:00** | FLOOR: **5** | ROOM: **Chicago D**

## KEYNOTE: 5001 | Building Non Modal Vibro-Acoustics Models from Measured System Responses

Chair | Steffen Marburg

### Keynote Speaker | Jean-Louis Guyader, Emeritus Professor

National institute of Applied Sciences

Jean-Louis Guyader is presently Emeritus Professor at the National Institute of Applied Sciences (INSA) in Lyon, France. He was the former Director of the Acoustics and Vibration Laboratory of INSA and founded SONORHC, a small company working on applications of time reversal to engineering problems, in 2011. His research focuses on vibration and acoustics, fluid-structure interaction in heavy and light fluids, inverse acoustic problems, theoretical methods for medium frequency vibro-acoustics problems, metamaterials, and time reversal in structures. His research has had numerous industrial applications in the aeronautics, automotive, building, and underwater defense industries. He has written two books and contributed several chapters to handbooks and compendiums. He is Fellow of the Acoustical Society of America and of the International Institute of Acoustics and Vibration. Moreover, he received the Chavasse prize and the Medal of the French Acoustical Society.

**08:00 – 09:00** | FLOOR: **5** | ROOM: **Chicago E**

## KEYNOTE: 5004 | Acoustic Materials for Industrial Noise Control

Chair | Bob Bernhard

### Keynote Speaker | A.R. Mohanty, PhD

Indian Institute of Technology

Dr. A. R. Mohanty is a professor of Mechanical Engineering at the Indian Institute of Technology, Kharagpur, India and also the Shyamal Ghosh and Sunanda Ghosh Chair Professor, where he has been a faculty member for the last two decades. Professor Mohanty obtained his PhD in the areas of Noise Control from the University of Kentucky. He was also a postdoctoral fellow at the Ray W. Herrick Labs of Purdue University working in the area of active control of tire noise. Professor Mohanty has worked at the CAE/NVH department of Ford Motor Company in Dearborn and Larsen & Toubro Limited, Mumbai. He has been a consultant to more than a hundred companies in the areas of noise control and machinery condition monitoring. His research interests are in the areas of machinery condition monitoring, industrial noise control and acoustical materials. Dr. Mohanty has more than 150 refereed journal and conference publications; he has one book, three book chapters and one patent to his credit. He held visiting faculty positions at universities in the USA, France and Singapore. Professor Mohanty is a fellow of the Indian National Academy of Engineering, Acoustical Society of India, Condition Monitoring Society of India and the International Society of Engineering Asset Management.

## 14.1 Numerical Methods and Simulation—*Advances in*

**09:00 – 17:40** | FLOOR: **4** | ROOM: **Addison**

Chairs | Steffen Marburg, Tim Wu, Chandramouli Padmanabhan, Chad Musser

| | | |
|---|---|---|
| 09:00 | **1456** | **Numerically Solving the Biot Equations for Sound Absorbing Materials Using a Wave Expansion Method** |
| | | Ciarán O'Reilly; Olivier Dazel; Gwendal Gabard |
| 09:20 | **1348** | **Vibration Analysis of Laminated Composite Rectangular Plates with General Boundary Conditions** |
| | | Yu Fu; Jianjun Yao; Zhenshuai Wan; Gang Zhao |
| 09:40 | **1618** | **Free Vibration Analysis of Arbitrary Triangular Laminated Composite Plates with General Boundary Conditions** |
| | | Lu Yanming; Liu Tao |
| 10:00 | **1298** | **Research on Optimization Algorithm of Bidirectional Evolutionary Structure Based on Stiffness Optimization** |
| | | XiaoYan Teng; BingKun Mao; HeTao Zhao; XuDong Jiang |
| 10:20 | Coffee Break | |
| 10:40 | **1899** | **Overview of Structural-Acoustic Modal Analysis under Random Loading** |
| | | Shung H. (Sue) Sung; Donald J. Nefske |
| 11:00 | **1769** | **A Study of the Frequency and Shape Dependency of Acoustic Radiation Modes** |
| | | Jiawei Liu; Yangfan Liu; J. Stuart Bolton |
| 11:20 | **1797** | **Application of the Energy Based Finite Element Method for Acoustic Calculations in the High Frequency Range** |
| | | Boris Dilba; Otto von Estorff; Henning Lohmann; Olgierd Zaleski |
| 11:40 | **2148** | **Prediction of Radiated Noise Generated by Compact Acoustic Sources and Vibrating Systems** |
| | | Abderrazak Mejdi; Bryce Gardner; Chad Musser |
| 12:00 | Lunch on Your Own | |
| 13:40 | **1479** | **A Low-Rank Iteration Scheme for Multi-Frequency Acoustic Problems** |
| | | Suhaib Baydoun; Lei Li; Matthias Voigt; Steffen Marburg |

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| 14:00 | **1461** | **An Improved Method for Dynamic Load Identification Based on Tikhonov Regularization** |
| | | Zhanpeng Zheng; Chengjun Wu |
| 14:20 | **2149** | **Prediction of Acoustic Response using Ray Tracing in the Presence of Complex Shaped Obstacles** |
| | | Abderrazak Mejdi; Bryce Gardner; Chad Musser |
| 14:40 | **1345** | **An Artificial Bee Colony Algorithm for Solving Hydraulic Shaking Table Acceleration Harmonic Estimation Problem** |
| | | Jianjun Yao; Zhenshuai Wan |
| 15:00 | **2104** | **Noise Shielding Models for the Conceptual Design of Unconventional Aircraft** |
| | | Francesco Centracchio; Lorenzo Burghignoli; Monica Rossetti; Umberto Iemma |
| 15:20 | **2276** | **Vibration Mode Localization in Rectangular Plates with V-Shaped Through Cracks** |
| | | Tianming Huang; Huancai Lu; D. Michael McFarland; Wen L. Li; Chin An Tan; Lawrence A. Bergman; Alexander F. Vakakis |
| 15:40 | Coffee Break | |
| 16:00 | **1416** | **A Comprehensive Analysis Process for Vehicle Impact-Harshness Performance Assessment** |
| | | Paras Shah; Raghav Hanumantharayappa; Parimal Tathavadekar |
| 16:20 | **1429** | **A Comparison of Ground Surface Exciters for Locating Buried Pipelines** |
| | | Boao Jin; Yan Gao; Xiwang Cui; Yuyou Liu |
| 16:40 | **2233** | **Approximate Analytical Solution of Nonlinear Natural Frequencies of a Functionally Graded Material Microbeam by using Multiple Harmonic Balance Method** |
| | | Canan Uz; Ender Cigeroglu |
| 17:00 | **2305** | **Multi-Objective Optimal Design of Launch Pad by Empirical Prediction Method Combined with NURBS Modeling and Genetic Algorithm** |
| | | Seoryong Park; Soogab Lee; Dongyeon Han |
| 17:20 | **2327** | **The Effect of Hydrostatic Loading on the Vibration Response of a Plate: Investigative Study** |
| | | Kyle Saltmarch; Jie Pan; David Matthews |

## **18.1** Tire and Road Noise—*Advances in*

MONDAY | **09:00 – 12:20** | FLOOR: **4** | ROOM: **Armitage**

Chairs | Ulf Sandberg, Tyler Dare, Paul Donavan

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|---|---|---|
| 09:00 | **1857** | **Spectral Analysis of the Acoustical Performance of Winter Tires for Different Road Textures, Test Speeds and Tire State-of-Wear** |
| | | Tiago Vieira; Ulf Sandberg |
| 09:20 | **2169** | **NordTyre—Noise Reduction Potential in Nordic Countries by Introduction of EU Tyre Label** |
| | | Rasmus Stahlfest Holck Skov; Hans Bendtsen; Ulf Sandberg |
| 09:40 | **1474** | **A Comparison Between Modal and Wave Propagation Models for Simulation of Tire-Pavement Interaction Noise** |
| | | Sterling McBride; Ricardo Burdisso; Corina Sandu |
| 10:00 | **2206** | **A Study of Groove Pulsation Noise Reduction by Simple Aerodynamic Modelling of a Tire Rolling on Porous Pavement** |
| | | Masao Ishihama; Kosuke Miyoshi |
| 10:20 | Coffee Break | |
| 10:40 | **1639** | **Input Power Estimation to Tire due to Tire-Road Interference for Tire and/or Road Labeling** |
| | | Toru Yamazaki; Kaito Sawada; Hiroki Nakamura; Atsushi Kitahara |
| 11:00 | **1559** | **Diagnosis of Tire Vibration Noise Based on a Smart Tire System** |
| | | Yan Wang; Yintao Wei |
| 11:20 | **1837** | **Developing Evaluation Model of Tire Pattern Impact Noise** |
| | | Wataru Takahashi; Nobutaka Tsujiuchi; Akihito Ito; Hamiyu Seki; Kazumasa Hosomi |
| 11:40 | **2108** | **An Image Based Computational Model to Predict Air Pumping Noise in Rolling Tires** |
| | | Shivashish Gupta; Madhav Londhe; Sharad Goyal; Chirag Patel; Nachiketa Tiwari |
| 12:00 | **1501** | **Models of Tire-Road Contact Deformation and Cavity Acoustics for Rolling Resistance and Road Noise** |
| | | Masao Ishihama; Keisuke Matsumoto; Kosuke Miyoshi; Isoharu Nishiguchi |
| 12:20 | Lunch on Your Own | |

## 18.2 Tire and Road Noise—*Pavement Noise*

MONDAY | **14:00 – 16:20** | FLOOR: **4** | ROOM: **Armitage**

Chairs | Anneleen Bergiers, Dana Lodico

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| 14:00 | **1719** | **Development of Suitable Low Noise Road Surfacing Materials on Local Roads in Hong Kong** |
| | | Cho Shing Leung; Wai Chau; Chee Kwan Lee; Kwok Keung Lau |
| 14:20 | **1365** | **Acoustical Longevity and Durability of Pavements** |
| | | Dana Lodico; Paul Donavan |
| 14:40 | **1876** | **Acoustic Lifecycle Study of the Double-Layer Porous Asphalt on E4 in Huskvarna, Sweden** |
| | | Ulf Sandberg; Piotr Mioduszewski |
| 15:00 | Coffee Break | |
| 15:20 | **1424** | **Pilot Study in Antwerp to Study the Acoustical Quality and Durability of Thin Noise Reducing Asphalt Layers in an Urban Environment** |
| | | Anneleen Bergiers; Johan Maeck |
| 15:40 | **1601** | **Investigation of the Sound Power Level Equation for Concrete Pavement** |
| | | Iori Yasuda; Hisho Mori; Tomotaka Ueta; Kenichi Ishikawa; Motoomi Yoshida; Shiro Kabashima |
| 16:00 | **1918** | **An In-Depth Look at the Tire Rubber Hardness Influence on Tire/Road Noise Measurements** |
| | | Erik Buehlmann; Sebastian Egger |

## 18.3 Tire and Road Noise—*Tire Acoustic Cavity Noise*

MONDAY | **16:20 – 17:40** | FLOOR: **4** | ROOM: **Armitage**

Chairs | Truls Berge, Rui Cao

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| 16:20 | **1486** | **Experimental Analysis of Tyre Acoustic Cavity Resonance Noise** |
| | | Xiaojun Hu; Xiandong Liu |
| 16:40 | **1488** | **Simulation Analysis of Vibration Response of Tire Inner Surface Applied for Acoustic Cavity Resonance** |
| | | Jiajing Yi; Xiandong Liu |
| 17:00 | **2059** | **Identifying Acoustic Tube Resonance in Tire Noise** |
| | | Paul Donavan |
| 17:20 | **1367** | **Passband Analysis of Tire-Pavement Noise** |
| | | Michael Staiano |

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| 17:40 | **1482** | **Tire Cavity Induced Structure-Borne Noise Study with Experimental Verification** |
| | | Rui Cao; J. Stuart Bolton |

## **9.3** Flow Induced Noise and Vibration—*Experiments*

MONDAY | **09:00 – 11:40** | FLOOR: **4** | ROOM: **Belmont**

Chair | Carsten Spehr

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| 09:00 | **1610** | **Acoustic Characteristics of High Speed Jets With an Offset Plate** |
| | | Harinath Reddy Nakkala; Srinivasan K |
| 09:20 | **1546** | **Extreme Value Statistics of Flow Induced Noise and Vibration** |
| | | Connor McCluskey; Stephen Conlon; Manton Guers |
| 09:40 | **1494** | **Optical Visualization of Sound Source of Edge Tone using Parallel Phase-Shifting Interferometry** |
| | | Risako Tanigawa; Kenji Ishikawa; Kohei Yatabe; Yasuhiro Oikawa; Takashi Onuma; Hayato Niwa |
| 10:00 | **1613** | **Overview of Recent Flow Induced Sound and Vibration Experimental Works at Groupe d'Acoustique de l'Universite de Sherbrooke** |
| | | Olivier Robin; Alain Berry |
| 10:20 | Coffee Break | |
| 10:40 | **1397** | **Measurement and Mode Analysis of Flow Induced Noise Radiated from Forward- and Back-Step with Combined Proper Orthogonal Decomposition Analysis** |
| | | Osamu Terashima |
| 11:00 | **1284** | **Blower's Pulsation Dampener using Reactive Silencers** |
| | | Paul Liang |
| 11:20 | **1547** | **Low Wavenumber Pressure Content of Turbulent Boundary Layer Flows** |
| | | Richard DeJong; Paul Bootsma; Kurtis DeVries; Steven Sorenson |
| 11:40 | Lunch on Your Own | |
| 13:40 | **I-INCE Young Professionals Workshop** *(See Schedule)* | |
| 16:00 | **Young Professionals Networking \| Halstead Foyer** | |

## 7.1 Community Noise—*Advances in*

MONDAY | **09:00 – 10:40** | FLOOR: **5** | ROOM: **Chicago A**

Chairs | Trond Maag, Margit Bonacker

| | | |
|---|---|---|
| 09:00 | **2082** | **New Strategies for Sound in the Public Realm: Integrating a Publicly-Controlled Sound Installation in an Active City Square** |
| | | Sven Anderson |
| 09:20 | **1856** | **Everyday Quiet Areas: What They Mean and How They Can be Integrated in Noise Action Plans** |
| | | Antonella Radicchi |
| 09:40 | **1873** | **Key Elements Related to Context and Morphology for the Acoustic Design of Urban Environments** |
| | | Arnthrudur Gisladottir; Trond Maag; Lea Louise Holst Laursen; Poul Henning Kirkegaard |
| 10:00 | **1590** | **Can Participatory Experience Performances Co-Create Qualification and Design of Audible Public Realm?** |
| | | Trond Maag; Rikke Munck Petersen |
| 10:20 | **2281** | **Avoiding Neighbors Complaints because of Construction Site Noise** |
| | | Margit Bonacker |
| 10:40 | Coffee Break | |

## 7.2 Community Noise—*Urban Sound Planning*

MONDAY | **11:00 – 15:00** | FLOOR: **5** | ROOM: **Chicago A**

Chairs | Luigi Maffei, Dick Botteldooren

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| 11:00 | **1498** | **Objective and Subjective Assessment of Pockets of Quiet Inside Historical Urban Areas** |
| | | Luigi Maffei; Roxana Adina Toma; Massimiliano Masullo |
| 11:20 | **1935** | **Sounds in the City: Differences in Urban Noise Management Strategies across Cities** |
| | | Christopher Trudeau; Daniel Steele; Romain Dumoulin; Catherine Guastavino |
| 11:40 | **1628** | **Screening Noise Analysis with Preliminary Building Project Information** |
| | | Mark Storm |
| 12:00 | **1927** | **Early Stage Sound Planning in Urban Re-Development: The Antwerp Case Study** |
| | | Dick Botteldooren; Luc Dekoninck; Camille Meeussen; Timothy Van Renterghem |

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| 12:20 | Lunch on Your Own | |
| 13:40 | **1785** | **The Blue Noise Promenade—A Large-Scale Model for Bringing Sound into the Urban Planning and Design Agenda of the Limmat Valley Zurich** |
| | | Trond Maag; Andres Bosshard |
| 14:00 | **1938** | **Crowdsourcing Soundscape Information from Smartphones** |
| | | Yalcin Yildirim |
| 14:20 | **1863** | **Acoustic Planning of Urban Space** |
| | | Mario Huaquin |
| 14:40 | **1894** | **Acoustical Criteria for the Texas Capitol Complex Master Plan** |
| | | Jack B. Evans |
| 15:00 | Coffee Break | |

## 16.5 Sound Quality and Product Noise—*Information Technology Equipment Noise*

MONDAY | **15:20 – 17:00** | FLOOR: **5** | ROOM: **Chicago A**

Chairs | Seth Bard, Charles Oppenheimer

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| 15:20 | **2230** | **ISO 10302-1 Under Revision—For More Practical Test Conditions to Simulate Actual Load Conditions of Air-Moving Devices** |
| | | Ikuo Kimizuka; Gaku Minorikawa |
| 15:40 | **1817** | **On the Use of Scale Models for Small-Scale Acoustic Applications** |
| | | Nan Zhang; D. W. Herrin |
| 16:00 | **1665** | **Technical Challenges for High Static Pressure Application of Test Plenum per ISO10302-1 for Small Fan Sound Power Level Measurement** |
| | | Hideto Kawahara; Takefumi Nakano; Gaku Minorikawa; Ikuo Kimizuka; Toshiaki Nakayama; Msaharu Miyahara |
| 16:20 | **1626** | **Study on Identification and Reduction of Aerodynamic Noise Source on Casing in Axial Flow Fan** |
| | | Ryouichi Maki; Gaku Minorikawa; Takefumi Nakno; Tae-Gyun Lim |
| 16:40 | **1477** | **Impulsive Sounds in Printers** |
| | | Charles Oppenheimer |

## *3.1 Aircraft Noise—Advances in*

MONDAY | **09:00 – 11:00** | FLOOR: **5** | ROOM: **Chicago B**

Chair | Hirokazu Ishii

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| 09:00 | **1528** | **The Role of Castellations on Pipe Jet Noise** |
| | | R. Anureka; Srinivasan K |
| 09:20 | **1386** | **Noise Reduction and Aerodynamics of Airfoils with Porous Trailing Edges** |
| | | Thomas Geyer; Ennes Sarradj |
| 09:40 | **1691** | **Experimental Study on Noise Characteristics and Evaluation of Small Ducted Fan** |
| | | Takuya Kuranaga; Gaku Minorikawa; Takufumi Nakano |
| 10:00 | Coffee Break | |
| 10:20 | **1606** | **Reduction of Impinging Noise Issued from Non-Circular Orifices** |
| | | Kabilan Baskaran; Abhijit Dhamanekar; Srinivasan K |
| 10:40 | **1510** | **Cabin Noise Measurements with Microphone Arrays and Sound Intensity Probes** |
| | | Daniel Ernst; Carsten Spehr; Dirk Döbler |

## **3.5 Aircraft Noise—*Airport Noise***

MONDAY | **11:00 – 17:00** | FLOOR: **5** | ROOM: **Chicago B**

Chairs | Idar Granoien, Shinohara Naoaki

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| 11:00 | **1991** | **Noise Measures for the Enhancement of Airport Function at Narita International Airport** |
| | | Saburo Ogata; Daiske Imai; Shinji Hori; Kazuya Tamaki |
| 11:20 | **1793** | **Effectiveness of Noise Abatement Measures by using Restriction of Reverse Thrust and Noise Embankment on the Side of Runway** |
| | | Naoaki Shinohara; Toshiyasu Nakazawa; Yasuaki Kawase; Takatoshi Yokota; Kazuya Tamaki |
| 11:40 | **1820** | **Noise Indicators for Aircraft Noise Monitoring in Vietnam** |
| | | Thu Lan Nguyen; Takashi Yano; Ichiro Yamada; Masaharu Ohya; Koichi Makino; Thi Thanh Vu |
| 12:00 | Lunch on Your Own | |
| 13:40 | **1632** | **Air Traffic Management and Noise** |
| | | Mats Åbom; Karl Bolin; Pernilla Ulfvengren |

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| 14:00 | **1604** | **Performance Based Navigation (PBN) as a Noise Abatement Tool** |
| | | Jan Anders Marheim; Paal Hengebol; Michael James Newman |
| 14:20 | **2079** | **A Study on Aircraft Noise Compensation Criteria of the Environmental Impact Assessment in the Vicinity of the Airports** |
| | | JunHyeok Woo; Hyun Sup Kim; JongWon Son; Sang Kyu Park |
| 14:40 | **1842** | **Single Aircraft Pass-By: Modelling Relevant Noise at Ground** |
| | | Peter Houtave; Jean-Pierre Clairbois |
| 15:00 | Coffee Break | |
| 15:20 | **1924** | **Rotorcraft Noise Prediction Using JAXA's DREAMS Database of Meteorological Effects on Noise Propagation** |
| | | Hirokazu Ishii; Takatoshi Yokota; Koichi Makino; Toshio Matsumoto |
| 15:40 | **1523** | **Noise Sharing at ITAMI** |
| | | Yoshiyasu Yukawa; Kenji Matsubara |
| 16:00 | **1929** | **Noise-Related Charges and the Aircrafts' Noise Performance of the Major Airports** |
| | | Toru Takahashi; Naoaki Shinohara |
| 16:20 | **1733** | **Aircraft Type Identification for Jet Airplanes by Convolutional Neural Network** |
| | | Makoto Morinaga; Junichi Mori; Ippei Yamamoto; Takanori Matsui; Yasuaki Kawase; Kazuyuki Hanaka |
| 16:40 | **1747** | **Relevance of Buildings in Aircraft Noise Predictions** |
| | | Felix Schlatter; Micha Köpfli; Jean-Marc Wunderli |

## 17.1 Soundscape and Noise Management *—Health and Quality of Life*

MONDAY | **09:00 – 11:20** | FLOOR: **5** | ROOM: **Chicago C**

Chairs | Irene van Kamp, Andre Fiebig

| | | |
|---|---|---|
| 09:00 | **2118** | **A Research on Sound Events that are Easy to be Recalled by People—An Analysis of Questionnaire that is Conducted in the Coursework of Acoustics** |
| | | Takeshi Akita |
| 09:20 | **1602** | **Soundscape Design for Management of Behavioral Disorders: A Pilot Study among Nursing Home Residents with Dementia** |
| | | Paul Devos; Francesco Aletta; Tara Vander Mynsbrugge; Pieter Thomas; Karlo Filipan; Mirko Petrovic; Patricia De Vriendt; Dominique Van de Velde; Dick Botteldooren |

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| 09:40 | **2178** | **Study on the Anti-Noise Design of Child Care Center—Cases Study of Child Care Centers in Westwood, Los Angeles** |
| | | Mengxi Gao; Zaisheng Hong; Yiqian Yuan; Jiangwei Kong |
| 10:00 | Coffee Break | |
| 10:20 | **2009** | **The Restorative Environmental Sounds Perceived by Children** |
| | | Hui Ma; Shan Shu |
| 10:40 | **1571** | **Sound Emission Level in Spinning Classes and the Influence in the Health of Teachers** |
| | | Hetty Lobo; Israel Zica; Samuel Abdelmur; Felipe Dinato; José Lobo; Clarice Daga; Carlos Luna |
| 11:00 | **2016** | **Reliability of Wrist-Worn Sensors for Measuring Physiological Responses in Soundscape Assessments** |
| | | Bhan Lam; Joo Young Hong; Zhen Ting Ong; Woon-Seng Gan |

## 17.3 Soundscape and Noise Management—*Psychoacoustic Evaluation of Environmental Noise/Soundscape*

MONDAY | **11:20 – 12:20** | FLOOR: **5** | ROOM: **Chicago C**

Chairs | Patricia Davies, Andre Fiebig

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| 11:20 | **1340** | **Hoover Dam: An Example Focusing Soundscape Contextual Sensations, Realizations and Thought** |
| | | Wade Bray |
| 11:40 | **2068** | **Environment of Railway Station by Field Measurement and Subjective Experiment** |
| | | Hyojin Lee; Akiko Sugahara; Shinichi Sakamoto; Yoshiki Ikeda |
| 12:00 | **1698** | **A Psychoacoustic Approach to Playground Construction in a School Area** |
| | | M. Ercan Altinsoy |
| 12:20 | Lunch on Your Own | |

## 17.4 Soundscape and Noise Management—*Soundscape in Architecture and Urban Planning*

MONDAY | **14:00 – 16:20** | FLOOR: **5** | ROOM: **Chicago C**

Chair | Brigitte Schulte-Fortkamp

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|---|---|---|
| 14:00 | **1997** | **Recent Developments in the Standardization of Soundscape** |
| | | André Fiebig |
| 14:20 | **1555** | **Relationship between Impressions of Soundscapes of Parks and Acceptable Sound Levels for Road Traffic Noise** |
| | | Koji Nagahata; Rentaro Kakinuma; Ryo Hashimoto; Tsubasa Minegishi |
| 14:40 | **1832** | **Urban Planning Integrating the Soundscape Approach** |
| | | Brigitte Schulte-Fortkamp; Bennett Brooks |
| 15:00 | Coffee Break | |
| 15:20 | **1679** | **Identifying Sound Sources in Terms of Urban Environmental Parameters** |
| | | Dongchao Xu; Lei Yu; Jian Kang |
| 15:40 | **1994** | **Application of Psychoacoustic within Soundscape, the New Challenge for Acoustic Consultants** |
| | | Klaus Genuit |
| **16:00** | **1597** | **Analyzing the Soundscape of an Urban Park—A Case of Semmozhi Poonga** |
| | | Banu Chitra; Minakshi Jain; Faiz Ahmed |

## 5.2 Building and Architectural Acoustics—*Impact and Structureborne Noise in Buildings*

MONDAY | **09:00 – 17:00** | FLOOR: **5** | ROOM: **Chicago D**

Chairs | Berndt Zeitler, Matthew Golden, Yong-Joe Kim

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| 09:00 | **1279** | **Minimum Structural Floor Stiffness for Floating Floor Applications** |
| | | Angela Waters; Richard Sherren |
| 09:20 | **1433** | **Prediction of Heavy Weight Drops on Resilient Sports Floors in Existing Buildings** |
| | | Matthew Golden; Paul Gartenburg |
| 09:40 | **1441** | **Lightweight Floating Floor Innovations in Gym/Sports Applications** |
| | | Kathryn Katsiroumpas; Patrick Carels; Hamid Masoumi; Jonas Salkauskis |
| 10:00 | Coffee Break | |

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| 10:20 | **1778** | **Description and Calibration of the ISO Tapping Machine in Numerical Impact Sound Predictive Tools** |
| | | Cheng Qian; Juan Negreira; Delphine Bard; Sylvain Ménard |
| 10:40 | **1703** | **Experimental Study on the Reduction Performance of Floor Impact Sound According to Reduction Method of Floor Structure Layers in Aged-Apartment** |
| | | Cho Hyun-Min; Kim Sin-Tae; Kim Myung-Jun |
| 11:00 | **1538** | **Numerical Prediction of Impact Sound in Dwellings from Low to High Frequencies** |
| | | Pengchao Wang; Cédric Van Hoorickx; Arne Dijckmans; Geert Lombaert; Edwin Reynders |
| 11:20 | **2213** | **Evaluation of Receiving Room Diffusivity and the Effect on Low Frequency Impact Insulation Class** |
| | | Andrew Barnard; Sunit Girdhar; Miles Penhale; Carey Widder |
| 11:40 | **1533** | **Modal Sampling Technique on Reception Plate to Characterize Structure-Borne Sound Source** |
| | | Berndt Zeitler; Steffi Reinhold; André Jakob; Carl Hopkins |
| 12:00 | **1444** | **Acoustic Studies of Glacier, Karst and Lava Caves** |
| | | Janusz Piechowicz; Dorota Czopek; Pawel Malecki; Jerzy Wiciak |
| 12:20 | Lunch on Your Own | |
| 13:40 | **1379** | **Silencing the Undesired Heartbeat in a Semi-Anechoic Room** |
| | | Randy Rozema and Brett Birschbach |
| 14:00 | **1989** | **Reduction of Floor Impact Sound by Applying Sound Absorbing Material and Changing Slab Structure** |
| | | Kyoung Woo Kim; Hey-Kyung Shin; Kwan-Seop Yang |
| 14:20 | **2086** | **Floor Impact Sound Insulation and Airborne Sound Insulation on CLT Model Building** |
| | | Atsuo Hiramitsu; Takahiro Tsuchimoto; Shinsuke Kurumada |
| 14:40 | **1341** | **Examination of Vibration Evaluation Scale Considering Duration on Vibration Sense for Floor in Buildings** |
| | | Ryuta Tomita; Katsuo Inoue |
| 15:00 | **1642** | **Relation between Sound Radiation from Airborne-Sound and Point-Force Excitations of a Double-Leaf Plate** |
| | | Motoki Yairi; Kimihiro Sakagami; Takeshi Okuzono |
| 15:20 | Coffee Break | |
| 15:40 | **1692** | **The Study on Characteristics of Floor Impact Noise** |
| | | Xiaoyan Xue |

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| 16:00 | **2088** | **Reduction of Heavy-weight Floor Impact Sound by Granular Materials on Ceiling** |
| | | Takashi Yamauchi; Shuta Kawamata |
| 16:20 | **2075** | **Charateristics of Sound Insulation of MRI (Magnetic Resonance Imaging) Rooms in Hospital** |
| | | Wonhak Lee; Jihoon Park; Yongjin Yoon; Juho Kim |
| 16:40 | **2084** | **Annoyance Evaluation of Floor Impact Sounds with Temporal and Spatial Variation in VR Environments** |
| | | Hyun In Jo; Jung In Woo; Shahzad Ahmed; Jin Yong Jeon |

## 5.6 Building and Architectural Acoustics—*Building Acoustics Measurement*

MONDAY | **09:00 – 12:20** | FLOOR: **5** | ROOM: **Chicago E**

Chairs | Jeanette Hesedahl, Bruce Lachey

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| 09:00 | **2222** | **A Statistical Method for Parameter Estimation from Shroeder Decay Curves** |
| | | Hanna Autio; Delphine Bard |
| 09:20 | **2163** | **Assessing Noise Levels in University of Sharjah Classrooms using Measurements and Predictive Models** |
| | | Hussein Elmehdi |
| 09:40 | **1443** | **Building Interior Noise and Vibration Isolation Measurement** |
| | | Tungchen Chung |
| 10:00 | **1998** | **Acoustic Measurements of Duct and Duct Liner Materials** |
| | | Kevin Herreman; Corey Taylor |
| 10:20 | Coffee Break | |
| 10:40 | **2166** | **Field Measurements of a Demising Wall using an Intumescent Deflection Track and Exposed Concrete Ceiling** |
| | | Christopher Hoying |
| 11:00 | **1891** | **In-Situ Acoustic Absorption of a Living Green Wall** |
| | | Anna Romanova; Kirill V. Horoshenkov |
| 11:20 | **1700** | **Experimental Study on Sound Insulation Performance of Partition Walls Joined to Steel Beams** |
| | | Tomohiro Oda; Yasuhito Fujisawa; Mitsutoshi Watanabe |
| 12:00 | **1732** | **Sound Field Acquiring and Reproducing System for Auditorium Acoustic** |
| | | Akira Omoto |
| 12:20 | Lunch on Your Own | |

## 5.12 Building and Architectural Acoustics—*Measurement Methods*

MONDAY | **13:40 – 17:20** | FLOOR: **5** | ROOM: **Chicago E**

Chairs | John Davy, Carolina Monteiro

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|---|---|---|
| 13:40 | **1790** | **Acoustic Quality Evaluation of Voice Booths Using 1/3rd Octave Band** Frequency Response |
| | | Carolina Monteiro; Marcel Borin; Vito Romanelli |
| 14:00 | **1872** | **Study Case on the Acoustic Quality of Classrooms in Brazil** |
| | | André Raeder; Marcel Borin; Marcela Nakasato; Marcos Holtz |
| 14:20 | **1966** | **The New Acoustic Design Challenges in Active Learning Classrooms** |
| | | Shiva Hadavi; Joonhee Lee |
| 14:40 | **2223** | **Acoustically Conserving the Worship Heritage of Nossa Senhora De Penha De Franca Church, Goa** |
| | | Menino Allan Tavares; António P. O. Carvalho; Buland Shukla |
| 15:00 | Coffee Break | |
| 15:20 | **1392** | **Look ~ Do You See the Noise Leaking through that Ceiling?** |
| | | Gary Madaras |
| 15:40 | **1388** | **SonicLQ: An Acoustic Method for Locating and Sizing Air Leaks in Building Envelopes** |
| | | Ralph Muehleisen; Kanthasamy Chelliah |
| 16:00 | **1349** | **Laboratory Measurement of Aerodynamic Noise Emitted from Cladding and External Components of Buildings** |
| | | Kiyoshi Masuda; Ryu Tomitaka; Yukiko Hamada |
| 16:20 | **1638** | **Review and Comparison of ASTM and ISO Standards on Sound Transmission in Buildings** |
| | | Christoph Hoeller |
| 16:40 | **2007** | **Gauge Repeatability and Reproducibility Study of Airborne and Impact Insulation of Floor-Ceiling Assemblies** |
| | | Wayland Dong; John LoVerde |
| 17:00 | **1771** | **A Study on In-Situ Method of Measuring Acoustic Properties of Materials by using a Parametric Loudspeaker—Reduction of Pseudo Sound due to High Pressure Ultrasound** |
| | | Akiko Sugahara; Hyojin Lee; Shinichi Sakamoto; Shigeto Takeoka |

## 5.4 Building and Architectural Acoustics—*HVAC Equipment and System Noise*

MONDAY | **09:20 – 11:40** | FLOOR: **5** | ROOM: **Chicago F**

Chairs | Paul Bauch, Erik Miller-Klein

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|---|---|---|
| 09:20 | **1867** | **Noise Transmission from a Small, Hermetic, Reciprocating Compressor** |
| | | John Cunsolo; Timothy Brungart; Stephen Hambric |
| 09:40 | **1963** | **Vibration Isolation of Fans in HVAC Equipment** |
| | | Curtis Eichelberger; Paul Bauch |
| 10:00 | **2138** | **Rooftop HVAC Unit Mega Duct Attenuator** |
| | | Jim Borzym |
| 10:20 | Coffee Break | |
| 10:40 | **1636** | **Analysis of Air Conditioner Sound Quality Based on Electrical Components** |
| | | Byoungha Ahn; Daekyu Lim; Sunhwa Park |
| 11:00 | **2212** | **Experimental and Numerical Investigation into Flow and Noise Performances of Pipe Flow Driven by Centrifugal Ice-Making Fan in Household Refrigerator** |
| | | Mijeong Shin; Cheolung Cheong; Tae-Hoon Kim; Sang-Tae Kim |
| 11:20 | **2049** | **Effect of Reflections on HVAC Systems Power-Based Acoustic Simulation** |
| | | Mina Nashed; Tamer Elnady; Mats Åbom |
| 11:40 | Lunch on Your Own | |

## 20.1 Underwater and Maritime Acoustics—*Advances in*

MONDAY | **13:40 – 16:20** | FLOOR: **5** | ROOM: **Chicago F**

Chairs | Joe Cuschieri, Allan Beaudry

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|---|---|---|
| 13:40 | **1381** | **Extraction of Auditory Related Features for Marine Mammal Recognition** |
| | | Zeng Xiangyang; Wang Qiang; Lu Chenxiang |
| 14:00 | **1605** | **A Novel Search Method of Variable Scale Relative Entropy for Non-Cooperative Transient Underwater Acoustic Pulse Signals** |
| | | Kun Wei; Shiliang Fang |
| 14:20 | **1865** | **Understanding Radiated Underwater Noise Levels Measured at Different Sound Ranges** |
| | | Anton Homm; Stefan Schäl; Hans Hasenpflug |

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| 14:40 | **2032** | **Vibroacoustic Response of an Immersed Stiffened Multilayered Shell Excited by a Plane Wave** |
| | | Maxime Dana; Laurent Maxit; Julien Bernard |
| 15:00 | Coffee Break | |
| 15:20 | **2323** | **Marine Underwater Noise Control Design: Achieving Noise Goals with Lower Risk and Cost** |
| | | Jesse Spence; Raymond Fischer; Allan Beaudry |
| 15:40 | **1607** | **Study on Method of Hull Longitudinal Strength using Coupling Hull Beam Model Subjected to Underwater Non-Contact Explosion** |
| | | Jiang Keda; Dongyan Shi |
| 16:00 | **1656** | **Correction Method of Highly Non-Uniform Current Profile Acoustic Measurement Based on Doppler in Moving Media** |
| | | Zhaowen Sun; Shiliang Fang; Yongshou Yang |

## 3.2 Aircraft Noise—*Interior Noise*

MONDAY | **16:20 – 17:20** | FLOOR: **5** | ROOM: **Chicago F**

Chairs | Sebastian Ghinet, Sven Reimer

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|---|---|---|
| 16:20 | 2099 | **Prediction of Sound Transmission in Aircraft over the Mid and High Frequency Range** |
| | | Gerard Borello |
| 16:40 | 1417 | **Sound Quality of Aircraft Cabin for VIP and Business Jets** |
| | | Nurkan Turkdogru Gurun; Hemang Sheth |
| 17:00 | 2034 | **Noise Reduction of a Vacuum-Assisted Toilet** |
| | | Michael Rose; Dagan Pielstick; Zach Jones; Kent Gee; Scott Thomson; Scott Sommerfeldt |

## 1.2 Acoustic Materials—*Acoustic Metamaterials*

MONDAY | **09:00 – 12:40** | FLOOR: **5** | ROOM: **Chicago G**

Chairs | Sebastian Ghinet, James Manimala

| | | |
|---|---|---|
| 09:00 | **1701** | **Bilayer Membrane-Type Metamaterials Transmission Loss Carry Different Masses** |
| | | Tuo Xing; Xian-Hui Li |
| 09:20 | **2229** | **Acoustic Metasurface Harvester** |
| | | Huy Nguyen |

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| 09:40 | **1368** | **Anomalous Diffusion in Acoustic Phononic Crystals** |
| | | Salvatore Buonocore; Mihir Sen; Fabio Semperlotti |
| 10:00 | **1836** | **Distorting an Impulse Wave with Phononic Metamaterials—A Scale Model Study** |
| | | Michelle Swearingen; Jason Dorvee; Donald Albert; Michael Muhlestein; Megan Kreiger; James O'Daniel |
| 10:20 | **1448** | **Effective Medium Representation of Periodic Designs Based on a Semi-Analytical Approach** |
| | | Laetitia Roux; Christian Audoly; Anne-Christine Hladky; Nicole Kessissoglou |
| 10:40 | Coffee Break | |
| 11:00 | **1851** | **Study of Vibration Absorption Characteristics of Membrane-Type Resonators with Varying Membrane Configurations** |
| | | Cong Gao; Dunant Halim; Chris Rudd |
| 11:20 | **1704** | **Experimental Analyses of Membrane-Type Acoustic Metamaterials with Tunable Properties by a Compact Magnetic-Iron** |
| | | Junjuan Zhao; Yueyue Wang |
| 11:40 | **2320** | **Broadband Membrane-Type Acoustic Metamaterials with Polymorphic Anti-Resonance Modes and Experimental Verification** |
| | | Guojian Zhou; Jiu Hui Wu; Xiujie Tian; Jian Shen; Wei Huang; Keda Zhu |
| 12:00 | **2288** | **Control of Sound Directivity Based on Metamaterials** |
| | | Xiaozhou Liu; Jiehui Liu |
| 12:20 | **2080** | **Design and Demonstration of Acoustic Bends with Metamaterials** |
| | | Jun Yang; Han Jia; Wenjia Lu; Jun Yang |
| 12:40 | Lunch on Your Own | |

## 1.4 Acoustic Materials—*Porous Materials Measurement and Modeling*

MONDAY | **13:40 – 18:00** | FLOOR: **5** | ROOM: **Chicago G**

Chairs | Olivier Robin, Jennifer Shaw

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|---|---|---|
| 13:40 | **1600** | **Notes on the Sound Field above a Porous Material** |
| | | Raffaele Dragonetti; Marialuisa Napolitano; Rosario Romano |
| 14:00 | **2110** | **Study on Loosely-Supported Technique for Controlling Elastic Behavior of Test Samples in an Impedance Tube Measurement** |
| | | Masateru Kimura; Toshikazu Satoh; Michiyuki Yamaguchi; Jason Kunio; Edward Green |

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| 14:20 | **2010** | **SLaTCoW (Spatial LAplace Transform for Complex Wavenumber Recovery) Method for Frequency Complex Wavenumber Dispersion Relation Recovery** |
| | | Alan Geslain; L. Schwan; J. P. Groby; V. Romero-Garcia; P. Leclaire; A. El-Hafidi |
| 14:40 | **2318** | **Experimental Analysis of the Dispersion in the Measurement of the Absorption Coefficient with the Impedance Tube** |
| | | Bruno Neto; Israe Pereira; Sideto Futatsugi; Paulo Mareze; Eric Brandão; William Fonseca |
| 15:00 | **1762** | **Experimental Modelling of High Transmission Loss Layered Materials via Transfer Matrix Method** |
| | | John Anton; Ed Green |
| 15:20 | Coffee Break | |
| 15:40 | **1745** | **A Spectral Method for Fast Broadband Insertion Loss Modeling of Curved Sound Packages: Correlation with Poroelastic Finite Elements** |
| | | Corentin Coguenanff; Arnaud Duval; Mickael Goret |
| 16:00 | **2112** | **Comparison of Bulk Property Measurement Methods Using Impedance Tube** |
| | | Masateru Kimura; Jason Kunio; Edward Green |
| 16:20 | **1534** | **A Self-Consistent Approach for the Acoustical Modeling of Vegetal Wools** |
| | | Clément Piegay; Philippe Glé; Emmanuel Gourdon; Etienne Gourlay |
| 16:40 | **2219** | **Sound Absorption Predictions of Multiple Layer Porous Materials and Test Validations** |
| | | Zheng Yu |
| 17:00 | **1868** | **Perforated Materials with Periodically Distributed Annular Cavities for Low Frequency Acoustic Absorption** |
| | | Thomas Dupont; Philippe Leclaire; Olga Umnova; Raymond Panneton |
| 17:20 | **1791** | **Comparison with Acoustic Impedance Measurement Results of Cardioid Microphones and Other Probes** |
| | | Kazuma Hoshi; Toshiki Hanyu |
| 17:40 | **1775** | **Sound-Absorbing Materials using of Rice Straws (Oblique Incident Sound-Absorption Coefficient of Oblique Arrangement of Hollow Cylindrical Biomass)** |
| | | Shuichi Sakamoto; Taisei Tsurumaki; Kohei Fujisawa; Koki Yamamiya |

## *22.1 Vibro-Acoustics—Advances in*

MONDAY | **09:00 – 11:20** | FLOOR: **5** | ROOM: **Chicago H**

Chair | Li Cheng

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| 09:00 | **1395** | **Experimental and Numerical Study on the Acoustic Mapping and Radiation Force Quantification of Focused Ultrasound Transducers** |
| | | Songmao Chen; Alessandro Sabato; Christopher Niezrecki; Peter Avitabile |
| 09:20 | **1354** | **Solid-State Thermoacoustics** |
| | | Haitian Hao; Carlo Scalo; Mihir Sen; Fabio Semperlotti |
| 09:40 | **2105** | **Stop Band Analytical Design for Flexural Waves in Periodic Continuously Corrugated Beam** |
| | | Adrien Pelat; Thomas Gallot; François Gautier |
| 10:00 | Coffee Break | |
| 10:20 | **1459** | **Multi-Mode Interactions in a Nonlinear Structural-Acoustic Cylindrical Waveguide** |
| | | Biswajit Bharat and Venkata Sonti |
| 10:40 | **1591** | **Low and Medium Frequency Noise Reduction inside an Acoustic Cavity using De-Tuned Slit and Multi-Slit Resonators** |
| | | V S N Reddi Chintapalli, and V V Gopal Rao Lokireddy |
| 11:00 | **1570** | **Coupled Structural Acoustics of Constrained Semi-Infinite Plate under Line Harmonic Forcing** |
| | | Jaykumar Atulbhai Bhalodia; Abhijit Sarkar |

## **22.2 Vibro-Acoustics—*Acoustic Black Holes***

MONDAY | **11:20 – 15:20** | FLOOR: **5** | ROOM: **Chicago H**

Chair | Steve Conlon

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|---|---|---|
| 11:20 | **1861** | **Studies on Vibration Energy Harvesting Using a Cantilever Beam with a Modified Acoustic Black Hole Cavity** |
| | | Chenhui Zhao; M. G. Prasad |
| 11:40 | **1475** | **Optimal Design and Position of an Embedded One-Dimensional Acoustic Black Hole** |
| | | Cameron McCormick; Micah Shepherd |
| 12:00 | **1912** | **Numerical Analysis of Wave Propagation in Functionally Graded 1-D Acoustic Black Hole via Viscoelastic Local Interaction Simulation Approach** |
| | | Wei Huang; Hui Zhang; Hongli Ji; Carlos Cesnik; Jinhao Qiu; Daniel Inman |

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| 12:20 | Lunch on Your Own | |
| 14:00 | **1844** | **Vibroacoustic Properties of Plates with Tuned Acoustic Black Holes** |
| | | Yu Xiong; Edward Smith; Stephen Conlon |
| 14:20 | **1895** | **Numerical Modelling of Additively Manufactured Acoustic Black Holes** |
| | | Sebastian Rothe; Hagen Watschke; Thomas Vietor; Sabine Christine Langer |
| 14:40 | **1403** | **Sound Radiation of Plates with Embedded Circular Acoustic Black Hole Indentations** |
| | | Li Ma; Li Cheng |
| 15:00 | **2058** | **The Use of Perfect Absorption in the Tunability of the Resonant Modes of an Acoustic Black Hole** |
| | | Julien Leng; Vicent Romero; Jean-Philippe Groby; Adrien Pelat; Ruben Pico; François Gautier |
| 15:20 | Coffee Break | |

## 22.3 Vibro-Acoustics—*Application of Vibro-Acoustic Methods to Noise Control Treatment*

MONDAY | **15:40 – 18:00** | FLOOR: **5** | ROOM: **Chicago H**

Chairs | Olivier Robin, Jinghao Liu

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|---|---|---|
| 15:40 | **1890** | **Investigation of Structure-Borne Noise in Plates Supported by Vibration Isolators through a Hybrid Deterministic/SEA Approach** |
| | | Simone Baro; Roberto Corradi |
| 16:00 | **2238** | **Transmission Loss Prediction through a Curved Structure-Cavity System with Attached Sound Packages by Means of a Hybrid Patch Transfer-Green Functions Approach** |
| | | Kamal Kesour; Noureddine Atalla |
| 16:20 | **2046** | **Absorption Characteristics of Membrane-Embedded Acoustic Liners** |
| | | Alexander Svetgoff; James Manimala |
| 16:40 | **1870** | **A Matrix-Free Model Order Reduction Scheme for Vibro-Acoustic Systems including Complex Noise Control Treatments** |
| | | Stijn Jonckheere; Elke Deckers; Wim Desmet |
| 17:00 | **1402** | **Design Optimization of Multilayer Materials Based on the Acoustic Characteristic Indicators** |
| | | Jinxiang Pang and Xianfeng Wang |
| 17:20 | **1378** | **Research on Vibration Control of Thin Plate Based on Prestressing** |
| | | Cheng Zhang; Jlan-run Zhang; Xi Lu |

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| 17:40 | **2091** | **Acoustic Behaviour of New Rice Husk Composites** |
| | | Julieta Antonio; Antonio Tadeu; Beatriz Marques; João Almeida |

## 2.1 Active Control of Sound and Vibration—*Advances in*

MONDAY | **09:00 – 12:00** | FLOOR: **4** | ROOM: **Clark**

Chairs | Jing Lu, Yangfan Liu

| | | |
|---|---|---|
| 09:00 | **1739** | **On the Frequency-Independence of Interior Radiation Modes using Coupled Modes Theory** |
| | | Christian Hesse; Hans Peter Monner |
| 09:20 | **1649** | **Theory on the Use of Potential Energy Modes in Active Noise Control of a Small Region with Acoustic Sensors and Impedance Boundary Conditions** |
| | | Yangfan Liu; Jiawei Liu; J. Stuart Bolton |
| 09:40 | **1953** | **Optimization of Exciter Arrangement to Improve Beamforming Performance of Multi-Actuator Panels with Low-Damping Loss Factor** |
| | | Onyu Jeon; Homin Ryu; Semyung Wang |
| 10:00 | Coffee Break | |
| 10:20 | **2083** | **Active Vibration Control System using Membrane Piezo-Electric Ceramics for Steel Staircases** |
| | | Hitoshi Matsushita |
| 10:40 | **2180** | **Reducing Noise Leakage Problem of Open-Fit Hearing Aid using Active Noise Cancellation** |
| | | Chung Ying Ho, Kuo Kai Shyu, Cheng Yuan Chang, and Sen M. Kuo |
| 11:00 | **2315** | **An Investigation into the Nonlinear Vibration Response of a Beam: PZT Stack and Proof-Mass System** |
| | | Xishan Jiang; Jie Pan |
| 11:20 | **1425** | **Ship Vibration and Noise Test Verification Based on Statistical Energy Analysis Method** |
| | | Xuhong Miao; Yuhui Li; Fuzhen Pang; Xueren Wang |
| 11:40 | **1427** | **Establishing Error Sensing Strategy by using Pseudo-Uniform Structure Quantity for the Active Rib Stiffened Double-Panel Structure** |
| | | Xiyue Ma; Kean Chen; Jian Xu; Bing Zhou |
| 12:00 | Lunch on Your Own | |

## **2.3** Active Control of Sound and Vibration—*Algorithms for Active Control and Speech Enhancement*

MONDAY | **13:40 – 14:40** | FLOOR: **4** | ROOM: **Clark**

Chairs | Jing Lu, Yangfan Liu

| | | |
|---|---|---|
| 13:40 | **1788** | **Direction-of-Arrival Dependency of Active Noise Cancellation Headphones** |
| | | Stefan Liebich; Jan-Gerrit Richter; Johannes Fabry; Christopher Durand; Janina Fels; Peter Jax |
| 14:00 | **1976** | **Reference Weighted Filtered-x LMS Algorithm for Active Control of Impulsive Noise** |
| | | Rushikesh Dhakad; Guo Long; Tao Feng; Teik Lim |
| 14:20 | **1603** | **Kalman Filter Based Active Noise Control Algorithm with Simultaneous Transfer Function Modeling** |
| | | Kai Chen; Jing Lu |
| 14:40 | Coffee Break | |
| 16:30 | **Rayleigh Lecture** | |

## **15.3** Railroad Noise—*Noise and Vibration Mitigation Measures*

MONDAY | **09:00 – 12:00** | FLOOR: **5** | ROOM: **Denver**

Chairs | Scott Edwards, Herb Singleton

| | | |
|---|---|---|
| 09:00 | **2093** | **Noise Control of a Diesel Locomotive For Indian Railways** |
| | | Amiya Mohanty; Shahab Fatima |
| 09:20 | **2115** | **Predicting Light-Rail Groundborne Noise and Vibration from Tunnels** |
| | | Shannon McKenna; Christopher Layman |
| 09:40 | **1843** | **Elastic Components for Reduction of Vibrations in Railway Superstructure** |
| | | Harald Steger; Andreas Denk |
| 10:00 | **2309** | **Life Cycle Assessment of Ground Borne Vibration Mitigation Strategies using Subgrade Stiffening, Soft-Filled Barriers and Open Trenches** |
| | | Sakdirat Kaewunruen, Panrawee Rungskulroch, and Victor Martin |
| 10:20 | **2092** | **Vibration Isolators Made of Expanded Cork Agglomerate** |
| | | Sara Dias; António Tadeu; Julieta António; Filipe Pedro; Catarina Serra |
| 10:40 | Coffee Break | |

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| 11:00 | **1684** | **Analysis of Vibration Mitigation Effect of Steel Spring Floating Slab Track Soaked in Water** |
| | | Teng Li and Danqun Fang |
| 11:20 | **2311** | **The Effect of Climate Change on Service Life and Cost Investigation of Rail Turnouts with Various Mitigation Methods** |
| | | Sakdirat Kaewunruen; Serdar Dindar |
| 11:40 | **1680** | **Rail Roughness Monitoring in a Test Section using Tuned Rail Damper to Control Rail Corrugation Growth** |
| | | Hougui Zhang; Danqun Fang |
| 12:00 | Lunch on Your Own | |

## 15.4 Railroad Noise—*High Speed Rail Noise and Vibration*

MONDAY | **13:40 – 16:00** | FLOOR: **5** | ROOM: **Denver**

Chairs | Shannon McKenna, Bin Zhang

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| 13:40 | **1853** | **Vibration Prediction for High Speed Trains Utilising the Pipe in Pipe (PiP) Model to Determine Ground-Borne Noise Levels in the Vicinity of Different Tunnel Types** |
| | | Steve Summers; Graham Parry; Mike Ledbetter; Rebecca Edwards; Ben Mills |
| 14:00 | **1712** | **Railway Noise above 10 kHz Generated on a Curved Section of High-Speed Railway Line** |
| | | Tsugutoshi Kawaguchi; Takeshi Sueki; Toshiki Kitagawa |
| 14:20 | **1711** | **Full-Size Model of Shinkansen and Sound Proofing Walls Tested Noise Decreasing Effect of Developed Noise Absorbing Material** |
| | | Masao Myouken |
| 14:40 | **1664** | **Characterization of Surface Pressure Fluctuations of High-Speed Train Running in Open-Field using Wavenumber-Frequency Analysis** |
| | | Songjune Lee; Cheolung Cheong; Jaehwan Kim; Byung-hee Kim |
| 15:00 | **1587** | **Auditory Evaluation of High-Frequency Sounds Radiated from the Japanese High Speed Railways** |
| | | Masaaki Hiroe; Tetsuya Ozaki; Mari Ueda |
| 15:20 | **2200** | **Study on Aerodynamic Load Characteristic of Noise Barrier for High-speed Railway** |
| | | Gang Zou; Fei Dong; Junchuan Nlu; Fusheng Sui; Guofeng Bai |
| 15:40 | **1343** | **Schemes of Data Visualization for Ground Vibration Prediction Induced by Trains** |
| | | Yitjin Chen; Chi-Jane Chen; Chi-Jim Chen |
| 16:00 | Coffee Break | |

## 15.5 Railroad Noise—*Light Rail Noise and Vibration*

MONDAY | **16:20 – 17:20** | FLOOR: **5** | ROOM: **Denver**

Chairs | Chris Laymon, Bin Zhang

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|---|---|---|
| 16:20 | **1380** | **Assessing Risk in Rail Transit Ground-Borne Noise and Vibration Predictions** |
| | | Gary Glickman |
| 16:40 | **1490** | **Characteristics of Interior Noise in Sky-Rail and Noise Control** |
| | | Yaxuan Sun; Yongji Zhao |
| 17:00 | **1686** | **The Characteristics of Noise Due to Tramway Passing through Small Radius Section** |
| | | Deyun Ding; Danqun Fang |

## 11.2 Industrial Noise—*Mufflers and Silencers*

MONDAY | **09:00 – 15:00** | FLOOR: **5** | ROOM: **Los Angeles**

Chairs | Mats Abom, Tamer Elnady

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| 09:00 | **1702** | **Optimal Design of a Muffler for Reliable Noise Attenuation in Case of Uncertainty of Noise Source** |
| | | Jong Kyeom Lee; Jin Woo Lee |
| 09:20 | **1328** | **Analysis of Baffle Leakage in a High Attenuation Exhaust Muffler** |
| | | Jean-Michel Coulon; Noureddine Atalla |
| 09:40 | **1480** | **Modeling Acoustic Resonators with Higher-Order Equivalent Circuits** |
| | | Caleb Goates; Scott D. Sommerfeldt; David C. Copley |
| 10:00 | **1699** | **Experimental Analysis of Whistle Noise in a Particle Agglomeration Pipe** |
| | | Zhe Zhang; Heiki Tiikoja; Mats Åbom; Hans Bodén |
| 10:20 | **1612** | **Acoustic Analysis of Extended Inlet / Extended Outlet Concentric Tube Resonator using Green's Function** |
| | | Veerababu Dharanalakota; Venkatesham Balide |
| 10:40 | Coffee Break | |
| 11:00 | **1579** | **Experimental Study on the Performance of the Bladder Type Hydraulic Muffler** |
| | | Zhuang Wang |
| 11:20 | **1290** | **Reciprocating Engine Exhaust Dynamics** |
| | | Elden Ray |
| 11:40 | **1812** | **Technological Advancements of Syntactic Foam Liners for use in Hydraulic Noise Suppression** |
| | | Nathaniel Pedigo; Kenneth A.Cunefare |

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| 12:00 | Lunch on Your Own | |
| 13:40 | **2107** | **Source Flow Ripple and Source Impedance Measurement for Different Hydraulic Pumps** |
| | | Jinghao Liu; Thomas Butts; Sanghoon Suh |
| 14:00 | **1916** | **Muffler Shape Optimization to Improve Transmission Loss for Narrow-Band Excitations** |
| | | James Bender; Wenlong Yang; Sonya Thorpe; Alexis Castel; Ricardo Alvarez |
| 14:20 | **1666** | **Optimal Partition Layout of a Muffler for Thermal Energy Harvesting and Noise Attenuation** |
| | | Kee Seung Oh; Jin Woo Lee |
| 14:40 | **1558** | **Study on the Influence of Extended Inlet with Acoustic Materials on Low Frequency Noise Control** |
| | | Xinyu Zhang; Zuowei Wang; Xiaochen Zhao |
| 15:00 | Coffee Break | |

## **11.4** Industrial Noise—*Simulation*

MONDAY | **15:20 – 17:20** | FLOOR: **5** | ROOM: **Los Angeles**

Chairs | David Copley, Xin Hua

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| 15:20 | **1292** | **A First Generation Earthmoving Machine Sound Simulator and its Potential Use in Product Sound Development** |
| | | David Copley |
| 15:40 | **1405** | **Sound Field Calculations of a Diesel Generator with Enclosure by Finite Element Analysis** |
| | | Ersen Arslan; Mehmet Çalışkan; Caglar Uyulan |
| 16:00 | **1301** | **Application of Blind Source Separation in Industrial Noise Prediction and Control** |
| | | Wei Yang; Tiao Joo Kwee; Cheong Siong Chin; Wai Lok Woo; Sajin Saju |
| 16:20 | **2317** | **Simulationof Transformer Noise Controlling Based on an Equivalent Sound Source Model** |
| | | Xuan Cai; Xuelei Zhan; Na Wei; Yong Cai; Dakun Li |
| 16:40 | **1640** | **Engineering Way to Improve Accuracy of Noise Prediction for Industrial Plants by Field Noise Measurement Outcome** |
| | | Takahiro Hida |
| 17:00 | **1280** | **Vibration Assessment on Plant Blower Structure** |
| | | Zamri Mohamed; CK Eddy Nizwan CK Hussin; Mohd Razali Hanipah |

# DETAILED PROGRAM
# TUESDAY, 28 AUG

# TUESDAY, 28 AUGUST

**08:00 – 09:00** | FLOOR: **5** | ROOM: **Chicago D**

## KEYNOTE: 5003 | Fifty Years of Aircraft Noise Annoyance—Time to Introduce New Ideas

Chair | Irene van Kamp

### Keynote Speaker | Truls Gjestland

Fellow, Acoustical Society of America

Truls Gjestland worked as a research scientist at SINTEF for 50 years and is now semi-retired. He is a fellow of the Acoustical Society of America and honorary member of the Acoustical Society of Norway and East-European Acoustics Association. During his time at SINTEF, he was mainly involved in environmental noise projects including several European Union funded projects. He also developed a Noise Management Master Plan for the United Arab Emirates, and advised on theatre design in Switzerland. He has worked on a broad range noise issues including offshore oil platforms, navy vessels, and smaller fishing boats. He has served as advisor to European and U.S. aviation authorities, World Health Organization, and ICAO. On the administration side, he has been Secretary of the Federation of Acoustical Societies of Europe (FASE), Vice-President of the European Acoustics Association (EAA), two-time President of the Acoustical Society of Norway, and the Technical Chair of ICA 1995 (International Congress on Acoustics). He has been a member of the International Commission on Biological Effects of Noise (ICBEN) since 1983, and Chair of ICBEN teams for 'Community noise' and 'Noise policies and economics'.

**08:00 – 09:00** | FLOOR: **5** | ROOM: **Chicago E**

## KEYNOTE: 5004 | Sound Absorption of Microperforated Panels in Complex Vibroacoustic Environments

Chair | John Davy

### Keynote Speaker | Professor Li Cheng

Hong Kong Polytechnic University

Dr. Li Cheng is currently a Chair Professor of Mechanical Engineering and the Director of Consortium for Sound and Vibration Research (CSVR) at the Hong Kong Polytechnic University. He received his BSc degree from Xi'an Jiaotong University in 1984, DEA and PhD degrees from INSA-Lyon (Institut National des Sciences Appliquées de Lyon), France in 1986 and 1989, respectively. Dr. Cheng started his academic career at Laval University, Canada in 1992, rising from an assistant professor to Associate/Full Professor, before joining the Hong Kong Polytechnic University in 2000. Dr. Cheng's research interests mainly include sound and vibration, structural health monitoring, smart material/structure and fluid-structure interaction. He currently serves as the Deputy Editor-in-Chief and Receiving editor for the *Journal of Sound and Vibration*, an Associate Editor for the *Journal of Acoustical Society of America,* Associate Editor of *Structural Health Monitoring: An International Journal* and an editorial board member of a few other international journals. He is an elected fellow of the Acoustical Society of America, Acoustical Society of China, IMechE and the Hong Kong Institution of Engineers. Dr. Cheng is the president of the Hong Kong Society of Theoretical and Applied Mechanics. He is also a director of both IIAV (International Institutes of Acoustics and Vibration) and I-INCE (International Institute of Noise Control Engineering).

| TUESDAY 28 AUG | 07:00 | 07:30 | 08:00 | 08:20 | 08:40 | 09:00 | 09:20 | 09:40 | 10:00 | 10:20 | 10:40 | 11:00 | 11:20 | 11:40 | 12:00 | 12:20 | 12:40 | 13:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Addison** FLOOR: **4** | | | | | | **16.1** Product Sound Quality | | | | | **16.1** Product Sound Quality | | | | | | | |
| **Clark** FLOOR: **4** | | | | | | **7.3** Noise Mapping | | | | | **7.3** Noise Mapping | | | | | | | |
| **Armitage** FLOOR: **4** | | | | | | **19.4** Barriers | | | | | **19.4** Barriers | | | | | | | |
| **Belmont** FLOOR: **4** | | | | | | **9.2** Flow Induced Noise & Vibration—Computational Methods | | | | | **9.2** Flow Induced Noise & Vibration—Computational Methods | | | | | | | |
| **Chicago A** FLOOR: **5** | | | | | | **2.2** Application of Active Control | | | | | **2.0** Active Control of Sound and Vibration | | | | | | | |
| **Chicago B** FLOOR: **5** | | | | | | **12.3** Signal Processing | | | | | **12.3** Signal Processing | | | | | | | |
| **Chicago C** FLOOR: **5** | | | | | | **17.6** Apps, Social Media and Virtual Reality as Soundscape Evaluation Tools | | | | **17.6** Apps, Social Media and Virtual Reality as Soundscape Evaluation Tools | | | | | | | | |
| **Chicago D** FLOOR: **5** | | | **Keynote Lecture** | | | | **20.2** Ships and Offshore Noise and Vibration | | | **20.2** Ships and Offshore Noise and Vibration | | | | | | | | |

| TUESDAY | 07:00 | 07:30 | 08:00 | 08:20 | 08:40 | 09:00 | 09:20 | 09:40 | 10:00 | 10:20 | 10:40 | 11:00 | 11:20 | 11:40 | 12:00 | 12:20 | 12:40 | 13:00 |
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| **Chicago E** FLOOR: **5** | | | **Keynote Lecture** | | | | **5.3** HVAC Noise Control Methods and Standards | | | | **5.3** HVAC Noise Control Methods and Standards | | | | | | | |
| **Chicago F** FLOOR: **5** | | | | | | **21.1** Advances in Vehicle NVH | | | | | **21.2** Body Structure NVH | | | | | | | |
| **Chicago G** FLOOR: **5** | | | | | | | **1.3** Microperfrated Panels | | | | **1.3** Microperfrated Panels | | | | | | | |
| **Chicago H** FLOOR: **5** | | | | | | **22.4** Vibro-Acoustic Experiments | | | | | **22.4** Vibro-Acoustic Experiments | | | | | | | |
| **Denver** FLOOR: **5** | | | | | | **12.2** Acoustical Holography/Beamforming | | | | **12.2** Acoustical Holography/Beamforming | | | | | | | | |
| **Los Angeles** FLOOR: **5** | | | | | | | **11.3** Large Silencers | | | | **11.3** Large Silencers | | | | | | | |
| **Indiana** FLOOR: **6** | INCE Board Cert Info/Breakfast 50 ppl | | | | | | | | | | | | | | | Women in Eng Lunch | | |
| **Grand Ballroom** FLOOR: **7** | | | | | | **Exhibits Open**: 09:00 – 17:00<br>**Poster Session**: 09:00 – 12:00<br>**Poster Session**: 13:30 – 17:30 | | | | | | | | | | | |

| TUESDAY 28 AUG | 13:20 | 13:40 | 14:00 | 14:20 | 14:40 | 15:00 | 15:20 | 15:40 | 16:00 | 16:20 | 16:40 | 17:00 | 17:20 | 17:40 | 18:00 | 19:00 | 19:30 | 21:30 |
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| **Addison** FLOOR: **4** | **16.1 + 16.2** Product Sound Quality & Power Tool Noise | | | | | | | **16.2** Power Tool Noise | | | | | | | | **Congress Banquet Chicago Museum of Science and Industry** | | |
| **Clark** FLOOR: **4** | **7.3 + 12.1** Noise Mapping + Advances in Measurement Methods | | | | | | | | **12.1** Advances in Measurement Methods | | | | | | | | | |
| **Armitage** FLOOR: **4** | | **24.0** William Lang Memorial Session | | | | | | | | William Lang Reception | | | | | | | | |
| **Belmont** FLOOR: **4** | | | **9.2** Flow Induced Noise & Vibration - Computational Methods | | | | | | | | | | | | | | | |
| **Chicago A** FLOOR: **5** | | **2.2** Application of Active Control | | | | | | **5.11** Predictions and Prediction Methods in Bldg/Room Acoustics | | | | | | | | | | |
| **Chicago B** FLOOR: **5** | | **12.3** Signal Processing | | | | | | | **5.5** Bldg Acoustics Case Studies | | | | | | | | | |
| **Chicago C** FLOOR: **5** | | **17.6** Apps, Social Media and Virtual Realit as Soundscape Evaluation Tools | | | | | **17.5** Indoor Soundscape | | | | | | | | | | | |
| **Chicago D** FLOOR: **5** | | **5.7** Façade and Envelop Sound Isolation | | | | | **5.7** Façade and Envelop Sound Isolation | | | | | | | | | | | |

| TUESDAY | 13:20 | 13:40 | 14:00 | 14:20 | 14:40 | 15:00 | 15:20 | 15:40 | 16:00 | 16:20 | 16:40 | 17:00 | 17:20 | 17:40 | 18:00 | 19:00 | 19:30 | 21:30 |
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| **Chicago E** FLOOR: **5** | | **3.4** UAV Noise | | | | **3.4** UAV Noise | | | | | | | | | | | | |
| **Chicago F** FLOOR: **5** | | **21.3** Powertrain NVH | | | | | | **21.4** Aerodynamic and Flow Induced Vehicle Noise | | | | | | | | | | |
| **Chicago G** FLOOR: **5** | | **1.3** Microperfrated Panels | | | | | **10.3** Noise Policies and Regulations | | | | | | | | | | | |
| **Chicago H** FLOOR: **5** | | **22.4 + 22.5** Vibro-Acoustic Experiments + Vibro-Acoustics of Composite Panels | | | | | | | **22.7** Mid and high Frequency Numerical Methods in Vibro-Acoustics | | | | | | | | | |
| **Denver** FLOOR: **5** | | **6.1** Classic Papers | | | | | | **6.1** Classic Papers | | | | | | | | | | |
| **Los Angeles** FLOOR: **5** | | **11.5** Mining Noise | | | | | **11.6** Gear Noise | | | | | | | | | | | |
| **Indiana** FLOOR: **6** | | | | | | | | | | | | | | | | | | |
| **Grand Ballroom** FLOOR: **7** | **Exhibits Open**: 09:00 – 17:00<br>**Poster Session**: 13:30 – 17:30 | | | | | | | | | | | | | | | | | |

# TUESDAY, 28 AUGUST

## TECHNICAL SESSIONS

**09:00 – 14:20** | FLOOR: **4** | ROOM: **Addison**

## 16.1 Sound Quality and Product Noise—*Product Sound Quality*

Chairs | Ercan Altinsoy, Masayuki Takada

| | | |
|---|---|---|
| 09:00 | **1828** | **Sound Label for Household Appliances** |
| | | M. Ercan Altinsoy; Serkan Atamer |
| 09:20 | **1960** | **Psychoacoustic Tonality Analysis** |
| | | Julian Becker; Roland Sottek |
| 09:40 | **1777** | **Subjective Evaluation for Harshness Sounds** |
| | | Risa Takahashi; Masayuki Konishi; Koji Ishida |
| 10:00 | **2236** | **Methods of Acoustical End-of-line Testing for Sound Quality Assurance during Vehicle Manufacturing** |
| | | Roland Salzer; David Mackenzie; Christian Hubert; Gunther Papsdorf |
| 10:20 | | Coffee Break |
| 10:40 | **1464** | **Sound Quality Evaluation of Noise Emitted from Brush Cutters** |
| | | Masayuki Takada; Kohei Iida; Shoki Tsunekawa; Shin-Ichiro Iwamiya |
| 11:00 | **1438** | **Sound Quality Evaluation of Residential HVAC&R Equipment** |
| | | Weonchan Sung; Patricia Davies; J. Stuart Bolton |
| 11:20 | **1307** | **Subjective and Objective Assessment of Loudness for Mobile Phone Applications** |
| | | Wookeun Song; Lars Birger Nielsen; Tore Stegenborg-Andersen; Idir Edjekouane; Cyril Plapous; Vincent Barriac |
| 11:40 | Lunch on Your Own | |
| 13:20 | **1525** | **Imagine, Design, and Experience Interior Active Sounds for EV: A Comprehensive Process** |
| | | Peyret Paul; Patrick Boussard; Clément Dendievel; Stéphane Molla; Antoine Minard |
| 13:40 | **2277** | **Intensity Perception for Complex Vertical Whole-Body Vibration** |
| | | Anna Schwendicke; Shuye Cheng; Xudong Yu; M. Ercan Altinsoy |
| 14:00 | **1708** | **The Effect of "Twinkle Twinkle Little Star" on Short-Term Memory** |
| | | Munhum Park; Pavarit Chuprasert; Achcharaphan Kloemwilai; Napat Fahkrajang; Pruch Sawetratanastien |

## 16.2 Sound Quality and Product Noise—*Consumer Product Noise*

TUESDAY | **14:20 – 17:40** | FLOOR: **4** | ROOM: **Addison**

Chairs | Ercan Altinsoy, David Nelson

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| 14:20 | **1624** | **Between Engineering and Hearing Research: Auditory Models in Product Development** |
| | | Florian Völk |
| 14:40 | **1313** | **Perceived Effectiveness of The Rumbler Emergency Siren System** |
| | | Frank Angione; Colin Novak; Ashley Lehman; Ben Merwin; Tom Pagliarella; Chris Imeson; Nikolina Samardzic; Peter D'Angela; Helen Ule |
| 15:00 | **1355** | **A New Psychoacoustic Method for Reliable Measurement of Tonalities According to Perception** |
| | | Wade Bray |
| 15:20 | Coffee Break | |
| 15:40 | **1928** | **Assessing LED Bulb Noise** |
| | | David Nelson; Jeff Schmitt |
| 16:00 | **1629** | **Compliance of Chain-Saw Noise Information with the Machinery Directive 2006/42/EC** |
| | | Paul Brereton; Jacqueline Patel |
| 16:20 | **2120** | **Buy Quiet: Findings of I-INCE TSG-10** |
| | | Willem Beltman; Robert Hellweg; Jean Jacques; Patrick Kurtz; Jean Tourret |
| 16:40 | **1470** | **Simplified Determination of the Environmental Correction for Noise Emission Measurements** |
| | | Fabian Heisterkamp; Ilka Arendt |
| 17:00 | **1414** | **Parameter Values for a Signal Processing Methodology with Constant Maximum Sample Kurtosis across Fractional-Octave-Bands** |
| | | Edward Zechmann |
| 17:20 | **1377** | **Dynamic Modeling and Double-Side Optimization of the Orbital Sander Vibration** |
| | | Lingjian Shi; Beibei Sun |

## 19.4 Transportation Noise—*Barriers*

TUESDAY | **09:00 – 11:40** | FLOOR: **4** | ROOM: **Armitage**

Chairs | Kohei Yamamoto, Jean-Pierre Clairbois

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| 09:00 | **2040** | **Changes in Sound Due to Noise Barrier Reflections** |
| | | Judy Rochat |

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| 09:20 | **1408** | **Acoustic Effectivity of Old Noise Barriers** |
| | | Joern Huebelt; Christian Schulze; Paul Lindner; Michael Chudalla; Wolfram Bartolomaeus |
| 09:40 | **1410** | **Calculating Traffic Noise Reduction at Long Distance using Diffracting Elements** |
| | | Eef Brouns; Frits Van der Eerden; Arno Eisses; Anneke Kruyen; WillemJan Van Vliet |
| 10:00 | **1683** | **Heavy Vehicle Noise Control by Parallel Barrier** |
| | | Zhibo Wang; Yat Sze Choy; Kai Ming Li |
| 10:20 | Coffee Break | |
| 10:40 | **2250** | **Practical Use of an Additional Noise Barrier for High Speed Train** |
| | | Daigo Sato; Masakazu Kiyama; Takefumi Kozasa; Akira Omoto |
| 11:00 | **1900** | **Traffic Noise Reduction as an Additional Role of Gabion Fences** |
| | | Krystian Woźniak; Marian Tracz |
| 11:20 | **1939** | **A New Homogeneous Porous Sound Absorptive Barrier Slab Made of Sand Rock** |
| | | Guo Jing; Yan Xiang |
| 11:40 | Lunch on Your Own | |

## **24.1** William Lang Memorial Session

TUESDAY | **13:40 – 16:20** | FLOOR: **4** | ROOM: **Armitage**

Chair | Robert Bernhard

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| 13:40 | **Bill Lang—Family and Personal Perspectives** |
| | Bob Lang |
| 14:00 | **Bill Lang's Seminal Contributions to INCE-USA, International INCE, the INCE Foundation, and IBM** |
| | George Maling |
| 14:20 | **Bill Lang's Contributions to IBM Acoustics and IBM in General** |
| | Matt Nobile; Dave Yeager |
| 14:40 | **Bill Lang's Contributions at the National Academy of Engineering** |
| | Dan Mote; Proctor Reid |
| 15:00 | **Technology for a Quieter America and Follow-on Workshops** |
| | Eric Wood |

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| 15:20 | **Bill Lang and Global Noise Policy** |
| | Tor Kihlman |
| 15:40 | **Bill Lang's Contribution to Noise Control Engineering in Japan** |
| | Hideki Tachibana |
| 16:00 | **Bill Lang and I-INCE** |
| | Robert Bernhard |
| 16:20 | **Bill Lang Reception** |

## 9.2 Flow Induced Noise and Vibration—*Computational Methods*

TUESDAY | **09:00 – 15:20** | FLOOR: **4** | ROOM: **Belmont**

Chairs | Randolph Leung, Carsten Spehr

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| 09:00 | **2134** | **Acoustically Induced Vibration Questionnaire** |
| | | Robert Bruce; Adam Young; Arno Bommer |
| 09:20 | **1592** | **The Application of Leading-Edge Serrations to Reduce Underwater Noise from SUBOFF Model** |
| | | Yalin Li; Yongwei Liu |
| 09:40 | **2067** | **Duct Aeroacoustic Control by Multiple Flexible Panels** |
| | | Harris K. H. Fan; Cheng Shen; Randolph C. K. Leung |
| 10:00 | **1295** | **Analysis and Optimization of Air Duct Noise of Frost-Free Refrigerator Based on Experiment and CFD Method** |
| | | Du Xiaofei; Chengxi Li |
| 10:20 | Coffee Break | |
| 10:40 | **1483** | **Noise Prediction of Axial Fan Duct using a Lattice Boltzmann Approach and Acoustic FEM** |
| | | Kentaro Hayashi; Toshifumi Kudo |
| 11:00 | **1772** | **Broadband Noise Prediction of Stochastic Sources Based on the Linearized Euler Equations** |
| | | Cesar Legendre; Benjamin DeBrye; Yves Detandt; Alexis Talbot; Athanasios Poulos; Maxime Raskin |
| 11:20 | **2011** | **Methodology for Predicting Flow Induced Noise in Axial Fans through Aero Vibro-Acoustics (AVA)** |
| | | Prashant Gawade; Sushil Paradhe; Vishal Patil; Marvin Mealman |
| 11:40 | **1384** | **Time Domain Boundary Element Method for the Leading Edge Noise Subjected to Linear Vorticity** |
| | | Sparsh Sharma; Thomas Geyer; Ennes Sarradj |

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| 12:00 | **1742** | **Analysis of the Physical Behavior of Refrigerant-Flow Induced Noise in an Automotive HVAC System by a Coupled Simulation** |
| | | Atsushi Itoh |
| 12:20 | Lunch on Your Own | |
| 14:00 | **2261** | **CFD Based Lock-In Modeling of Cavity-Pipe Line Systems** |
| | | Ted Bagwell; Kristin Cody |
| 14:20 | **2321** | **Review of Causes and Mitigation of Cavity Noise in Machinery and Other Mechanisms** |
| | | Frank Kushner |
| 14:40 | **1373** | **FSI Vibration Analysis Method of Complex Fluid-Filled Piping Systems** |
| | | Shuaijun Li; Yong Chen; Chunguo Wang |
| 15:00 | **2102** | **Predicting Noise from Mower Deck using a Computational Aeroacoustics Model** |
| | | Hany Nakhla; Christopher Waltenberry; Jose Magalhaes; Sanghoon Suh |
| 15:20 | Coffee Break | |

## 2.2 Active Control of Sound and Vibration—*Application*

TUESDAY | **09:00 – 15:20** | FLOOR: **5** | ROOM: **Chicago A**

Chairs | Jiancheng Tao, Haishan Zhou, Delf Sachou

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| 09:00 | **1557** | **Truncated Singular Value Decomposition Method for Mitigating Unwanted Enhancement in Active Noise Control Systems** |
| | | Xuchen Wang; Yangfan Liu; J. Stuart Bolton |
| 09:20 | **2042** | **Multi-Channel Adaptive Feedforward Systems for Multi-Input Multi-Output Active Control of Broadband Road Noise** |
| | | Guo Long; Tao Feng; Rushikesh Dhakad; Teik Lim |
| 09:40 | **1800** | **Active Vibration Control System for Reducing Gear Whine Noise** |
| | | Jan Troge; Welf-Guntram Drossel; Eric Hensel; Tom Georgi |
| 10:00 | **2076** | **A Review of the Applications of Hybrid Active/Passive Noise Control Systems in Ducts** |
| | | Jiancheng Tao; Xiaojun Qiu; Haishan Zou |
| 10:20 | Coffee Break | |
| 10:40 | **2190** | **An Improved Active-Passive Hybrid Muffler** |
| | | Hongling Sun; Qiyan Ke; Han Wang; Ming Wu; Jun Yang |

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| 11:00 | **1869** | **Experimental Results of the Effect of Increased Filter Length and Sample Rate of a Feedback Active Noise Control System with the FxLMS-Algorithm Implemented in VHDL** |
| | | Jonas Hanselka; Alexander Klemd; Delf Sachau; Bernd Klauer |
| 11:20 | **1866** | **Simulative Study on the Effect of the Increase of the Sample Rate of a Feedback Active Noise Control System** |
| | | Max Lorenzen; Jonas Hanselka; Delf Sachau |
| 11:40 | **2246** | **Controlling Sound Radiation through Openings with the Active Noise Control System at the Edge** |
| | | Shuping Wang; Jiancheng Tao; Xiaojun Qiu; Jie Pan |
| 12:00 | **2204** | **Experimental Study on Nonuniform Hartmann Resonators** |
| | | Sonu Thomas; Srinivasan K |
| 12:20 | Lunch on Your Own | |
| 13:40 | **2158** | **Taking Control of Your Acoustical Environment—A Look at the Current State of Personal Noise Control Technology** |
| | | Jia Hao Chuah |
| 14:00 | **2287** | **Window Active Noise Control System with Virtual Sensing Technique** |
| | | Rina Hasegawa; Dongyuan Shi; Yoshinobu Kajikawa; Woon-Seng Gan |
| 14:20 | **1661** | **Performance Analysis of Active Control of Micro-Vibration Induced by Spacecraft Reaction Wheel** |
| | | Shi-Hwan Oh |
| 14:40 | **1993** | **A400M Fuselage Controlled by Optimized Set of Tuned Vibration Absorbers** |
| | | Delf Sachau; Christian Koehne |
| 15:00 | **1391** | **Using Frequency Dependent Causality Analysis and Automated Tuning with Broadband ANC Systems to Optimize the Performance of the 3D Sound Field in a Passenger Vehicle** |
| | | Jonathan Christian |
| 15:20 | Coffee Break | |

## 5.11 Building and Architectural Acoustics—*Predictions and Prediction Methods*

TUESDAY | **15:40 – 17:40** | FLOOR: **5** | ROOM: **Chicago A**

Chairs | Carolina Monteiro, John Davy, Berndt Zeitler

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| 15:40 | **1415** | **A Vibrations Approach to Determining Batch-To-Batch Changes in Poured Gypsum Used in Flooring Systems** |
| | | Sunit Girdhar; Andrew Barnard |

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| 16:00 | **1796** | **Optimization of Sound Absorbing Ceilings** |
| | | Emma Arvidsson; Erling Nilsson; Delphine Bard Hagberg |
| 16:20 | **1383** | **Real-Time Auralization of Sound Insulation** |
| | | Michael Vorlaender; Imran Muhammad |
| 16:40 | **1896** | **A Model to Predict the Acoustic Satisfaction in Distracting Background Speech** |
| | | Tobias Renz; Philip Leistner; Andreas Liebl |
| 17:00 | **2017** | **An Efficient and Accurate Sound Insulation Prediction Model for Finite Double-Leaf Walls with a Common Studded Frame** |
| | | Edwin Reynders; Jan Van den Wyngaert; Mattias Schevenels |
| 17:20 | **1339** | **Diffracted Edge Wave Prediction of Finite, Rectangular Rigid Plates using the Physical Theory of Diffraction** |
| | | Ning Xiang; Aleksandra Rozynova |

## **12.3** Measurement Methods—*Signal Processing*

TUESDAY | **09:00 – 15:40** | FLOOR: **5** | ROOM: **Chicago B**

Chairs | Andrew Barnard, Jing Lu

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| 09:00 | **1513** | **Multiple Sound Images Reproduction with Parametric Array Loudspeakers and Indirect Electrodynamic Loudspeakers** |
| | | Yoshinori Ogami; Takahiro Fukumori; Masato Nakayama; Takanobu Nishiura |
| 09:20 | **1560** | **Discomfort Reduction Based on Time-Frequency Auditory-Masking for Railway Brake Sound** |
| | | Misaki Otsuka; Sayaka Okayasu; Takahiro Fukumori; Masato Nakayama; Takanobu Nishiura |
| 09:40 | **2096** | **Environmental Sound Monaural Source Separation with Clustered Non-Negative Matrix Factorization** |
| | | Charlotte Ellison; Matthew Blevins |
| 10:00 | **1889** | **Line Spectra Enhancement Technique Based on Auto-Adaptive Window Length** |
| | | ChuanQi Zhu; ShiLiang Fang |
| 10:20 | Coffee Break | |
| 10:40 | **1516** | **HRTF Personalization Based on Pinna Shape Estimation by Standardized Scanning with Handy 3D Scanner** |
| | | Zhuan Zuo; Takahiro Fukumori; Masato Nakayama; Takanobu Nishiura |

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| 11:00 | **1562** | **Comfortable Sound Design with Chord-Forming of Musical Instrument Sound for Dental Treatment Sound** |
| | | Yoshitaka Ohshio; Takahiro Fukumori; Masato Nakayama; Takanobu Nishiura; Yoichi Yamashita |
| 11:20 | **1830** | **Delamination Detection in Composite Laminates using a Vibration-Based Chaotic Oscillator Method** |
| | | Xuan Li; Dunant Halim; Xiaoling Liu; Chris Rudd |
| 11:40 | **1593** | **Impulsive Noise Reduction in Speech Acquisition Based on Throat Vibration Measurement with Laser Microphone** |
| | | Hiroki Shindo; Takahiro Fukumori; Masato Nakayama; Takanobu Nishiura |
| 12:00 | **1398** | **Object Identification Based on the Perturbation Analysis of the Sound Field in The Room Environment** |
| | | Haitao Wang; Yakun Wang; Jinfu Wang; He Du; Ruyue Zheng; Xiangyang Zeng |
| 12:20 | Lunch on Your Own | |
| 13:40 | **1594** | **Wearable Personal Audio-Spot Design Based on the Collaboration of Bone Conduction Headphone and Parametric Loudspeakers** |
| | | Toshihiro Fujii; Takahiro Fukumori; Masato Nakayama; Takanobu Nishiura |
| 14:00 | **1357** | **A Paradigm of Noise Interference in a Wave** |
| | | Himanshu Dehra |
| 14:20 | **1595** | **A Study on Audible Low-Frequency Sound Emphasis Based on Multiplexed Double Sideband Modulation in Parametric Loudspeaker** |
| | | Yusei Nakano; Takahiro Fukumori; Masato Nakayama; Takanobu Nishiura |
| 14:40 | **1596** | **Spectral Peak Noise Reduction with Frequency Modulated Carrier Wave for Parametric Loudspeaker** |
| | | Kairi Mori; Takahiro Fukumori; Masato Nakayama; Takanobu Nishiura |
| 15:00 | **1342** | **Termites use Vibrations to Eavesdrop on Predatory Ants** |
| | | Joseph Lai; Sebastian Oberst; Theodore Evans |
| 15:20 | **1987** | **Estimation of an Uncertain Source Power from Monitors at Multiple Distant Locations** |
| | | D. Keith Wilson; Chris Pettit; Carl Hart; Daniel Breton; Vladimir Ostashev |
| 15:40 | Coffee Break | |

## 5.5 Building and Architectural Acoustics—*Case Studies*

TUESDAY | **16:00 – 17:20** | FLOOR: **5** | ROOM: **Chicago B**

Chairs | Erik Miller-Klein, Paul Bauch, Marcos Holtz

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| 16:00 | **1906** | **An Open Office Plan Case Study: Demountable Glass Partitions and Speech Privacy** |
| | | Corey Taylor; Kevin Herreman |
| 16:20 | **1780** | **Polyurethane Foam for Reduction of Impact Noise and Vibration in Fitness Floors** |
| | | Jessica Scarlett; Brad Dimock |
| 16:40 | **2139** | **New Urban Restaurant in Historic Hotel Separated by High-Transmission-Loss, Spring-Suspended Ceiling** |
| | | Jim Borzym |
| 17:00 | **2175** | **Case Studies of HVAC Noise Control with Challenging Design Constraints** |
| | | Adam Buck; Gina Jarta |

## 17.6 Soundscape and Noise Management—*Apps, Social Media, and Virtual Reality as Soundscape Evaluation Tools*

TUESDAY | **09:00 – 11:20** | FLOOR: **5** | ROOM: **Chicago C**

Chairs | Antonella Radicchi, Andy Chung

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| 09:00 | **1541** | **Mapping Tranquility—A Case Study of the Central Park Soundscape, New York City** |
| | | Eoin King; Elizabeth Caltagirone; Ben Steers; Paul Slaboch |
| 09:20 | **1860** | **From Crowdsourced Data to Open Source Planning: The Implementation of the Hush City App in Berlin** |
| | | Antonella Radicchi |
| 09:40 | **1810** | **Realism and Immersion in the Reproduction of Audio-Visual Recordings for Urban Soundscape Evaluation** |
| | | Kang Sun; Dick Botteldooren; Bert De Coensel |
| 10:00 | Coffee Break | |
| 10:20 | **1763** | **Integrating Artificial Intelligence with Virtual Reality for Soundscape Appraisal** |
| | | Andy Chung; Wai Ming To; Iris Vong |

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| 10:40 | **1319** | **Using Sound Level Meter Apps to Raise Noise Pollution Awareness —New York City Case Study** |
| | | Greg F. Scott |
| 11:00 | **1633** | **A Community-Driven Plug-And-Sense Sensor Network for Soundscapes and Environmental Noise** |
| | | Tae Hong Park |
| 12:00 | Lunch on Your Own | |

## 17.5 Soundscape and Noise Management—*Indoor Soundscape*

TUESDAY | **13:40 – 16:40** | FLOOR: **5** | ROOM: **Chicago C**

Chairs | Semiha Yilmazer, Keely Siebein

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| 13:40 | **2146** | **Taipei MRT Cabin Soundscape—Route between Shandao Temple and Taipei Main Station** |
| | | Julie C Chen; Christain Christain; Yu-Tein Yen; Anastasia Mimosa; Elisabeth Kathryn; Lucky Tsaih |
| 14:00 | **2122** | **Soundscape of Transportation: Aircraft** |
| | | Marylin Roav; Hyun G. Paek; Gary Siebein Jr. |
| 14:20 | **2157** | **A Study of Diffusivity in Concert Halls Using Large Scale Acoustic Wave-Based Modeling and Simulation** |
| | | Hassan Azad; Roozbeh Ketabi; Gary Siebein |
| 14:40 | **2156** | **The Soundscape of Theaters** |
| | | Keely Siebein; Gary Siebein Jr. |
| 15:00 | Coffee Break | |
| 15:20 | **2052** | **Strategies for Tunable Indoor Soundscapes** |
| | | Ganapathy Mahalingam |
| 15:40 | **2170** | **Study of Soundscape Design Incorporating Sound Instrument into Mini-Plant Factory** |
| | | Taiko Shono; Hidemaro Shimoda; Na Lu; Syuichi Obayashi; Jiaxun Hu |
| 16:00 | **1958** | **Effect of Sound Absorption on Children's Concentration to Listening to Teacher's Speech in a Child Daycare Room** |
| | | Keiji Kawai; Momoko Otaku |
| 16:20 | **1390** | **A Qualitative Approach to Investigate Indoor Soundscape of the Built Environment** |
| | | Semiha Yilmazer; Volkan Acun |

## **20.2** Underwater and Maritime Acoustics—*Ships and Offshore Noise and Vibration*

TUESDAY | **09:00 – 12:20** | FLOOR: **5** | ROOM: **Chicago D**

Chairs | Yegao Qu, Bernt Mikal Larsen

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| 09:00 | **1755** | **Emitted Noise in Harbors—Effect of Shore Power** |
| | | Bernt Mikal Larsen |
| 09:20 | **2001** | **Evaluating Biological Effects of Dredging-Induced Underwater Sounds** |
| | | Andrew McQueen; Burton Suedel; Justin Wilkens; Morris Fields |
| 09:40 | **1754** | **COMPILE II—A Benchmark of Pile Driving Noise Models against Offshore Measurements** |
| | | Stephan Lippert; Marten Nijhof; Tristan Lippert; Otto von Estorff |
| 10:00 | Coffee Break | |
| 10:20 | **1751** | **Sound Radiation Characteristics of Underwater Cylindrical Shells with Structural Complexities** |
| | | Yao Sun |
| 10:40 | **1652** | **Analysis of Acoustic Radiation Characteristics of an Infinitely Long Half-Filled Cylindrical Shell** |
| | | Shuai Zhang; Tianyun Li; Xiang Zhu |
| 11:00 | **1455** | **Unsteady Flow of an Impulsively Started Circular Cylinder with Two Symmetrical Strips** |
| | | Jialiang Zhou; Guoyong Jin |
| 11:20 | **2292** | **The Vibration Test and Analysis of the Star Air Compressor** |
| | | Hu Hengbin; Zhang Linke; Tan You |
| 11:40 | **1608** | **Free Vibration Analysis of Rectangular Thin Plate with Multiple Openings under General Boundary Conditions** |
| | | Rui Nie; Tianyun Li; Xiang Zhu; Wenjie Guo; Jun Zhang |
| 12:00 | **2135** | **A Review of Offshore Noise Levels** |
| | | Arno Bommer; Adam Young; Robert Bruce |
| 12:20 | Lunch on Your Own | |

## 5.7 Building and Architectural Acoustics—*Facade and Envelope Sound Isolation*

TUESDAY | **13:40 – 16:40** | FLOOR: **5** | ROOM: **Chicago D**

Chairs | Jeanette Hesedahl, Melinda Miller

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| 13:40 | **2053** | **The Use of Scatterer Arrays to Improve the Sound Transmission Loss Across Plenum Windows** |
| | | SK Tang |
| 14:00 | **1584** | **Active Noise Control Strategy for Road Traffic Noise Energy Penetrating Windows in High-Rise Buildings using a Vibration Active Control Device** |
| | | Jiping Zhang; Jie Jiang; Peng Chen; Zheming Wang |
| 14:20 | **1493** | **Acoustical Effects of Modern Building Envelope Advancements: You Can Hear the Difference!** |
| | | Jeffrey Fullerton; Jennifer Keegan; Thomas Hackett |
| 14:40 | **1308** | **Noise Reduction and Air Behaviors in Ventilated Single-Glazed Façade with Glass Fiber-Based Shading Louvers and Compact Silencers** |
| | | Jeehwan Lee |
| 15:00 | Coffee Break | |
| 15:20 | **2247** | **Simulation of Acoustic Insulation of Facades Based on Existing Thermal Regulation in Chile** |
| | | Jaime Delannoy; Leonardo Meza; Antonio Marzzano |
| 15:40 | **1789** | **The Effects of Acoustic Treatment on Plenum Windows in Reducing Outdoor Noise in Residential Buildings** |
| | | Tony Cheng; Louisa LY Cheung; David BK Yeung |
| 16:00 | **1725** | **Comparison of Predicted Sound Transmission Loss through an Opening by using Finite Element and Ray-Tracing Methods** |
| | | Won-Gil Ji; Suk-Min Kwon; Hong-Seok Yang |
| 16:20 | **1971** | **Noise Mitigation using Facade Design on Indonesian Hospital: Dr. Soetomo General Hospital Case Study** |
| | | Ainun Nadiroh; Dhany Arifianto; Nyilo Purnami |

## 5.3 Building and Architectural Acoustics—*HVAC Noise Control Methods and Standards*

TUESDAY | **10:40 – 12:20** | FLOOR: **5** | ROOM: **Chicago E**

Chairs | Jeff Fullerton, Jerry Lilly

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| 09:00 | **2161** | **Silencer SPICE and All That's Nice** |
| | | Karl Peterman |
| 09:20 | **1862** | **Centrifugal Chiller Noise Sources and Mitigation** |
| | | Patrick Marks; R. Troy Taylor; Dale Unger |
| 09:40 | **2012** | **Defining the Line of Practicality: an Investigation into the Impacts of Detailed Source Modeling and Preliminary Site Investigation when Specifying Mechanical Noise Control Measures** |
| | | Matthew Downey |
| 10:00 | **1385** | **Predicting Sound Levels from Mechanical Equipment Rooms** |
| | | Felicia Doggett |
| 10:20 | Coffee Break | |
| 10:40 | **2025** | **Acoustical Performance of Foil-Faced Fiberglass Insulation Board** |
| | | Jerry Lilly; Francis Babineau |
| 11:00 | **1874** | **Qualification Procedures for Reverberation Rooms** |
| | | Paul Bauch |
| 11:20 | **1968** | **Quieting Cryptocurrency Exhaust Fans** |
| | | Sean Connolly |
| 11:40 | **2129** | **Recent Experience with Cannabis Production Facility Noise** |
| | | Andrew Carballeira; Kristen Murphy |
| 12:00 | **1943** | **Commercialization of the Carbon Nanotube Thermophone for HVAC Active Noise Control Applications** |
| | | Steven Senczyszyn; Andrew Barnard |
| 12:20 | Lunch on Your Own | |

## 3.4 Aircraft Noise—*UAV Noise*

TUESDAY | **13:40 – 16:00** | FLOOR: **5** | ROOM: **Chicago E**

Chairs | Ran Cabell, Kevin Herreman

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| 13:40 | **1364** | **Acoustic Wind Tunnel Measurements of a Quadcopter in Hover and Forward Flight Conditions** |
| | | Nikolas Zawodny; Nicole Pettingill |
| 14:00 | **1314** | **Aeroacoustic Emissions from Quadcopter Unmanned Aircraft Systems as Quadrupoles** |
| | | Frank Mobley |
| 14:20 | **2310** | **Noise Level Prediction of a Small UAV Using Panel Contribution Analysis** |
| | | Gong Cheng; David Herrin |
| 14:40 | Coffee Break | |
| 15:00 | **1526** | **Comparative Acoustic Examination of UAV Propellers** |
| | | Konrad Oeckel; Jan Heimann; Michael Kerscher; Sven Angermann; Gunnar Heilmann; Wolfgang Rüther-Kindel |
| 15:20 | **1855** | **UAS Noise Certification** |
| | | David Senzig; Mehmet Marsan |
| 15:40 | **1362** | **Initial Developments Toward an Active Noise Control System for Small Unmanned Aerial Systems** |
| | | Noah Schiller; Nikolas Zawodny |

## 21.1 Vehicle Noise, Vibration, and Harshness—*Advances in*

TUESDAY | **09:00 – 10:20** | FLOOR: **5** | ROOM: **Chicago F**

Chair | Ming-Hung Lu

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| 09:00 | **1536** | **Design of a Test or Quantitative Rating of Squeak Propensity of Material Pairs** |
| | | Gil Jun Lee; Jay Kim |
| 09:20 | **1531** | **Noise Source Separation in Electric Vehicles Using Operational Transfer Path Analysis** |
| | | Ming-Hung Lu; Ming Une Jen; Dennis de Klerk |
| 09:40 | **1588** | **A Case Study on the Discomfort Caused by Vertical Vibration in a Micro Commercial Car** |
| | | Yu Huang; Dou Li |

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| 10:00 | **1727** | **A Study on Possible Causes of Squeak Noises in the Hand-Grab Bar Assembly of a Vehicle** |
| | | Gil Jun Lee; Sung Uk Choi; Jay Kim |
| 10:20 | Coffee Break | |

## 21.2 Vehicle Noise, Vibration, and Harshness—*Body Structure NVH*

TUESDAY | **10:40 – 12:20** | FLOOR: **5** | ROOM: **Chicago F**

Chairs | Gordon Ebbitt, Steve Sorenson

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| 10:40 | **1959** | **A Study on how Small Changes to Vehicle Panel Boundary Conditions Vary the Overall System Response** |
| | | Amy Dowsett; Dan O'Boy; Stephen Walsh; Steve Fisher |
| 11:00 | **2045** | **Lightweight, Flexible Damping Treatment using a Kinetic Spacer** |
| | | Seungkyu Lee; Taewook Yoo; Ronald Gerdes; Thomas Hanschen; Georg Eichhorn |
| 11:20 | **1741** | **A Methodology for Improving Vehicle Suspension's Vibro-Acoustic Performance for Road Induced Noise using FBS Method** |
| | | Jun Gu Kim; Yeon June Kang; David P. Song; Mun Hwan Cho; Kang Duck Ih |
| 11:40 | **1671** | **Fundamental Study of Time Domain Contribution Separation Technique for Principal Component Mode Affecting the Ride Comfort of a Vehicle** |
| | | Takuya Kajiyama; Hiroki Taguti; Junji Yoshida |
| 12:00 | **1670** | **Handle Vibration Reduction of Lawnmower by Applying Slightly Unbalanced Blade** |
| | | Shimpei Ohno; Yusuke Yamaguchi; Junji Yoshida |
| 12:20 | Lunch on Your Own | |

## 21.3 Vehicle Noise, Vibration, and Harshness—*Powertrain NVH*

TUESDAY | **13:40 – 15:20** | FLOOR: **5** | ROOM: **Chicago F**

Chairs | Pranab Saha, Gordon Ebbitt

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| 13:40 | **1694** | **Development of an Improved Simulation Method for Determining the Vibrational Behaviour of the Electric Motor in Hybrid-Electric Automotive Applications** |
| | | Ayden Shahfir |

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| 14:00 | **1743** | **Experimental Modal Analysis and Numerical Model Development of Diesel Engine Block** |
| | | Deepak Ghaisas; Sachin Pawar; Devendra Mandke; Sanghoon Suh |
| 14:20 | **1400** | **Prediction of In-Vehicle Powertrain Rigid Body Modes** |
| | | Ramakanth Maddali |
| 14:40 | **2154** | **Computational Analysis of DI Pump Ticking Noise Excited by Solenoid Valve Impact** |
| | | Qifan He; Nikhil Seera; Akira Inoue |
| 15:00 | **1305** | **Interaction of Gear Tooth Friction and Misalignment Effect on the Vibro-Acoustics of Spiral Bevel Gears** |
| | | Srikumar C Gopalakrishnan; Yawen Wang; Teik C. Lim |
| 15:20 | Coffee Break | |

## 21.4 Vehicle Noise, Vibration, and Harshness—*Aerodynamic and Flow Induced Vehicle Noise*

TUESDAY | **15:40 – 16:40** | FLOOR: **5** | ROOM: **Chicago F**

Chairs | Xin Hua, Pranab Saha

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| 15:40 | **1729** | **A Continuous Adjoint Framework for Vehicle Aeroacoustic Optimization** |
| | | Christos Kapellos; Michael Hartmann |
| 16:00 | **2098** | **Virtual Test Platform of Automotive Aeroacoustic Performances for Earlier Development Phase** |
| | | Munhwan Cho; Kang Duck Ih |
| 16:20 | **2015** | **A New Approach to End of Line Vehicle Audit—Turning Subjective Evaluations to Objective Rankings using a New Signal Processing Algorithm** |
| | | Gary Newton; Kiran Kumar Kandula; Eric Frank; Brian Thom; Mark Sturgill |

## 1.3 Acoustic Materials—*Microperforated Panels*

TUESDAY | **09:20 – 15:00** | FLOOR: **5** | ROOM: **Chicago G**

Chairs | Mats Abom, Yat Sze Choy

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| 09:20 | **1432** | **Sound Attenuation in a Flow Duct Periodically Loaded with Micro-Perforated Patches Backed by Helmholtz Resonators** |
| | | Teresa Bravo; Cedric Maury |

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| 09:40 | **1902** | **Dimensional Analysis in the Air Flow Resistivity Measurements of Perforated Plates** |
| | | Katarzyna Baruch; Aleksandra Majchrzak; Agata Szelą |
| 10:00 | **1431** | **Absorption and Transmission of Boundary Layer Noise through Thin Micro-Perforated Panel Structures** |
| | | Cedric Maury; Teresa Bravo |
| 10:20 | Coffee Break | |
| 10:40 | **1630** | **Acoustics of Micro-Perforated Orifice Plates** |
| | | Jennifer Lemne; Stefan Sack; Mats Åbom |
| 11:00 | **1940** | **Sound Absorber Design of Multilayered Microperforated Panels Using Bayesian Inference** |
| | | Ning Xiang; Cameron Fackler; Yiqiao Hou |
| 11:20 | **1744** | **Sound Quality Control by Microperforated Panel Housing Device** |
| | | Zhibo Wang; Yat Sze Choy |
| 11:40 | **1845** | **Acoustic Characterization of Additive Manufactured Micro-Perforated Panel Backed by Honeycomb Structure** |
| | | Deepak Akiwate; Mahendra Date; B Venkatesham; Suryakumar S |
| 12:00 | Lunch on Your Own | |
| 13:40 | **1707** | **Design of Space Sound Absorbers with Micro-Perforated Stretch Ceiling** |
| | | Yueyue Wang; Junjuan Zhao |
| 14:00 | **1309** | **Acoustic Absorption of a Microperforated Panel Without the Backing Cavity** |
| | | Cheng Yang |
| 14:20 | **1983** | **A New Type of Sound Absorbing and Isolation Material—Microck Sound Insulation Board** |
| | | Yongkang Miao; Bin Shao; Shiyung Ma; Tungchen Chung |
| 14:40 | **1374** | **Cooling, Heating, Sound-Absorbing, Lighting Ceilings** |
| | | Christian Nocke; Jean-Marc Scherrer |
| 15:00 | Coffee Break | |

## 10.3 Noise Policies and Regulations

TUESDAY | **15:20 – 17:20** | FLOOR: **5** | ROOM: **Chicago G**

Chairs | Arno Bommer, Doug Manvell

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| 15:20 | **1838** | **Noise Ordinance Noise Level Limits, an Update of the EPA's 1975 Findings** |
| | | Leslie Blomberg |
| 15:40 | **2113** | **What Exactly is the "Maximum Permissible Noise Level?"** |
| | | Cole Martin; Paul Burge |
| 16:00 | **1287** | **Noise Protection in Urban Areas—the New Legal Framework in Germany** |
| | | Annett Steindorf |
| 16:20 | **1831** | **Penalties for Noise Violations in the United States** |
| | | Leslie Blomberg; Owen Lenz |
| 16:40 | **1717** | **Low Frequency Noise—The Long Way of Amending the German Standard for Measurement and Rating LFN** |
| | | Christian Fabris |
| 17:00 | **1527** | **Development and the Regulations of the Noise Control of the Republic of China (Taiwan)** |
| | | Lin I-Chun |

## 22.4 Vibro-Acoustics—*Vibro-Acoustic Experiments*

TUESDAY | **09:00 – 14:40** | FLOOR: **5** | ROOM: **Chicago H**

Chairs | Steve Hambric, Steve Conlon

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| 09:00 | **1275** | **Tutorial on Wavenumber Transforms of Structural Vibration Fields** |
| | | Stephen Hambric; Andrew Barnard |
| 09:20 | **2121** | **Low and High Level Acoustic Propagation in Waveguides: Vibroacoustic Coupling in a Bent Pipe at Low Frequency** |
| | | Romain Beauvais; Joel Gilbert; François Gautier; Adrien Pelat; Véronique Florquin; Guillaume Vandenbossche |
| 09:40 | **1807** | **Application of an Experimental Modal Analysis on Composite Pressure Vessels for Monitoring Prestress Condition** |
| | | Sebastian John; René Eisermann; Georg Mair |
| 10:00 | **1731** | **High-Resolution Vibration Measurement and Analysis of the Flight-LAB Aircraft Fuselage Demonstrator** |
| | | René Winter; Jörn Biedermann; Marco Norambuena |

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| 10:20 | Coffee Break | |
| 10:40 | **1532** | **Analysis of the Impact of Different Types of Vibration Isolation on the Dynamic Loading of Machines and the Surrounding Environment** |
| | | Stanislav Ziaran; Ondrej Chlebo; Milos Musil |
| 11:00 | **1471** | **Setting Up Plane and Thin Panels with Representative Simply Supported Boundary Conditions: Comparative Results and Applications In Three Laboratories** |
| | | Olivier Robin; Alain Berry; Noureddine Atalla; Mathieu Aucejo; Boris Lossouarn; Lucie Rouleau; Jean-François Deü; Christophe Marchetto; Laurent Maxit |
| 11:20 | **1770** | **Notes on Measurement of Radiation Efficiency** |
| | | Steven Campbell; David Herrin; Brett Birschbach; Pat Crowley |
| 11:40 | **1668** | **Lightweight Low-Frequency Metamaterial Dampers** |
| | | Ka Yan Au-Yeung; Zhiyu Yang |
| 12:00 | **1784** | **The Measurement of Sound Scattering in a 1:8 Scale—Validation of the Measurement Stand and Procedure** |
| | | Aleksandra Majchrzak; Bartłomiej Chojnacki; Monika Sobolewska; Katarzyna Baruch; Adam Pilch |
| 12:20 | Lunch on Your Own | |
| 13:40 | **1660** | **Application of Panel Contribution Analysis Combined with Scale Modeling to Predict Sound Pressure Levels in a Bakery** |
| | | Gong Cheng; D. W. Herrin |
| 14:00 | **1489** | **Acoustical Characteristics of Multi-Leak Signals in Submerged Pipelines** |
| | | Shuangjiang Zhang; Yan Gao; Xueyun Ruan; Yuyou Liu |
| 14:20 | **1412** | **Development of Test System to Measure Anti Vibration Gloves Transmissibility at the Palm of the Hand** |
| | | Rafael Gerges; Samir Gerges |

## **22.5** Vibro-Acoustics—*Composite Panels*

TUESDAY | **14:40 – 15:40** | FLOOR: **5** | ROOM: **Chicago H**

Chair | Steve Hambric

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| 14:40 | **1442** | **Damping of Hybrid-Weave Composite Laminates** |
| | | Albert Allen |
| 15:00 | **1387** | **Transmission Loss Adaption of Sandwich Panels with Honeycomb Core Variation** |
| | | Martin Radestock; Thomas Haase; Hans Peter Monner |

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| 15:20 | **1886** | **Numerical and Experimental Assessment of the Transmission Loss of Honeycomb Sandwich Panels** |
| | | Simone Baro; Roberto Corradi; Andrea Parrinello; Gian Luca Ghiringhelli |
| 15:40 | Coffee Break | |

## 22.7 Vibro-Acoustics—*Numerical Methods*

TUESDAY | **16:00 – 17:40** | FLOOR: **5** | ROOM: **Chicago H**

Chairs | Ricardo Alvarez, Steve Hambric

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| 16:00 | **1361** | **Topology Optimization of Damping Material for the Acoustic Response of Plates** |
| | | Zhifei Zhang; Bi Wu; Zhongming Xu; Yansong He |
| 16:20 | **1864** | **Performance of Multi-Orifice Resonator on Higher Order Modes of an Acoustic Cavity** |
| | | V S N Reddi Chintapalli; Jeyaraj P |
| 16:40 | **1617** | **Influence of Internal Cavity in Air-Borne Radiated Noise of an Underwater Structure** |
| | | Dooho Lee; Bong-Ki Kim; Hyun-Sil Kim; Seong-Hyun Lee |
| 17:00 | **2279** | **Structural Topology Optimization with Stochastic Dynamic Response Constraints** |
| | | XiaoYan Teng; Wenxiang Xiong; HeTao Zhao; Wenjin Zhu |
| 17:20 | **2111** | **Uncertainty Analysis for Improved Correlation of Airborne SEA Model** |
| | | Dilal Rhazi; Parimal Tathavadekar |

## 7.3 Community Noise—*Noise Mapping*

TUESDAY | **09:00 – 14:20** | FLOOR: **4** | ROOM: **Clark**

Chairs | Eoin King, Jorge Arenas, Gaetano Licitra

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| 09:00 | **1393** | **Noise Mapping in the EU: State of Art and 2018 Challenges** |
| | | Gaetano Licitra; Elena Ascari |
| 09:20 | **2215** | **Preliminary Results of Dynamap Noise Mapping Operations** |
| | | Roberto Benocci; Fabio Angelini; Marco Cambuaghi; Alessandro Bisceglie; Hector Eduardo Roman; Rosa Ma Alsina-Pagès; Joan Claudi Socoró; Francesc Alías; Ferran Orgab; Giovanni Zambon; |
| 09:40 | **2176** | **Spatial Statistical Modeling of Road Traffic Noise for Supporting Strategic Regional Planning** |
| | | Hunjae Ryu; Phillip Kim; Nokil Park; Bum Seok Chun; Seo Il Chang |

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| 10:00 | **1931** | **The Pilot Noise Map of Sao Paulo: First Findings and Next Steps** |
| | | Talita Pozzer; Marcos Holtz; Juan de Frias |
| 10:20 | Coffee Break | |
| 10:40 | **1813** | **Sensitivity Map—A Case Study in Sao Paulo, Brazil** |
| | | Teddy Kaeriyama Yanagiya; Juan Frías |
| 11:00 | **2097** | **The Use of Pilot Areas as a Base for Large-Scale Strategic Noise Mapping: Technical Aspects and Application of Software Based Strategies** |
| | | Antonio Notario; Juan Frias; Talita Pozzer; Marcos Holtz; Nicolas Isnard |
| 11:20 | **2268** | **Application of Noise Map in Organic Renewal of the Non-Protected Districts** |
| | | Kong Jiangwei; Mengxi Gao; Ruhong Xin; Xiang Liu; Jian Zeng |
| 11:40 | **1675** | **Development of Annoyance Map with Combined Noise of Aircraft and Road Traffic Noise Based on the Partial Loudness Model** |
| | | Chanil Chun; Doo Young Gwak; Kiseop Yoon; Soogab Lee |
| 12:00 | Lunch on Your Own | |
| 13:00 | **1882** | **Educational App for Traffic Noise Mapping** |
| | | Enrique Suarez; Jorge P. Arenas |
| 13:20 | **2130** | **Transportation Noise and Public Health Outcomes: Biological Markers and Pathologies** |
| | | Enda Murphy; Jon-Paul Faulkner |
| 13:40 | **1759** | **Study by Long-Term Measures about ISO 1996 Standard** |
| | | Juan Miguel Barrigón Morillas; David Montes González; Guillermo Rey-Gozalo; Pedro Atanasio Moraga; Rosendo Vílchez-Gómez; José Trujillo Carmona |
| 14:00 | **2264** | **Strategic Versus Simplistic Noise Modelling of the Bay Area of California: Comparing the Impact on Policy and the Community** |
| | | Ben Hinze |

## **12.1** Measurement Methods—*Advances in*

TUESDAY | **16:00 – 17:40** | FLOOR: **4** | ROOM: **Clark**

Chairs | Gilles Daigle, Kristin Cody

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| 14:20 | **1540** | **Emergency Vehicle Detection Using Acoustic Source Localization Techniques** |
| | | Eoin King; Jarrett B. Lagler; Akin Tatoglu |

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| 14:40 | **1688** | **Measurement of Sound Pressure inside Tube using Optical Interferometry** |
| | | Denny Hermawanto; Kenji Ishikawa; Kohei Yatabe; Yasuhiro Oikawa |
| 15:00 | **1753** | **Measurement of the Sound Transmission Loss of Rubber Seals Via the Aperture in Sound Barrier Fixture** |
| | | Juhyun Jeon; Yeon June Kang; Hyeongrae Lee; Hyunseok Choi |
| 15:20 | **1622** | **Four-Microphone Measurement of Transmission Loss of Automotive Door Seals: Improved Correction Factor** |
| | | Weimin Thor; Zhuang Mo; J. Stuart Bolton |
| 15:40 | Coffee Break | |
| 16:00 | **1409** | **A High Performance Phase Correction Method for Sound Intensity Analysers** |
| | | Erlend Fasting; Ole-Herman Bjor |
| 16:20 | **1625** | **A Semi-Analytical Model to Estimate the Uncertainties of Wind-Induced Noise in a Screened Microphone** |
| | | David Ecotière |
| 16:40 | **1710** | **Comparison of Noise Reduction Performance Evaluation Methods for Low-Noise Pavement in Korea** |
| | | Byungchae Kim; Kyoungwon Chae; Hyunjin Kim |
| 17:00 | **1752** | **Comparing Steady State and Impulse Test Methods to Measure the Damping of Composites Applied to Homogeneous Substrates** |
| | | Jerrod Ward |
| 17:20 | **1549** | **Innovative Approach to Noise Monitoring Using Programmable Audio DSP** |
| | | Ted Pyper |

## 12.2 Measurement Methods—*Acoustical Holography/Beamforming*

TUESDAY | **09:00 – 11:20** | FLOOR: **5** | ROOM: **Denver**

Chairs | Gunnar Heilman, Stuart Bolton

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| 09:00 | **1423** | **The Sound Source Location in Small Spaces Based on Phase Conjugation Method and Verification Experiment** |
| | | Song Liu; Maofa Li |
| 09:20 | **1451** | **Sound Source Localization using Cylindrical Nearfield Acoustic Holography** |
| | | Chaitanya S K; Sonu Thomas; Srinivasan K |

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| 09:40 | **1472** | **Noise Source Identification in an Under-Determined System by Convex Optimization** |
| | | Tongyang Shi; Yangfan Liu; J. Stuart Bolton |
| 10:00 | Coffee Break | |
| 10:20 | 1897 | **Reconstruction of the Sound Field in a Room Based on Wavenumber Processing** |
| | | Efren Fernandez-Grande |
| 10:40 | **1829** | **Microphone Arrays an a Wind Tunnel Environment with a Hard Reflective Floor** |
| | | Andy Meyer; Marie Pelz; Dirk Dobler |
| 11:00 | **2071** | **Ultrasonic Hand Gesture Detection and Tracking using CFAR and Kalman Filter** |
| | | Qinglin Zeng; Zheng Kuang; Shuaibing Wu; Jun Yang |
| 12:00 | Lunch on Your Own | |

## 6.1 Classic Papers Student Paper Competition

TUESDAY | **13:40 – 17:00** | FLOOR: **5** | ROOM: **Denver**

Chairs | Jinghao Liu, Rui Cao

| | | |
|---|---|---|
| 13:40 | **2278** | **An Overview of Eric E. Ungar and Donald Ross's 1964 Paper, *"Vibrations and Noise Due to Piston-Slap in Reciprocating Machinery."*** |
| | | Steven Campbell |
| 14:00 | **2319** | **Overview on A. Krokstad, S. Strom and S. Sorsdal's 1967 Paper, *Calculating The Acoustical Room Response By The Use of A Ray Tracing Technique*** |
| | | Tongyang Shi |
| 14:20 | **2290** | **A Review of R. Parker's *"Resonance Effects in Wake Shedding from Parallel Plates"*** |
| | | Connor McCluskey |
| 14:40 | **2274** | **An Overview of R.J. Alfredson and P.O.A.L. Davies Paper on *The Radiation of Sound from an Engine Exhaust and its Influence on the Development of a Muffler Flow Insertion Loss Rig*** |
| | | Jonathan Chen |
| 15:00 | **2291** | **An Overview of Broner's 1978 Review Paper on *the Effect of Low Frequency Noise on People and More Recent Research on the Effects of Low Frequency Noise*** |
| | | Weonchan Sung |

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| 15:20 | Coffee Break | |
| 15:40 | **2283** | **An Overview of R.J Alfredson and P. O. A. L. Davies Paper on *The Radiation of Sound from an Engine Exhaust and its Influence on the Development of a Muffler Flow Insertion Loss Rig*** |
| | | Suraj Prabhu |
| 16:00 | **2289** | **An Overview of Crocker and Price's Paper on *Sound Transmission Using Statistical Energy Analysis*** |
| | | Yu Xiong; Edward Smith; Stephen Conlon |
| 16:20 | **2285** | **An Overview of W.A. Utley's paper on *Single Leaf Transmission Loss at Low Frequencies and its Influence on Subsequent Research and Measurement Standards*** |
| | | Samuel Underwood; Lily Wang |
| 16:40 | **2282** | **An Overview of S.H. Candall's 1970 Paper on *The Role Of Damping In Vibration Theory and Its Influence On Subsequent Research*** |
| | | Sunit Girdhar |

## **11.3** Industrial Noise—*Large Silencers*

TUESDAY | **09:20 – 11:40** | FLOOR: **5** | ROOM: **Los Angeles**

Chairs | Ray Kirby, Tim Wu

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|---|---|---|
| 09:20 | **2232** | **The Impact of Design Details on Large Silencer Performance** |
| | | Paul Williams; James Hill; Jamie Thomson; Ray Kirby |
| 09:40 | **2035** | **BEM Modeling of Large Silencers with Reflective Symmetry** |
| | | Hao Zhou; Peng Wang; Tim Wu |
| 10:00 | **2060** | **Design of Large Reactive Silencers for Automotive Applications** |
| | | Ray Kirby; Akhilesh Mimani |
| 10:20 | Coffee Break | |
| 10:40 | **2033** | **BEM Analysis of Tuned Dissipative Silencers** |
| | | Peng Wang; Tim Wu |
| 11:00 | **1716** | **A New Simulation and Optimization Tool for Calculating the Attenuation of Airborne and Structure-Borne Sound of Maritime Silencers** |
| | | Paul Lindner; Christian Schulze; Jörn Hübelt; Jan Troge; Tom Georgi |
| 11:20 | **2185** | **Determination of a Power Transfer Matrix via a Boundary Element Method Determined Scattering Matrix** |
| | | Kangping Ruan; David Herrin; Tim Wu |
| 12:00 | Lunch on Your Own | |

## 11.5 Industrial Noise—*Mining Noise*

TUESDAY | **13:40 – 15:00** | FLOOR: **5** | ROOM: **Los Angeles**

Chairs | Hugo Camargo, Amanda Azman

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|---|---|---|
| 13:40 | **1418** | **Low Speed Control Vortex Axial Fan Design for Minimum Noise** |
| | | Mark Hurtado; Ricardo Burdisso |
| 14:00 | **1462** | **Exposure and Area Noise Assessment of Stone, Sand, and Gravel Mining Facilities** |
| | | Hugo Camargo; Amanda Azman; Kan Sun |
| 14:20 | **1389** | **Redesign of Continuous Miner Scrubber Fan System Ductwork for Noise Reduction** |
| | | Kyle Schwartz; Matt Langford; Ricardo Burdisso |
| 14:40 | **1999** | **Re-Packable Silencers to Reduce Noise Levels Generated by Mine Fans** |
| | | Felipe Calizaya; Sekhar Bhattacharyya |
| 15:00 | Coffee Break | |

## 11.6 Industrial Noise—*Gear Noise*

TUESDAY | **15:20 – 16:20** | FLOOR: **5** | ROOM: **Los Angeles**

Chair | Pravin Sondkar

| | | |
|---|---|---|
| 15:20 | **1816** | **Transient Vibration of Tapered Roller Bearing Excited by Localized Damages on Cup Raceway** |
| | | Desheng Li |
| 15:40 | **1563** | **An Analytical and Numerical Investigation of Modulation Sidebands of a Planetary Gear under Fluctuated External Torque** |
| | | Yunbo Yuan |
| 16:00 | **1565** | **Free Vibration Analysis of Two-Stage Planetary Gear with Friction** |
| | | Wei Liu; Tao He |

# DETAILED PROGRAM
# WEDNESDAY, 29 AUG

| WEDNESDAY 29 AUG | 07:00 | 07:30 | 08:00 | 08:20 | 08:40 | 09:00 | 09:20 | 09:40 | 10:00 | 10:20 | 10:40 | 11:00 | 11:20 | 11:40 | 12:00 | 12:20 | 12:40 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Addison** FLOOR: **4** | | | **19.3** Traffic Noise | | | | | | | | **19.3** Traffic Noise | | | | | | |
| **Clark** FLOOR: **4** | | | **12.1** Advances in Measurement Methods | | | | | | **12.1 + 12.4** Advances in Measurement Methods + Environmental Management through Monitoring | | | | | | | | |
| **Armitage** FLOOR: **4** | | | **13.5** Health Effects of Occupational Noise | | | | | | | | | **19.6** Transport Sound Simulation and Environmental Impact | | | | | |
| **Belmont** FLOOR: **4** | | | | **3.3** Aircraft Exterior Noise | | | | | | **3.3** Aircraft Exterior Noise | | | | | | | |
| **Chicago A** FLOOR: **5** | | | **5.11** Predictions and Prediction Methods in Bldg/Room Acoustics | | | | | | **5.11** Predictions and Prediction Methods in Bldg/Room Acoustics | | | | | | | | |
| **Chicago B** FLOOR: **5** | | | **5.5** Bldg Acoustics Case Studies | | | | | | | **5.5** Bldg Acoustics Case Studies | | | | | | | |
| **Chicago C** FLOOR: **5** | | | **13.1** Health Effects of Environmental Noise | | | | | **13.2** Health Effects of Aircraft Noise | | | | | | | | | |
| **Chicago D/E** FLOOR: **5** | | | | | | | | | | | | | | | | | |

| WEDNESDAY | 07:00 | 07:30 | 08:00 | 08:20 | 08:40 | 09:00 | 09:20 | 09:40 | 10:00 | 10:20 | 10:40 | 11:00 | 11:20 | 11:40 | 12:00 | 12:20 | 12:40 |
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| **Chicago F** FLOOR: **5** | | | **21.5** Vehicle Passive Noise Control | | | | | | | | **16.7** Psychoacoustics in Noise Evaluation | | | | | | |
| **Chicago G** FLOOR: **5** | | | **1.1** Advances in Acoustic Materials | | | | | | | **1.1** Advances in Acoustic Materials | | | | | | | |
| **Chicago H** FLOOR: **5** | | | **22.7** Mid and High Frequency Numerial Methods in Virbo-Acoustics | | | | | | | | **22.9** Inverse Approaches in Vibro-Acoustics | | | | | | |
| **Denver** FLOOR: **5** | | | **7.4** Wind Turbine Noise | | | | | | | **7.4** Wind Turbine Noise | | | | | | | |
| **Los Angeles** FLOOR: **5** | | | | | | **5.8** Acoustic Regulations, Enforcement and Classification for New, Existing and Retrofitted Bldgs | | | | **5.8** Acoustic Regulations, Enforcement and Classification for New, Existing and Retrofitted Bldgs | | | | | | | |
| **Indiana** FLOOR: **6** | | | **11.7** Case Studies | | | | | | | | | | | | | | |
| **Northwestern** FLOOR: **6** | | | | | **8.1** Advances in Construction Noise | | | | | | | | | | | | |
| **Grand Ballroom** FLOOR: **7** | | | **Exhibits Open**: 08:00 – 13:30<br>**Poster Session**: 09:00 –12:00 | | | | | | | | | | | | | | |

| WEDNESDAY 29 AUG | 13:00 | 13:20 | 13:40 | 14:00 | 14:20 | 14:40 | 15:00 | 15:20 | 15:30 | 16:00 | 16:30 | 17:00 | 17:30 | 18:00 | 18:30 | 19:00 |
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| **Addison** FLOOR: **4** | | | **19.5** Perception of Electric and Hybrid Vehicles | | | | | | | | | | | | | |
| **Clark** FLOOR: **4** | | **12.4** Environmental Management through Monitoring | | | | | | | | | | | | | | |
| **Armitage** FLOOR: **4** | | | **19.6** Transport Sound Simulation and Environmental Impact | | | | | | | | | | | | | |
| **Belmont** FLOOR: **4** | | **3.3** Aircraft Exterior Noise | | | | | | | | | | | | | | |
| **Chicago A** FLOOR: **5** | | | | | | | | | | | | | | | | |
| **Chicago B** FLOOR: **5** | | | | | | | | | | | | | | | | |
| **Chicago C** FLOOR: **5** | | | | | | | | | | | | | | | | |
| **Chicago D/E** FLOOR: **5** | | | **INCE-USA Award Recognition Ceremony** | | | | | | **Plenary Lecture** | | **Closing Ceremony** | | | | | |

| WEDNESDAY | 13:00 | 13:20 | 13:40 | 14:00 | 14:20 | 14:40 | 15:00 | 15:20 | 15:30 | 16:00 | 16:30 | 17:00 | 17:30 | 18:00 | 18:30 | 19:00 |
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| **Chicago F** FLOOR: **5** | **16.7** Psychoasoustics in Noise Evaluation | | | | | | | | | | | | | | | |
| **Chicago G** FLOOR: **5** | | | | | | | | | | | | | | | | |
| **Chicago H** FLOOR: **5** | | | **22.9** Inverse Approaches in Vibro-Acoustics | | | | | | | | | | | | | |
| **Denver** FLOOR: **5** | | | | | | | | | | | | | | | | |
| **Los Angeles** FLOOR: **5** | | | | | | | | | | | | | | | | |
| **Indiana** FLOOR: **6** | | | | | | | | | | | | | | | | |
| **Northwestern** FLOOR: **5** | | | | | | | | | | | | | | | | |
| **Grand Ballroom** FLOOR: **7** | **Exhibits Open**: 08:00 – 13:30 | | | | | | | | | | | | **Closing Reception** | | | |

## 19.3 Transportation Noise—*Traffic Noise*

WEDNESDAY | **08:00 – 12:20** | FLOOR: **4** | ROOM: **Addison**

Chairs | Adam Alexander, Jordi Romeu

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|---|---|---|
| 08:00 | **1736** | **The Implementation of EC Directive 2015/996 for the Austrian Railway Network** |
| | | Christian Kirisits; Günter Dinhobl; Christoph Lechner |
| 08:20 | **1481** | **Worst-Noise Traffic Condition—A Case Study** |
| | | David Buehler |
| 08:40 | **2065** | **Development of Traffic Noise Screening Tool** |
| | | Adam Alexander; Ahmed El-Aassar |
| 09:00 | **2072** | **Field Measurements of Sound Power Levels of Vehicles Running on Japanese General Roads** |
| | | Miki Yonemura; Hyojin Lee; Shinichi Sakamoto |
| 09:20 | **1767** | **Survey on Vehicle Horn Use at Intersections in Taipei City, Taiwan** |
| | | Shoki Tsunekawa; Kazuma Hashimoto; Tamaki Inada; Masayuki Takada; Yoshinao Oeda; Katsuya Yamauchi; Ki-Hong Kim; Shin-ichiro Iwamiya |
| 09:40 | **2004** | **Collaborative Traffic Data for Road Noise Mapping** |
| | | Anderson Ladino Velásquez; Carolina Duque; Sergio Andrés Castrillón Idárraga; Andres Felipe Osorio Muriel; Jorge Mauricio Carranza Infante; Claudia Elena Durango Vanegas; Diego Mauricio Murillo Gómez |
| 10:00 | **2069** | **Outdoor Sound Propagation Models to Reproduce Low-Frequency Adverse Wind Effect on Road Traffic Noise Propagation** |
| | | Takuya Oshima; Koya Hiroi; Yumi Kurosaka |
| 10:20 | Coffee Break | |
| 10:40 | **2095** | **Challenges of Defining Existing (Traffic) Noise Near Protected Species Habitat** |
| | | Tim Casey |
| 11:00 | **2155** | **Spectral Comparison of Pass-By Traffic Noise** |
| | | Zhuang Li |

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| 11:20 | **1979** | **Localization of Heavy Truck Pass-By Noise Sources Using Acoustic Beamforming** |
| | | Paul Donavan; Carrie Janello |
| 11:40 | **1288** | **Indoor Pass-by Noise Engineering to Understand Vehicle Noise Sources and Prediction of Outdoor Noise Levels** |
| | | Andreas Schuhmacher; Ernesto Varricchio |
| 12:00 | **1756** | **Analysis of Temporal Variations of Urban Noise in a Large City after the Application of European Noise Directive** |
| | | Juan Miguel Barrigón Morillas; Guillermo Rey Gozalo; David Montes González; Pedro Atanasio Moraga; Rosendo Vílchez-Gómez; José Trujillo Carmona |
| 12:20 | Lunch on Your Own | |

## 19.5 Transportation Noise—*Perception of Electric and Hybrid Vehicles*

WEDNESDAY | **13:40 – 15:20** | FLOOR: **4** | ROOM: **Addison**

Chairs | Ercan Altinsoy, Katsuya Yamauchi

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| 13:40 | **1316** | **Experience and Perception of AVAS on Electric Vehicles in Norway** |
| | | Truls Berge |
| 14:00 | **1846** | **Experimental Study on the Effect of Vertical Baffles on Liquid Sloshing Noise in a Partially Filled Rectangular Tank under Periodic Excitation** |
| | | Siva Teja Golla; Venkatesham Balide; Raja Banerjee |
| 14:20 | **1835** | **Designing an Interior and Exterior Acoustical Brand Identity for Electric Vehicles by Means of Sound Synthesis** |
| | | David Welsh; Antonio Gomez; Jonathan Pierce |
| 14:40 | **2210** | **Prediction of Detectability of Synthesized Vehicle Sounds using Logistic Regression** |
| | | Lisa Steinbach; M. Ercan Altinsoy |
| 15:00 | **1619** | **Effect of Amplitude Fluctuation on Detectability of Alert Sound for Electric and Hybrid Vehicle in an Actual Environment** |
| | | Nozomiko Yasui |

## 13.5 Noise and Health—*Occupational Noise*

WEDNESDAY | **08:00 – 10:20** | FLOOR: **4** | ROOM: **Armitage**

Chairs | Jose Limardo, Daniel Carr

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| 08:00 | **1394** | **Mining Hearing Conservation Programs: Do They Really Prevent Hearing Loss?** |
| | | Amanda Azman; Kan Sun |
| 08:20 | **1508** | **Noise Exposure at Workstations in the Polish Medical Facilities —Pilot Study** |
| | | Bozena Smagowska; Dariusz Pleban |
| 08:40 | **2125** | **Risk of Hearing Impairment Among Employees using Communication Headsets** |
| | | Malgorzata Pawlaczyk-Luszczynska; Adam Dudarewicz; Kamil Zaborowski; Malgorzata Zamojska-Daniszewska |
| 09:00 | **1530** | **Occupational Risk Assessment Related to Ultrasonic Noise** |
| | | Dariusz Pleban; Bozena Smagowska; Jan Radosz |
| 09:20 | **1783** | **Awarding and Promoting Excellence in Initiatives to Control Noise and Prevent Hearing Loss** |
| | | Thais Morata; Bryan Beamer |
| 09:40 | **1376** | **Analytical Modeling of Distributed Array of Resilient Particle Impact Dampers on a Cantilever Beam** |
| | | Kamil Kocak; Kenneth Cunefare |
| 10:00 | **1898** | **International Space Station (ISS) Crewmembers' Noise Exposures** |
| | | Jose Limardo; Christopher Allen; Richard Danielson; Andrew Boone |
| 10:20 | Coffee Break | |

## 19.6 Transportation Noise—*Transportation Sound Simulation and Environmental Impact*

WEDNESDAY | **11:00 – 14:40** | FLOOR: **4** | ROOM: **Armitage**

Chairs | Roalt Aalmoes, Stephen Rizzi

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| 11:00 | **1338** | **Psychoacoustic Test to Determine Sound Quality Metric Indicators of Rotorcraft Noise Annoyance** |
| | | Siddhartha Krishnamurthy; Andrew Christian; Stephen Rizzi |
| 11:20 | **1353** | **Auralization of an Unmanned Aerial Vehicle under Propeller Phase Control** |
| | | Kyle Pascioni; Stephen Rizzi; Aric Aumann |

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| 11:40 | **1507** | **Virtual Reality Aircraft Noise Simulation for Community Engagement** |
| | | Roalt Aalmoes; Merlijn Boer; Henk Veerbeek |
| 12:00 | Lunch on Your Own | |
| 13:40 | **1352** | **Receiver-Based Auralization of Broadband Aircraft Flyover Noise using the NASA Auralization Framework** |
| | | Aric Aumann; Stephen Rizzi; Stephanie Heath |
| 14:00 | **1535** | **Perception and Presence in Virtual Reality for Simulated Aircraft Noise** |
| | | Noah Letwory; Roalt Aalmoes; Maykel Miltenburg |
| 14:20 | **1654** | **Ambisonic Auralisations for Community Consultation of Traffic Noise Impacts and Mitigation Measures** |
| | | Daniel Jimenez; Mitchell Allen; Chris Nugroho |

## 3.3 Aircraft Noise—*Exterior Noise*

WEDNESDAY | **08:20 – 14:40** | FLOOR: **4** | ROOM: **Belmont**

Chairs | Carsten Spehr, Takatoshi Yokota

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| 08:20 | **1758** | **Comparison of Lateral Attenuation at the Four Airports in Japan** |
| | | Yasuaki Kawase; Kazuyuki Hanaka; Naoaki Shinohara; Koichi Makino; Ippei Yamamoto |
| 08:40 | **1659** | **Numerical Study on the Effect of Wind on Sound Propagation over Sea Surface by Finite-Difference Time-Domain Method** |
| | | Takatoshi Yokota; Koichi Makino; Ippei Yamamoto |
| 09:00 | **2037** | **Quantifying the Effect of Uncertainty in Meteorological Conditions on Aircraft Noise Propagation** |
| | | Harshal Patankar; Victor Sparrow |
| 09:20 | **2000** | **Atmospheric Propagation Model Validation with the NRC Convair 580 Aircraft** |
| | | Sebastian Ghinet; Andrew Price; Gilles Daigle; Michael R. Stinson; Anant Grewal; Viresh Wickramasinghe |
| 09:40 | **1689** | **Uncertainties Due to Doppler's Shift on Aircraft Noise Prediction** |
| | | Yiming Wang; Kai Ming Li |
| 10:00 | Coffee Break | |

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| 10:20 | **1435** | **Validation of the sonAIR Aircraft Noise Simulation Model—A Case Study for Schiphol Airport** |
| | | David Jaeger; Christoph Zellmann; Dick G. Simons; Mirjam Snellen; Jean Marc Wunderli |
| 10:40 | **1509** | **New Approachs for the Dynamic Recording of Aircraft Noise as a Base for Modeling** |
| | | Philipp Schwizer |
| 11:00 | **1382** | **Localization of Noise Sources around Aircraft in Flight Based on Time-Domain Beamforming Technique** |
| | | Takehisa Takaishi; Kazuomi Yamamoto; Tomohiro Kobayashi; Takatoshi Yokota |
| 11:20 | **1839** | **Precise Sound Source Model for Aircraft Noise Prediction Based on Noise Source Distribution Determined by Phased Array Beamforming** |
| | | Tomohiro Kobayashi; Takatoshi Yokota; Koichi Makino; Takehisa Takaishi |
| 11:40 | Lunch on Your Own | |
| 13:20 | **1795** | **Validation of Aircraft Noise Prediction Models** |
| | | Hua He |
| 13:40 | **1884** | **Acoustic Analysis of STEX Inlet on Fan Noise Radiation** |
| | | Paul Slaboch; David Stephens; Christopher Miller |
| 14:00 | **1337** | **Parametric Aircraft Configuration Optimization According to ICAO Annex 16 Certification Standards and Sound Quality Evaluation within Conceptual Aircraft Design** |
| | | Miguel Yael Pereda Albarran; Eike Stumpf |
| 14:20 | **1721** | **Study on Effects of Aircraft Takeoff Thrust Reduction on Noise at Narita Airport** |
| | | Toshiyasu Nakazawa; Naoaki Shinohara; Kazuyuki Hanaka |

## 5.11 Building and Architectural Acoustics—*Predictions and Prediction Methods*

WEDNESDAY | **08:00 – 12:20** | FLOOR: **5** | ROOM: **Chicago A**

Chairs | Carolina Monteiro, John Davy, Berndt Zeitler

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| 08:00 | **1825** | **The STI-Matrix—An Innovative Simulation-Based Method for the Acoustic Evaluation and Assessment of Offices and Public Areas** |
| | | Michael Boehm |
| 08:20 | **1468** | **The Effect of Mechanical Connectors on the Sound Insulation of Structural Insulating Panels** |
| | | Arne Dijckmans; Lieven De Geetere; Debby Wuyts; Bart Ingelaere |

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| 08:40 | **1908** | **Prediction of Noise Caused by Structure-Borne Sound Sources** |
| | | Oliver Kornadt; Albert Vogel; Conrad Völker |
| 09:00 | **1276** | **The Equivalent Translational Compliance of Steel Studs with Different Steel Gauge Thicknesses** |
| | | John Laurence Davy; Waylang Dong; John LoVerde; Mohammad Fard |
| 09:20 | **1463** | **Rolling Noise Modeling in Buildings** |
| | | Matt Edwards; Fabien Chevillotte; François Xavier Becot; Luc Jaouen; Nicolas Totaro |
| 09:40 | Coffee Break | |
| 10:00 | **1529** | **Limits for Stage Machinery Noise** |
| | | Anton Melnikov; Ingo Witew; Marcus Maeder; Monika Gatt; Michael Scheffler; Steffen Marburg |
| 10:20 | **1804** | **Acoustic Design of Voice Booths in Open Plan Offices by Modal Analysis** |
| | | Rânnely Silveira Nogueira de Araújo; Carolina Monteiro; Marcel Borin; Marcos Holtz |
| 10:40 | **1658** | **Characterization of Low Frequency Behavior in a Reverberation Room using Simulation** |
| | | Jonathan Chen; D. W. Herrin; Charles Moritz; Jennifer Shaw |
| 11:00 | **1578** | **Investigation into the Directional Distribution of Incident Acoustic Energy on the Boundary of a Reverberation Chamber** |
| | | RuiLin Mu; Xiang Yan |
| 11:20 | **2133** | **Uncertainty Quantification of Sound Transmission Measurement Procedures Based on the Gaussian Orthogonal Ensemble** |
| | | Cédric Van Hoorickx; Edwin Reynders |
| 11:40 | **1585** | **The Use of Ray Tracing Method to Predict Sound Transmission Across Heavily Damped Plates under the Framework of Statistic Energy Analysis (SEA)** |
| | | Feng Yan; Robin Wilson |
| 12:00 | **1984** | **Measurement and Prediction of Flanking Transmissions in Wooden CLT Constructions using Reverse-SEA** |
| | | Jean-Luc Kouyoumji; Marta Fuente Gonzalez; Renaud Blondeau Patissier |
| 12:20 | Lunch on Your Own | |

## 5.5 Building and Architectural Acoustics—*Case Studies*

WEDNESDAY | **08:00 – 12:20** | FLOOR: **5** | ROOM: **Chicago B**

Chairs | Erik Miller-Klein, Paul Bauch, Marcos Holtz

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| 08:00 | **1466** | **Acoustic Impact on Collaborative Teaching and Learning Activities in Open Learning Spaces** |
| | | Colin Campbell; Jeroen Vugts; Esther van Oorschot-Slaat; Holger Brokmann |
| 08:20 | **1434** | **Resilient Channel: One Screw Makes a Difference** |
| | | Matthew Golden; Alexander Vaisman |
| 08:40 | **1893** | **Evaluation of Sound Field Spatial Uniformities in Offices Provided by Surface-Mounted Sound Masking Systems vs Plenum-Mounted Systems** |
| | | André L'Espérance; Louis-Alexis Boudreault; Nicolas Demers; Roderick Mackenzie |
| 09:00 | **1551** | **Measuring the Impact of a High-Performance All-Glass Building on the Indoor Acoustic Environment and the Occupants' Perception of Health, Satisfaction and Productivity** |
| | | Stanley Gatland II; Ihab Elzeyadi; Aldo Glean; Yacine Djama |
| 09:20 | **1919** | **Efficacy of a Biophilic Sound Masking System** |
| | | Simon Goddard |
| 09:40 | **2140** | **Absorption Treatment in Million Cubic Foot Public Space** |
| | | Jim Borzym |
| 10:00 | Coffee Break | |
| 10:20 | **2002** | **Writers Theatre, from Concept through Completion** |
| | | Gregory Miller; Laura Brill; John Strong; Carl Giegold |
| 10:40 | **2005** | **Use of PRINCE2 as a Project Management Approach for Spatial Audio Developments** |
| | | Diego Mauricio Murillo Gomez; Luis Alberto Tafur Jiménez |
| 11:00 | **1746** | **An Evaluation of the Railway Noise Reduction Performance of Different Balcony Door Designs in Hong Kong** |
| | | Ka-Fai Chiu; David B. K. Yeung; Ching Chan |
| 11:20 | **1580** | **Objective and Subjective Sound Environment in University Student Dormitories** |
| | | Fan Xu; Qi Meng; Jian Kang; Yanjun Han |
| 11:40 | **1366** | **Fitness Facility Noise Criteria for a Multi-Use Building** |
| | | Anthony Nash; Christopher Peltier |

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| 12:00 | **1852** | **Acoustical Comfort in Classrooms—Case Study at the University of Brasilia** |
| | | Clarice Daga; Hetty Lobo; José Lobo; Carlos Luna |
| 12:20 | Lunch on Your Own | |

## 13.2 Noise and Health—*Noise Effects of Environmental and Transportation Noise*

WEDNESDAY | **08:00 – 12:00** | FLOOR: **5** | ROOM: **Chicago C**

Chairs | Judy Rochat, Rick Norman

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| 08:00 | **1473** | **International Space Station Acoustics—A Status Report** |
| | | Chris Allen |
| 08:20 | **1329** | **Community Response to Step-Changes in Railway Noise Exposure and Effects of Earthquakes** |
| | | Yasuhiro Murakami; Takashi Yano; Makoto Morinaga; Shigenori Yokoshima |
| 08:40 | **1877** | **Global Noise Insensitivity—A Complex Analysis of the Problem** |
| | | Monika Sobolewska; Aleksandra Majchrzak; Bartłomiej Chojnacki; Katarzyna Baruch; Adam Pilch |
| 09:00 | **1948** | **Artificial Neural Network Models between Road Traffic Noise and Urban Form Indicators in Different Cities** |
| | | Phillip Kim; Hunjae Ryu; Jong June Jeon; Seo Il Chang |
| 09:20 | Coffee Break | |
| 09:40 | **1805** | **A Research Roadmap for Aircraft Noise** |
| | | Nicole Porter; Rick Norman; Xavier Oh; Andy Knowles; Rick Norman |
| 10:00 | **1737** | **The Effects of Annoyance Due to Aircraft Noise on Psychological Distress** |
| | | Clémence Baudin; Marie Lefèvre; Patricia Champelovier; Jacques Lambert; Bernard Laumon; Anne-Sophie Evrard |
| 10:20 | **1318** | **Assessing Aircraft Noise Conditions Affecting Classroom Behaviors** |
| | | Mary Ellen Eagan; Charlotte Clark; Gary Evans; Mel Smuk |
| 10:40 | **1841** | **Aircraft Noise Exposure and Objective Sleep Quality in the Population Living near Airports in France** |
| | | Ali Mohamed Nassur; Marie Lefèvre; Maxime Elbaz; Fanny Mietlicki; Philippe Nguyen; Carlos Ribeiro; Matthieu Sineau; Damien Leger; Bernard Laumon; Anne-Sophie Evrard |

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| 11:00 | **1823** | **Long-Term Follow-Up Study of Community Response to Step-Change in Aircraft Noise Exposure around Noi Bai International Airport** |
| | | Thu Lan Nguyen; Takashi Yano; Yasuhiro Hiraguri; Makoto Morinaga; Takashi Morihara; Thao Linh Nguyen; Bach Lien Trieu; Thanh Loc Bui |
| 11:20 | **2056** | **Study on the Influence of Traffic Noise on Animals and their Adaptive Strategies** |
| | | Ruhong Xin; Yuanyuan Zhang; Jiangwei Kong; Xiang Liu; Jian Zeng |
| 11:40 | **1879** | **Social Survey on Community Response to Road Traffic Noise in Kinshasa, Democratic Republic of the Congo** |
| | | Junior Nzelengenge Tambiki; Keiji Kawai |
| 12:00 | Lunch on Your Own | |

## 21.5 Vehicle Noise, Vibration, and Harshness—*Passive and Active Noise Control*

WEDNESDAY | **08:00 – 10:20** | FLOOR: **5** | ROOM: **Chicago F**

Chairs | Prakash Thawani, Gordon Ebbitt

| | | |
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| 08:00 | **1469** | **Weight Minimization of Automotive Sound Packages in the Presence of Air Leaks** |
| | | Hyunjun Shin; J. Stuart Bolton |
| 08:20 | **2126** | **Attenuating Axial Pipe Resonances in Exhaust Systems using Micro-Perforated Patches** |
| | | Xin Hua; Brandon Sobecki; James Egan; Yuntian Wang |
| 08:40 | **1787** | **Analysis of a Battery Electric Vehicle Interior Mid-frequency Noise and Sound Package Optimization Based on Hybrid FE-SEA Method** |
| | | Xian Wu; Meng Zhao |
| 09:00 | **1648** | **A Systematic Approach Study of Active Road Noise Control in Vehicles** |
| | | Xiaojun Chen; Wei Huang; Longchen Li; Hailin Ruan; Changwei Zheng; Xiujie Tian; Keda Zhu |
| 09:20 | **1981** | **Active Sound Quality Control for Subjective Preference** |
| | | Kenta Murai; Shunsuke Ishimitsu |
| 09:40 | **1491** | **A Study on Improving the Sound Quality of Electric Vehicles by Using Subharmonics** |
| | | Yongji Zhao; Yaxuan Sun |
| 10:00 | **1437** | **COMSOL Model for an Enclosed Coaxial Carbon Nanotube Speaker** |
| | | Suraj Prabhu; Andrew Barnard |
| 10:20 | Coffee Break | |

## 16.7 Sound Quality and Product Noise—*Psychoacoustics in Noise Evaluation*

WEDNESDAY | **10:40 – 15:00** | FLOOR: **5** | ROOM: **Chicago F**

Chairs | Sonoko Kuwano, Takeo Hashimoto

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|---|---|---|
| 10:40 | **1346** | **Evaluation of Noise Emitted from Construction Machine** |
| | | Takeo Hashimoto; Shigeko Hatano |
| 11:00 | **1499** | **Cross-Analyses of a Social Survey of Wind Turbine Noise in Japan** |
| | | Sonoko Kuwano; Takashi Yano; Takayuki Kageyama; Hideki Tachibana |
| 11:20 | **1539** | **Simulation and Detection of Intermittent Sounds in Wind Noise Tests on Automobiles** |
| | | Daniel Carr; Patricia Davies |
| 11:40 | **1524** | **The Characterization of Pleasant and Unpleasant Fan Sounds by Semantic Profiles and their Relationship to Patterns of the Specific Loudness** |
| | | Stephan Toepken; Steven Van De Par |
| 12:00 | Lunch on Your Own | |
| 13:00 | **1653** | **Interaction between Vehicle Interior Noise and Steering Vibration on the Uncomfortableness in Cabin** |
| | | Junji Yoshida; Mutsuki Sakuramoto; Yoshiyuki Sukegawa |
| 13:20 | **1422** | **Evaluation of Subjective Impressions of the Sound of Dental Drills** |
| | | Tomomi Yamada; Sonoko Kuwano; Shigeyuki Ebisu; Mikako Hayashi |
| 13:40 | **1623** | **Threshold-Based Headphone Equalization** |
| | | Florian Völk |
| 14:00 | **1887** | **The Subjective Analysis of Wheel-Rail Squealing Noise by Modification of the British Standard BS 4142:2014** |
| | | Giora Rosenhouse |
| 14:20 | **1682** | **Analysis on Korean Emotion Vocabulary Due to Inter-Floor Noise using Word Embedding** |
| | | Hyekyung Shin; Kyoung-wpo Kim; Kwan-seop Yang |
| 14:40 | **1615** | **Difference of Perceived Loudness of Sounds between Chinese Males and Females** |
| | | Mariko Tsuruta-Hamamura; Jiaming Wang; Manami Aono; Shin-Ichiro Iwamiya |

## 1.1 Acoustic Materials—*Advances in*

WEDNESDAY | **08:00 – 11:20** | FLOOR: **5** | ROOM: **Chicago G**

Chairs | Olivier Robin, Luc Jaouen

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|---|---|---|
| 08:00 | **1324** | **Compact 2DOF Liner Based on a Long Elastic Open Neck Acoustic Resonator** |
| | | Frank Simon; Delphine Sebbane |
| 08:20 | **1883** | **Acoustic Performance of Additively Manufactured Reeds as an Absorber** |
| | | WeSaam Lepak; Michael Sterner; Paul Slaboch |
| 08:40 | **1478** | **A Comparison between Glass Fiber and Polymeric Fiber when Serving as a Structural Damping Medium for Fuselage-Like Structures** |
| | | Yutong Xue; J. Stuart Bolton |
| 09:00 | **1799** | **Enlarging Sound Attenuation in the Low Frequency Domain by Giving a Poroelastic Material a Lamella Structure** |
| | | Olivier Robin; Nicolas Dauchez; Benoit Nennig; Li Ke |
| 09:20 | **1542** | **How to Model the Acoustic Properties of a Solid Foam with Thin Membranes?** |
| | | Camille Gaulon; Juliette Pierre; Caroline Derec; Fabien Chevillotte; François-Xavier Bécot; Luc Jaouen; Florence Elias; Wiebke Drenckhan; Valentin Leroy |
| 09:40 | **1662** | **Determination of Effective Parameters of Acoustic Fabrics including Applications** |
| | | Weiyun Liu; D. W. Herrin |
| 10:00 | Coffee Break | |
| 10:20 | **1809** | **The Experiment of Permeable Ceramic as Sound Absorption Material** |
| | | Hui Li; Xiang Yan |
| 10:40 | **1697** | **Advances In Technology—Novel Solutions for Pipe Noise Mitigation** |
| | | Richard Pamley; Mark Swift |
| 11:00 | **1933** | **Sound Absorption Characteristic of Glass and Plastic Bottles—Considerations of their Dependences on Material Properties** |
| | | Teruo Iwase; Satoshi Sugie; Hiroyasu Kurono; Masayuki Abe; Yasuaki Okada; Koichi Yoshihisa |
| 12:00 | Lunch on Your Own | |

## 22.7 Vibro-Acoustics—*Numerical Methods*

WEDNESDAY | **08:00 – 10:20** | FLOOR: **5** | ROOM: **Chicago H**

Chairs | Ricardo Alvarez, Steve Hambric

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| 08:00 | **1681** | **Implementation of Impedance Boundary Condition in Scaled Boundary FEM for Mid-Frequency Acoustics** |
| | | Sundararajan Natarajan; Chandramouli Padmanabhan |
| 08:20 | **1757** | **A Transient Hybrid FE-SEA Method** |
| | | David Hawes; Robin Langley; Yuki Ishii |
| 08:40 | **2234** | **Open Station Vehicle Noise Performance Assessment and Improvement Using SEA** |
| | | Sandeep Burli |
| 09:00 | **1850** | **Energy Sharing between Nonlinear Structures by Entropy Modelling** |
| | | Antonio Culla; Antonio Carcaterra |
| 09:20 | **2270** | **High Frequency Vibro-Acoustic Fatigue Analysis with a Radiosity Based Theory** |
| | | Qiang Zhong; HB Chen |
| 09:40 | **1871** | **Thermodynamics of High Frequency Nonlinear Vibrations** |
| | | Antonio Carcaterra; Antonio Culla |
| 10:00 | **1957** | **An Investigation of Ultrasonic Transducer Loading on a Workpiece** |
| | | Marco Zennaro; Dan O'Boy; Alex Haig; Stephen Walsh |
| 10:20 | Coffee Break | |

## 22.9 Vibro-Acoustics—*Inverse Approaches*

WEDNESDAY | **10:40 – 14:40** | FLOOR: **5** | ROOM: **Chicago H**

Chair | Haijun Wu

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| 10:40 | **1674** | **Combination Analysis of Operational TPA and CAE for Extraction of High Contributing Vibration Mode to Vehicle Interior Road Noise** |
| | | Ryo Majima; Junki Isemura; Daiki Hayashi; Junji Yoshida |
| 11:00 | **1768** | **Selection of Input Force Locations when Determining Blocked Forces** |
| | | Keyu Chen; David Herrin |
| 11:20 | **2243** | **Application of Acoustical Wave Propagator for the Determination of Impact Force on a Thin Elastic Plate** |
| | | Ning Wang; Jie Pan |

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| 11:40 | **2070** | **Vibration Field Rendering for a Point-Excited Rectangular Panel Speaker** |
| | | Ki-Ho Lee; Jeong-Guon Ih |
| 12:00 | Lunch on Your Own | |
| 13:40 | **2147** | **Enhancing the Accuracy in Reconstruction of Vibro-Acoustic Responses of a Complex Structure using Helmholtz Equation Least Squares Based Nearfield Acoustical Holography** |
| | | Logesh Kumar Natarajan; Sean F. Wu |
| 14:00 | **1428** | **A Comparison of Sound Field Reconstructions Using a Spherical Wave Model and a Plane Wave Model** |
| | | Kean Chen; Yan Wang; Xiyue Ma; Jian Xu; Bing Zhou |
| 14:20 | **1569** | **An Inverse Patch Transfer Function Method Based on the Green's Function in Free Field** |
| | | Dou Li; Haijun Wu; Liang Yu; Weikang Jiang |

## **12.1** Measurement Methods—*Advances in*

WEDNESDAY | **08:00 – 11:00** | FLOOR: **4** | ROOM: **Clark**

Chairs | Gilles Daigle, Kristin Cody

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|---|---|---|
| 08:00 | **1774** | **A Comprehensive Integrated Solution for Environmental Noise Monitoring** |
| | | Bob Selwyn |
| 08:20 | **1761** | **A Metrology Technique for Airborne Ultrasound in Occupational Health Based on High Spatial Resolution Scans at a Reference Workplace** |
| | | Robert Schöneweiß; Christoph Kling; Christian Ullisch-Nelken; Andrea Wolff; Christian Koch |
| 08:40 | **1411** | **Potential Inconsistencies in Conformity Declarations Caused by Different IEC 61672-3 Acoustical Test Methods in Current Sound Level Meters** |
| | | Elvis Alexandre Antonio de Freitas Gouveia Alves; David Bello Bondarenco; Jorge Enrique Bondarenco Zajarkievaiech |
| 09:00 | **1849** | **Volumetric Sampling of the Sound Field in a Room** |
| | | Samuel Arturo Verburg; Efren Fernandez-Grande |
| 09:20 | **2150** | **Measurements of Environmental Noise using a Direction of Sound Arrival Identifier** |
| | | Naru Sato; Kenji Shinohara; Norihito Sunago; Keishi Sakoda |
| 09:40 | Coffee Break | |

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| 10:00 | **2023** | **A Round Robin Study of Sound Power Measurement Methods to Determine Reproducibility and Bias** |
| | | Samuel Underwood; Lily Wang |
| 10:20 | **1962** | **Approximation of a Measurement Surface for the Determination of the Sound Power Level of a Large-Scale Industrial Plant** |
| | | Christian Fabris |
| 10:40 | **1806** | **Optical Visualization of Sound Field inside Transparent Cavity using Polarization High-Speed Camera** |
| | | Kenji Ishikawa; Kohei Yatabe; Yasuhiro Oikawa; Takashi Onuma; Hayato Niwa |

## 12.4 Measurement Methods—*Environmental Management through Monitoring*

WEDNESDAY | **11:00 – 15:00** | FLOOR: **4** | ROOM: **Clark**

Chairs | Doug Manvell, Arno Bommer

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| 11:00 | **1407** | **Monica, a European Project Focused on the Internet of Things for the Acoustic Quality and Safety of Outdoor Large Scale Events** |
| | | Bruno Vincent; Karim Haddad; Enrico Gallo; Christophe Doucet; Diego Caviedes Nozal; Marco Jahn; Vincent Gissinger; Wookeun Song |
| 11:20 | **2251** | **Use of Long Term Monitoring Data to Determine Variations of Sound Levels in Urban Sound Environment** |
| | | Yuyou Liu; Wencheng HU; Yan Gao; Paul Shields |
| 11:40 | **1621** | **An Innovative Low Cost Sensor for Urban Sound Monitoring** |
| | | Jérémy Ardouin; Ludovic Charpentier; Mathieu Lagrange; Félix Gontier; Nicolas Fortin; David Ecotière; Judicael Picaut; Christophe Mietlicky |
| 12:00 | **2183** | **Real-Time, Automated Noise Impact Assessment Monitoring of an Industrial Facility** |
| | | Anthony Gerard; Marc Poirier; Michel Pearson; Roderick Mackenzie; Philippe Laliberté |
| 12:20 | Lunch on Your Own | |
| 13:20 | **1723** | **Combining Noise and Weather Data in Real-Time Monitoring** |
| | | Douglas Manvell |
| 13:40 | **2018** | **Ensuring the Future of Mining with Advances in Compliance Monitoring** |
| | | Patrick Dzijacky |

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| 14:00 | **1583** | **A Study on Possible Solutions to the Challenges Associated with Limited Survey Locations in Community Noise Measurement Based on Noise Mapping in China** |
| | | Jiping Zhang; Heng Ma; Peng Chen; Zheming Wang |
| 14:20 | **1728** | **Reduction of Uncertainties for a Model Based Measurement System for Impulsive Sound Events** |
| | | Frits Van der Eerden; Peter Wessels; Frank Van den Berg; Anneke Kruyen |
| 14:40 | **2003** | **Community Noise and Cruise Vessels Implementing Shore Power at the Port of Vancouver** |
| | | Gary Olszewski; Bryce Docker; Douglas Manvell |

## 7.4 Community Noise—*Wind Turbine Noise*

WEDNESDAY | **08:00 – 11:20** | FLOOR: **5** | ROOM: **Denver**

Chairs | Norm Broner, Mark Bastasch

| | | |
|---|---|---|
| 08:00 | **1302** | **Noise and Vibration from Urban Wind Turbines** |
| | | Stephen Dance; Ben Dymock |
| 08:20 | **1973** | **Regulating and Predicting Wind Turbine Sound in the U.S.** |
| | | Robert O'Neal; Kenneth Kaliski; Mark Bastasch |
| 08:40 | **2020** | **Wind Turbine Noise Measurements in Chile** |
| | | José David Parra; Christian Darr; Enrique Suárez; Jorge Arenas; Ricardo Burdiso; Sterling McBride; Igor Valdebenito |
| 09:00 | **2225** | **Acoustic Characterization of Wind Farms in Chile: Wind Turbine Noise Measurements throughout the Country** |
| | | Nicolás A. Bastián-Monarca; Juan Pablo Álvarez; Christian Darr; José David Parra; Jorge P. Arenas; Enrique Suárez |
| 09:20 | **1420** | **Directivity of Amplitude Modulated Sound around a Wind Turbine under Actual Meteorological Conditions** |
| | | Yasuaki Okada; Koichi Yoshihisa; Sinya Hyodo |
| 09:40 | **1567** | **Signal Enhancement Method on Wind Turbine Blade Fault Inspection** |
| | | Tsung-Hsien Tu; Fang-Chun Lo; Pei-Yao Yu; Chiou-Fong Chung; Ruey-Chyi Chen |
| 10:00 | Coffee Break | |

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| 10:20 | **2280** | **MW Wind Turbine Noise Measurement and Assessment of Low-Frequency Tonal Noise** |
| | | Eunkuk Son; Gwang-Se Lee; Sungmok Hwang; Jinjae Lee; Seungjin Kang; Sail Park; Seokwoo Kim |
| 10:40 | **2167** | **A Practical Method for Estimating a Presence of a Prominent Tonal Component in Wind Turbine Noise** |
| | | Sakae Yokoyama; Tomohiro Kobayashi; Hideki Tachibana |
| 11:00 | **1315** | **Effects of Infrasound Exposure on Humans** |
| | | Andrea Bauerdorff |
| 12:00 | | Lunch on Your Own |

## 11.7 Industrial Noise—*Case Studies*

WEDNESDAY | **08:00 – 10:00** | FLOOR: **6** | ROOM: **Indiana**

Chairs | Jinghao Liu, Xin Hua

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|---|---|---|
| 08:00 | **1310** | **Low-Frequency Pulsation from a Package Boiler** |
| | | Tyler Dare; Benjamin Beck; William Bonness; Suzana Rufener; Tom Flynn |
| 08:20 | **1635** | **Resolution of an Environmental Noise Problem Caused by a 345 KV Power Pole** |
| | | David Parzych |
| 08:40 | **2186** | **Transformer Noise Reduction using Acoustical Blankets Installed with Magnetic Mounting Bracket** |
| | | Pierre-Claude Ostiguy; Anthony Gérard; Roderick Mackenzie; Michel Pearson; André L'espérance |
| 09:00 | **1577** | **Study on Structure Borne Noise Prediction and Reduction Design of Underwater Platform Mounted Equipment for Military** |
| | | Jong-Ik Jeon |
| 09:20 | **1972** | **The Impact of Wind Direction on Flare Noise in Suburban Area: Sound Pressure Level Distribution** |
| | | Dhany Arifianto; Ainun Nadiroh |
| 09:40 | **1826** | **Analyzing Field Environments to Generate a New, Better Test** |
| | | Jade Vande Kamp; Aaron Offringa |
| 10:00 | Coffee Break | |
| 12:00 | Lunch on Your Own | |

## **5.8** Building and Architectural Acoustics—*Acoustic Regulations, Enforcement and Classification for New, Existing, and Retrofitted Buildings*

WEDNESDAY | **09:00 – 11:40** | FLOOR: **5** | ROOM: **Los Angeles**

Chairs | Birgit Rasmussen, Jeong-Ho Jeong

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| 09:00 | **1740** | **Acoustic Classification of Noise in Bathroom of Residential Building through Auditory Experiment** |
| | | Jongkwan Ryu; Hansol Song |
| 09:20 | **1294** | **Challenges for Noise Relevant Urban Development—The Case of Hamburg Stelling** |
| | | Andrey Yordanov |
| 09:40 | **2006** | **Developing Classifications using a Dual-Rating Method of Evaluating Impact Noise** |
| | | John LoVerde; Wayland Dong |
| 10:00 | Coffee Break | |
| 10:20 | **2245** | **Survey on Adverse Impacts of Construction Noises through Construction Stages** |
| | | Sungchan Lee; Jae Ho Kim; Joo Young Hong |
| 10:40 | **2172** | **Auditory Experiment for Classification Scheme on Rubber Ball Impact Sound** |
| | | Jeong-Ho Jeong |
| 11:00 | **2047** | **A Pilot Study on Acoustic Regulations and Classification for Hospitals & Comparison between the Nordic Countries** |
| | | Birgit Rasmussen |
| 11:20 | **2326** | **A Pilot Study on Acoustic Regulations and Classification for Office Buildings—Comparison between the Nordic Countries** |
| | | Birgit Rasmussen |
| 12:00 | Lunch on Your Own | |

## 8.1 Advances in Construction Noise

WEDNESDAY | **08:40 – 10:20** | FLOOR: **5** | ROOM: **Northwestern**

Chairs | Shiu-Keung Tang, Paul Burge

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|---|---|---|
| 08:40 | **2269** | **Real-Time Vibration Monitoring of Demolition Activities Directly above Sensitive Power Facilities** |
| | | Shiu-keung Tang; Chi-chung Ng; Kei-Choi Mak |
| 09:00 | **1458** | **Reduction of Construction Machinery Noise in Multiple Dominant Frequencies Using Feedforward Type Active Control** |
| | | Laura Kanazawa; Koichi Mizutani |
| 09:20 | **1854** | **Roadway Construction Noise Model Version 2.0 Data Collection Program** |
| | | Sharon Carpenter; Dayna Bowen |
| 09:40 | **2132** | **Close-Proximity Demolition and Construction Vibration** |
| | | Keith Yoerg; Judy Rochat |
| 10:00 | **1970** | **Identification of Modular Construction Activity Noise Levels by using K-Means Clustering** |
| | | Sanam Dabirian; Sanghyeok Han; Joonhee Lee |
| 10:20 | Coffee Break | |
| 12:00 | Lunch on Your Own | |

# WEDNESDAY, 29 AUGUST

## CLOSING CEREMONY

**16:30 – 17:30** | FLOOR: **5** | ROOM: **Chicago D/E**

**Plenary Speaker** | **Patricia Davies, PhD**

Purdue University

### Perception-Based Engineering: Integrating Sound Perception into Engineering Design

Patricia Davies is a professor of Mechanical Engineering at Purdue University. She became Director of the Ray W. Herrick Laboratories in 2005, which is a laboratory of over 120 graduate students and around 24 faculty focused on graduate student research with an emphasis on technology transfer. She also has a courtesy appointment in Psychological Sciences. She received her B.Sc. in Mathematics from the University of Bristol in 1977, and her M.Sc. and PhD in Sound and Vibration from the University of Southampton in 1981 and 1985, respectively. Dr. Davies joined the faculty of the School of Mechanical Engineering at Purdue in 1987. Her research in vibrations and acoustics includes signal processing, nonlinear system identification, sound perception, and the impact of noise on people. A theme in her research is bridging the gap between experimental results and predictions from models based on current understanding of human, mechanical and/or material behavior. Applications include effects of transportation noise (sleep disturbance, annoyance), HVAC &R systems, diesel engines, seat-occupant systems, and energetic materials. Her research is sponsored by government agencies and industry. She is a member of a group of engineering and psychology professors at Purdue who conduct research on how people perceive and are affected by machines and engineered systems, and how to integrate that knowledge into engineered system design. Dr. Davies served as President of the Institute of Noise Control Engineering 2008-2010 and is a Fellow of that society. In Fall 2016, she received the Per Brüel Gold Medal for Noise Control and Acoustics from the ASME and in 2018 became a Fellow of the Acoustical Society of America.

# DETAILED PROGRAM
# POSTERS

## POSTERS—*Building and Architectural Acoustics*

TUESDAY | **09:00 – 10:30** | FLOOR: **7** | **Exhibit Area**

Chairs | Xin Hua, Karl Washburn, David Herrin, Steve Sorenson

| | | |
|---|---|---|
| 09:00 | **1647** | **Display System for Distribution of Virtual Image Sources by using Mixed Reality Technology** |
| | | Wataru Teraoka; Yuta Kataoka; Yasuhiro Oikawa; Yusuke Ikeda |
| 09:00 | **1878** | **Adjustment of the Reverberation Time and Dimensions in the Reverberation Chamber for the Reduction of the Measurement Dispersion** |
| | | Bartlomiej Chojnacki; Aleksandra Majchrzak; Monika Sobolewska; Adam Pilch; Katarzyna Baruch |
| 09:00 | **2199** | **A Characteristic of Floor Impact Noise Reduction using Slab Reinforcement of the Existing Apartment** |
| | | Seong Shin Hong; Bon Soo Koo; Byung Kwon Lee |
| 09:00 | **1450** | **The Effect of Artificial Lightweight Aggregate in Foamed Concrete of Floor Slabs on Impact Sound Insulation** |
| | | ChangYeon Yun; HwuyWan Seo; ChangGu Kang; ChangGeun Cho; BoHyeong Lee; KiHong Park |
| 09:00 | **1644** | **The Performance of Heavy-Weight Mortar-Based Buffer-Type Floor Structure against Floor Impact Sound** |
| | | Myounghoon Jun; Youngsoo Chun; Bunsik Lee |
| 09:00 | **2249** | **Floor Impact Sound and Vibration Characteristics with Types of Ceiling Structure and Finishing Material in Wall Structure Testing Facility of Slab Thickness 120mm** |
| | | In Ho Kim; Jongkwan Ryu; Daeho Mun |
| 09:00 | **2307** | **Evaluation of Floor Impact Sound Reduction Effect of the Buffer-Type Floor Structure according to the Shape of Shear Connect** |
| | | Nagkyeng Hwang; Youngsoo Chun; Sangmo KIM |
| 09:00 | **1350** | **Noise Emissions of a Mail Processing and Distribution Center: A Case Study** |
| | | Andrea Nicolini; Michele Goretti |
| 09:00 | **1922** | **Classrooms Acoustical Comfort in Tucuman, Argentina, Analysis, Evaluation and Awareness** |
| | | Leonardo Paterlini; BeatrizSilvia Garzón |
| 09:00 | **2039** | **The Acoustics of the Church of Santa Sofia in Benevento** |
| | | Ilaria Lombardi; Gino Iannace; Amelia Trematerra |
| 09:00 | **2194** | **The Acoustic of a Courtyard** |
| | | Ilaria Lombardi; Gino Iannace; Amelia Trematerra |

## **POSTERS**—*Advances in Analytical Simulation and Ship/Offshore NVH*

TUESDAY | **10:30 – 12:00** | FLOOR: **7** | **Exhibit Area**

Chairs | Xin Hua, Karl Washburn, David Herrin, Steve Sorenson

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|---|---|---|
| 10:30 | **1460** | **Numerical Simulation and Experiment Research of Lower Arm B** |
| | | Zhihong Liu; Huigang Wang |
| 10:30 | **1735** | **A FSI Simulation of Tire-Water Interaction Noise** |
| | | Chonglei Zhao; Yintao Wei |
| 10:30 | **1905** | **Cabin Tractor Acoustic Design at Mid-High Frequency by Statistical Energy Analysis** |
| | | Silvia Milana; Annalisa Fregolent; Walter D'Ambrogio; Antonio Culla |
| 10:30 | **2044** | **Use of the Raytracing Based Solver BEAM for the Evaluation of Transfer Functions within the Time Domain** |
| | | Ralf Burgschweiger; Ingo Schäfer; Martin Ochmann |
| 10:30 | **1311** | **High Speed and Weakly Nonlinear Propagation of Quasi-Monochromatic Acoustic Waves in Bubbly Liquids** |
| | | Tetsuya Kanagawa; Takanori Yoshimoto |
| 10:30 | **1503** | **Numerical Study on Bubble Dynamics in a Human Joint: Effect of Liquid Viscosity and Surface Tension** |
| | | Hisao Taira; Tetsuya Kanagawa |
| 10:30 | **1446** | **Reconstruction of Radiated Noise Demodulation Spectrum by Exploiting the Structure of Group Sparsity** |
| | | Qisong Wu; Ping Xu; Shiliang Fang |
| 10:30 | **1556** | **Statistical Analysis for Ship Parametric Resonance in Irregular Waves** |
| | | Zhang Xiao; Yang Hezhen |
| 10:30 | **1611** | **Nonlinear Structural and Acoustic Responses of Debonded Sandwich Shells** |
| | | Yegao Qu; Wenming Zhang; Zhike Peng; Guang Meng |
| 10:30 | **1990** | **Localization of Propeller Tip Vortex Noise Assisted by Spectral Kurtosis** |
| | | Jeung-Hoon Lee; Dong-Ho Kim; Yun-Ho Shin |
| 10:30 | **1599** | **Study on Load Fluctuation and Vibration Characteristics on Structure Caused by Dam Breaking Structure** |
| | | Dongyan Shi; Zhikai Wang; Ham Li |

## **POSTERS**—*Advances in Transportation Noise*

TUESDAY | **13:30 – 15:30** | FLOOR: **7** | **Exhibit Area**

Chairs | Xin Hua, Karl Washburn, David Herrin, Steve Sorenson

| | | |
|---|---|---|
| 13:30 | **1519** | **Analysis and Comparison of Airport Noise Metrics** |
| | | Huijuan Zhang; Lijuan Zhang |
| 13:30 | **2202** | **Study on the Generation and Propagation of Metro-Induced Ground Vibration** |
| | | Hao Xu; Guofeng Bai; Fusheng Sui |
| 13:30 | **2205** | **A Revision on Mandatory Microphone Positions in the ISO11819-2 for Different Pavement Surfaces based on Noise Emission Characteristics** |
| | | Daeseok Han; Suhyung Lee; Sang-Hyuk Lee; Byung Sik Ohm |
| 13:30 | **2208** | **The Comparison Analysis Between Reference Tires of ISO Standard and OEM Tire for Pavement Noise Level Measurement** |
| | | Sang Hyuk Lee; Soo Hyung Lee; Daeseok Han; Byungsik Ohm |
| 13:30 | **2227** | **Feasibility Study for the Measurement of Tyre/Road Noise in Korea** |
| | | Byungsik Ohm; Suhyung Lee; Inkyoon Yoo |
| 13:30 | **1673** | **Investigative Research using 6-Sigma Method on the Influences of Tire Design Factors on Automobile Road Noises** |
| | | Byung Sam Kim; Il Do Chang; Min Ho Kim |
| 13:30 | **2228** | **A Study on Mid-Long Term Performance Management Methods of 2-Layer Low Noise Pavement** |
| | | Suhyung Lee; Sang Hyuk Lee; Dae Seok Han; In Kyoon Yoo; Byung Sik Ohm |
| 13:30 | **1690** | **Fine-Scale Study of the Population Exposure to Road Traffic Noise in Foshan** |
| | | Ziqin Lan; Ming Cai; Yuanyuan Zhang; Yao Huang |
| 13:30 | **1734** | **Computational Aeroacoustics Study of Tire Rolling Noise** |
| | | Chonglei Zhao; Yintao Wei |
| 13:30 | **1840** | **Noise Generated during the Passage through the Bridge Expansion Joints in Cracow—Case Study** |
| | | Bartłomiej Chojnacki; Bartłomiej Kukulski; Magdalena Matys; Kamil Piotrowski |
| 13:30 | **2031** | **Cluster Analysis for Temporal Stratification of the Week Days** |
| | | Guillermo Quintero; Andreu Balastegui; Jordi Romeu |

## POSTERS—*Advances in Passive and Active Noise Control*

TUESDAY | **15:30 – 17:30** | FLOOR: **7** | **Exhibit Area**

Chairs | Xin Hua, Karl Washburn, David Herrin, Steve Sorenson

| | | |
|---|---|---|
| 15:30 | **2209** | **Study on Acoustic and Physical Properties Optimization of PET Composite Layers for Automotive Interior Materials** |
| | | Kim SangMin; Ji-Young Ju; Jang-Seok Park; Mee Huh; Jin-Su Ham |
| 15:30 | **1419** | **Apply Double Layer Sound Absorption System Development and Acoustic Performance Evaluation of Low Height Barrier Near Railways** |
| | | ByungKuk Hong; JeWon Yoon; KangSeok Jang; YoungChan Kim; EunSeong Seo |
| 15:30 | **2295** | **Sound Absorption Materials for Smart Manufacturing** |
| | | Antonio Scofano; Sabato Di Filippo; Raffaele Dragonetti; Marialuisa Napolitano; Rosario Romano |
| 15:30 | **2087** | **Active Noise Control by a Beam-Steerable Parametric Speaker with a Human Tracking System Equipped with a Motion Sensor** |
| | | Hideo Furuhashi; Yuki Matsui; Madoka Oi |
| 15:30 | **1650** | **Acoustics of Micro-perforated Panel Silencer with Partitions in the Back-Cavity** |
| | | Congshuang Jiang; Danqun Fang |
| 15:30 | **1581** | **Prediction and Measurement of Acoustic Transmission Loss of Acoustic Window with Composite Sandwich Structure** |
| | | Changmin Lee; Gwuansoo Jeon; Baegyun Jung; Youngmin Lee |
| 15:30 | **1718** | **Noise Reduction Strategies of Large-Scale Thermal Power Plant Based on Noise Source Contribution Analysis** |
| | | XiWei Wang; Xiang Yan |
| 15:30 | **2256** | **Shunt Truck Noise Impact Evaluation and Control Methods** |
| | | Mike Masschaele; Gordon Reusing; Mathew Brenner |
| 15:30 | **2203** | **Study on Characteristics of Headliner SR Noise According to its Material and Temperature Condition for Vehicle** |
| | | Jaewon Lee; Seung Lee |
| 15:30 | **2297** | **Effect of Vacuum Percentage on Sound Insulation of Composite Board** |
| | | Zong Cai Liu; Zhaojin Sun; Jianqiang Guo; Shaoqing Liu |

## POSTERS—*Advances in Measurement Methods and Signal Processing*

WEDNESDAY | **09:00 – 10:30** | FLOOR: **7** | **Exhibit Area**

Chairs | Xin Hua, Karl Washburn, David Herrin, Steve Sorenson

| | | |
|---|---|---|
| 09:00 | **1351** | **The Determination of Sound Power with ISO3744 Method in Quasi-Anechoic Environments: Problems in the Characterization of the Measurement Environment with the Comparison Method** |
| | | Franco Bertellino; Vincenzo Vellucci |
| 09:00 | **2296** | **Survey Location Optimization of Structural Vibration Based on Select Mode** |
| | | Chunhui Yuan |
| 09:00 | **1332** | **Spherical Sound Sources Localization using SONAH** |
| | | Hung Chen Jr.; Adam Koutný; Ondřej Jiříček |
| 09:00 | **1421** | **A Study for Localization of Infrasound** |
| | | Tetsuya Doi; Keiichiro Iwanaga; Tomohiro Kobayashi; Yasutaka Nakajima |
| 09:00 | **1497** | **Array Spatial Feature Based Near-Field Noise Suppression Technique** |
| | | Shuai Yao; Jian Liu |
| 09:00 | **1500** | **Velocity Estimation Based on the Broadband Acoustic Signal** |
| | | Ning Han; Shuxia Huang |
| 09:00 | **1766** | **Method of Spatially Correlated Wideband Ambient Noise Simulation for Underwater Acoustic Array** |
| | | Liangxin Chen; Shiliang Fang; Liang An |
| 09:00 | **1794** | **A DEMON Line Spectrum Detection Method Based on Parameter Pre-Estimation** |
| | | Xinwei Luo; Shiliang Fang |
| 09:00 | **2026** | **The Procedure Monitoring for the Machining Centers by Noise and Vibration** |
| | | Mingmei Han; Xun Wang; Xiaobin Cheng; Jun Yang |
| 09:00 | **2051** | **Noise Reduction using Neural Network Trained with Amplitude Spectra** |
| | | Mitsunori MIzumachi; Reiya Otani |
| 09:00 | **2193** | **Image Denoising via Trained Dictionaries for the Time-frequency Image of Underwater Acoustical Plus Signals** |
| | | Jian Liu; Shiliang Fang; Shuai Yao; Yangjie Wei |
| 09:00 | **2207** | **Evaluation of Structural Health Monitoring Results Utilizing Environmental Noise** |
| | | Yoshinori Takahashi |

## POSTERS—*Advances in Sound Quality, Product Noise, and Health*

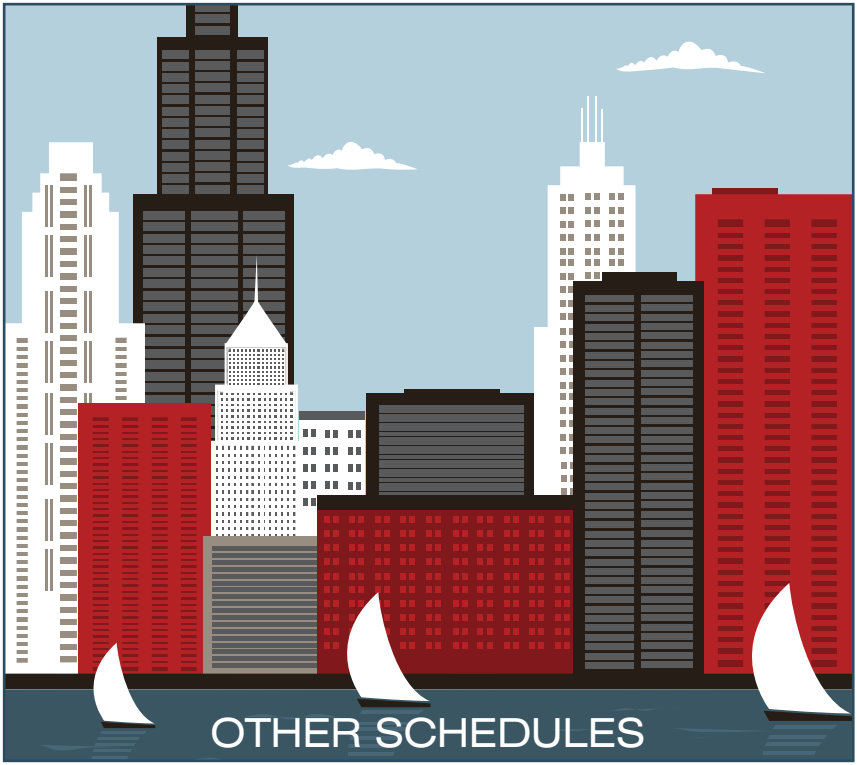
WEDNESDAY | **10:30 – 12:00** | FLOOR: **7** | **Exhibit Area**

Chairs | Xin Hua, Karl Washburn, David Herrin, Steve Sorenson

| | | |
|---|---|---|
| 10:30 | **1413** | **Noise Mapping of Quiet Areas** |
| | | Andreas Novak |
| 10:30 | **2216** | **Initial Verification of Dynamic Acoustic Mapping Along the Motorway Surrounding the City of Rome** |
| | | Roberto Benocci; Fabio Angelini; Alessandro Flavio Aggio; Alessandro Bisceglie; Rosa Ma Alsina-Pagès; Joan Claudi Socoró; Francesc Alías; Ferran Orgab; Patrizia Bellucci; Laura Peruzzi; Giovanni Zambon |
| 10:30 | **1678** | **Basic Research for Preparing Noise Guidelines of Wind Farms in South Korea** |
| | | Young Min Park; Kyoung Min Kim; Kwang Kyu Kang |
| 10:30 | **1502** | **Effect of Sound Design by Passive Noise Control on Auditory Impression** |
| | | Kenta Murai; Shunsuke Ishimitu; Ryosuke Ishii |
| 10:30 | **1504** | **Analysis of Auditory Impression of Getting into a Car** |
| | | Natsuki Yamagiwa; Shunsuke Ishimitsu; Yuki Date |
| 10:30 | **1928** | **Assessing LED Bulb Noise** |
| | | David Nelson; Jeff Schmitt |
| 10:30 | **1396** | **On the Estimation of Psychological Stress Caused by Road Noise in a Vehicle Cabin** |
| | | Osamu Terashima; Fumiya Kinoshita; Hideaki Touyama; Masahiro Sawada |
| 10:30 | **1730** | **Difference in Annoyance of Environmental Noise between Indoor and Outdoor Hearing Situation in Residential Space** |
| | | Hansol Song; Jongkwan Ryu; Jaeseung Hwang |
| 10:30 | **1693** | **Research on the Scheme of Urban Automatic Noise Monitoring** |
| | | Wei Wan; Ming Cai; Lve Chen; Bofan Yao |
| 10:30 | **2089** | **The Risk of Temporary Hearing Threshold Shift in Bartenders** |
| | | Adam Dudarewicz; Kamil Zaborowski; Anna Wolniakowska; Malgorzata Pawlaczyk-Luszczynska; Mariola Sliwinska-Kowalska |

# INCE USA


CATCH THE
NEXT WAVE
IN NOISE CONTROL
ENGINEERING
NOISE-CON
2019
SAN DIEGO, CA
AUG. 26-28




## Registration & Information

FLOOR: 7 | ROOM: Registration Counter

*The registration desk will be open the following times:*

**Sunday, 26 August** | 12:00 – 18:00
**Monday, 27 August** | 07:00 – 18:00
**Tuesday, 28 August** | 07:00 – 18:00
**Wednesday, 29 August** | 07:00 – 16:00

## Exposition

FLOOR: 7 | ROOM: Exhibit Hall

*Exhibits are open the following times:*

**Monday, 27 August** | 17:30 – 19:30
*(Opening Reception)*
**Tuesday, 28 August** | 09:00 – 17:00
**Wednesday, 29 August** | 08:00 – 12:00

## Poster Sessions

FLOOR: 7 | ROOM: Grand Ballroom

Chairs | Xin Hua, Karl Washburn, David Herrin, and Steve Sorenson

*Posters will be displayed in the back of the exposition hall. Authors will be available the following times:*

**Tuesday, 28 August**

09:00 – 10:30
**Building and Architectural Acoustics**

10:30 – 12:00
**Advances in Analytical Simulation and Ship/Offshore NVH**

13:30 – 15:30
**Advances in Transportation Noise**

15:30 – 17:30
**Advances in Passive and Active Noise Control**

**Wednesday, 29 August**

09:00 – 10:30
**Advances in Measurement Methods and Signal Processing**

10:30 – 12:00
**Advances in Sound Quality, Product Noise, and Health**

## Presentation Uploads & Speaker Ready Room

FLOOR: 5 | ROOM:
*Behind Registration Counter*

*The presentation upload room and speaker ready room hours are the following times:*

Sunday, 26 August | 13:00 – 17:00
Monday, 27 August | 07:00 – 18:00
Tuesday, 28 August | 07:00 – 17:00
Wednesday, 29 August | 07:00 – 12:00*

**Speaker Ready Room ONLY, no uploads*

## Special Events

**Sunday, 26 August**

**Welcome Reception** | 18:00 – 20:00
FLOOR: 7 | ROOM: Grand Ballroom

**Monday, 27 August**

**Student Breakfast** | 07:00 – 08:00
FLOOR: 6 | ROOM: Indiana

**I-INCE Young Professional Social Networking Event** | 17:30 – 18:30
*(By invitation only)*
FLOOR: 4 | ROOM: Halstead Foyer

*Tickets for drinks and refreshments will be provided to young professional grant winners, I-INCE leaders and guests.*

**Exposition Opening Reception** | 17:30 – 19:30
FLOOR: 7 | ROOM: Grand Ballroom

**Tuesday, 28 August**

**INCE-USA Certification Information and Networking Breakfast** | 07:00 – 08:00
FLOOR: 6 | ROOM: Indiana

**Women in Noise Control Engineering Lunch** | 12:20 – 13:20
FLOOR: 6 | ROOM: Indiana

**Bill Lang Reception** | 16:20 – 17:30
FLOOR: 4 | ROOM: Armitage

**Congress Banquet** | 19:00 – 22:00
*(Ticket Required)*

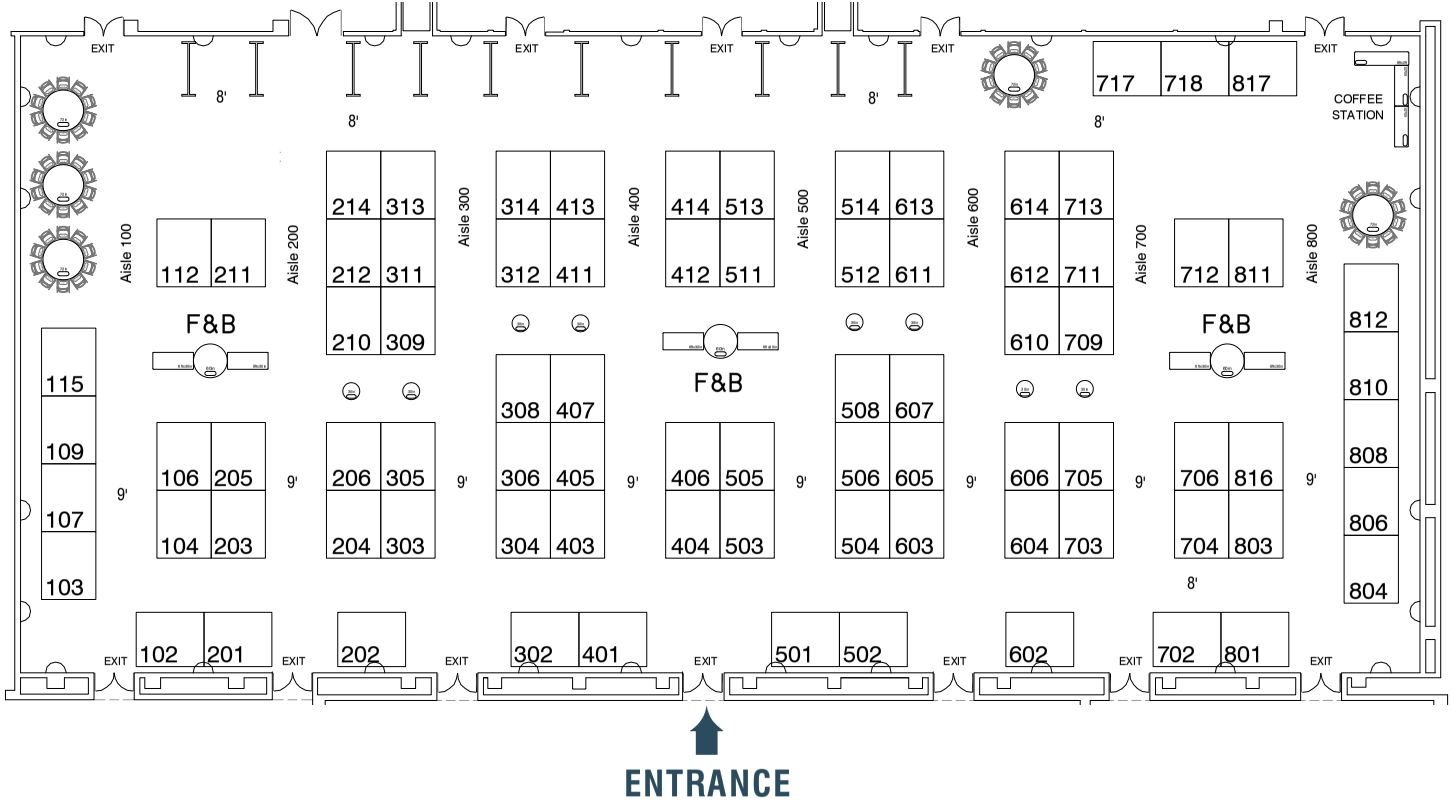
OFF-SITE: Museum of Science and Industry
*Bus departs hotel at 18:30*
*Bus Location: Lobby – Ohio St. Entrance*

**Wednesday, 29 August**

**Closing Reception** | 17:30 – 18:30
*Hosted by INTER-NOISE 2019, Madrid, Spain*

FLOOR: 7 | ROOM: Grand Ballroom 3

# EXPOSITION




# EXPOSITION FLOOR PLAN | FLOOR: 7 | ROOM: Grand Ballroom

# EXHIBITORS

| EXHIBITOR | BOOTH |
|---|---|
| Acoustiblok | 202 |
| AIL Sound Walls | 711 |
| Armtec LP | 603 |
| BASF Corp. | 210 |
| BASWA Acoustic | 806 |
| Beijing CA Acoustics Co. Ltd. | 214 |
| BRD Noise and Vibration Control | 804 |
| Bruel & Kjaer | 404-406 |
| BSWA Technology Co., Ltd. | 703 |
| CAE Software & Systems | 205 |
| Cambridge Sound Management | 211 |
| CDM | 702 |
| CertainTeed Ceilings | 605 |
| Cirrus | 611 |
| Commercial Acoustics | 305 |
| Damping Technologies, Inc. | 514 |
| DataKustik GmbH | 511 |
| DEWESoft LLC | 712 |
| Eckel Industries | 502 |
| Ecore Built By Yes | 304 |
| EMS-Bruel & Kjaer | 801 |
| ESI North America | 206 |
| ETS-Lindgren, Inc. | 607 |
| Free Field Technologies | 706 |
| Freudenberg Performance Materials | 816 |
| FSorb | 705 |
| Genesis Acoustics-OPTIS Group | 413 |
| Getzner USA, Inc. | 606 |
| G.R.A.S. Sound & Vibration | 401 |
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| Homasote | 314 |
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| INCE-USA – Membership | 718 |
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| Mason Industries | 303 |
| MBI Products | 803 |
| Microflown Technologies | 505 |
| Microtech Gefell GmbH & NovaStar Solutions | 203 |
| Mull-it-Over Products | 313 |
| Navcon Engineering Network | 407 |
| Noise Barriers, LLC | 306 |
| *Noise News International – NNI* | 717 |
| Norsonic | 309 |
| NTI-Audio | 504 |
| Odeon A/S | 506 |
| Ono Sokki Co., Ltd | 513 |
| OROS | 411 |
| Overly Door Company | 115 |
| Owens Corning | 103 |
| PAC International | 508 |
| PCB | 414 |
| PINTA | 812 |
| Polytec, Inc. | 709 |
| Prosig | 612 |
| Pyrok, Inc | 604 |
| Regupol America | 503 |
| RION Co. Ltd. | 602 |
| ROCKFON | 610 |
| Scantek, Inc. | 311 |
| Sensidyne/Svantek | 512 |
| Sigicom | 109 |
| Sinus Messtechnik GmbH | 106 |
| Soft dB | 613 |
| SoftNoise | 501 |
| SoundPlan | 405 |
| Soundproof Windows | 808 |
| Studio Six Digital LLC | 403 |
| TSI, Inc. | 112 |
| U.S. Sound & Vibration Institute | 212 |
| VAW Systems, Ltd. | 713 |
| ViAcoustics | 707 |
| Vibration Research | 312 |
| Vibro Acoustics | 213 |
| Wölfel | 810 |

# EXHIBITORS

## Acoustiblok Inc.

**Booth # 202**
6900 Interbay Blvd, Tampa, FL 33616 USA
**Phone** 1-813-980-1400
**Email** sales@acoustiblok.com
**www.acoustiblok.com**

We are an acoustical materials manufacture that has been in business for over twenty years. We were created out of a forty-two year old audio/video design firm. We own several USA patents on our products and systems. We are an American company with headquarters in Tampa, Florida. We supply turn key solutions for your consulting projects.

## AIL Sound Walls

**Booth # 711**
102 W. Hill St., Decatur, GA 30030 USA
**Phone** 1-519- 622-8600
**Email** ccook@ailsoundwalls.com
**www.ailsoundwalls.com**

Lightweight sound barrier system, which can be absorptive or reflective.

## Armtec LP

**Booth # 603**
8270 Greensboro Dr., Suite 810
McLean, VA 22102 USA
**Phone** 1-909-615-2037
**Email** michael.pruden@armtec.com
**www.armtec.com/soundwalls**

Armtec has been manufacturing noise barriers since 1977, with over 40 million sq ft installed throughout North America. Armtec is a manufacturer of Durisol Absorptive Noise Barriers and Acrylite Soundstop Transparent Noise Barrier Systems, to include a TL-4 crash tested system. We pride ourselves in servicing our customers from "Concept to Completion."

## BASF

**Booth #210**
1609 Biddle Avenue
Wyandotte, MI 48192 USA
**Phone** 1-734-324-6697
**Email** patricia.presswood@basf.com
**www.basotect.com**

Basotect foam has a unique range of properties. Its base material makes it flame-retardant and abrasive; it can be used for high head applications to up 465°F (240°C) and retains its properties over a wide temperature range. Because of its open-cell foam structure, it is light, sound-absorbing, thermally insulating and flexible even at low temperatures.

## BASWA acoustic

**Booth # 806**
21863 Aurora Rd., Cleveland, OH 44146 USA
**Phone** 1-216-539-8250
**Email** info@baswana.com
**www.baswana.com**

Sound absorption provides preservation of everyday health and wellbeing, impeding the body's natural stress responses caused by noise pollution. BASWA Acoustical Plaster Systems create wellbeing in all spaces, significantly reducing reverberation and allowing for more intentional human interactions.

## Beijing CA Acoustics Co. Ltd.

**Booth # 214**
Room M, the 18-floor, Block B, the No. 1 Building,Beisanhuanxilu 48,Beijing 100086, P. R. China
**Phone** +86 10 51626577
**Email** tang@caacoustics.com
**www.caacoustics.com**

CA Acoustics is a professional supplier specializing in manufacture and installation of acoustical products as well as integrated designs for particular requirements. Established in 2002 as a joint venture in Beijing, the company aims to provide total solutions to acoustic problems for customers from wide ranging fields, including industry, mass media, technological and educational research and so on. Our products cover Acoustic wind tunnel, Anechoic chamber, Acoustic test facilities, Sound enclosure, Acoustic door etc.

## BRD Noise and Vibration Control, Inc.

**Booth # 804**
112 Fairview Ave, Wind Gap, PA 18091 USA
**Phone** 1-610-863-6300
**Email** dan.burley@brd-nonoise.com
**www.hushcore.net**

BRD Noise and Vibration Control, Inc. specializes in HVAC acoustic design and manufacturing. Founded in 1975, BRD is committed to providing customers with reliable solutions to challenging problems in the field of noise and vibration control. Our JUST RIGHT ACOUSTICS™ and line of HUSHCORE™ products focus on prescriptive minimum design solutions to meet the objective criteria with performance accountability.

## Bruel & Kjaer

**Booth # 404-406**
Brüel & Kjær North America Inc.,
3079 Premiere Parkway, Suite 120
Duluth, GA 30097 USA
**Phone** 1-800-332-2040
**Email** bkinfo@bksv.com
**www.bksv.com**

Brüel & Kjær has 75 years of experience and is a world leader in sound and vibration instrumentation. We help customers worldwide with sound and vibration testing-standards compliance, research, product development and manufacturing.

Stop by our booth to receive a demo on our newest software. Our new BK Connect sound and vibration software is designed around user workflows and tasks. Full of innovative features and functions, this user-friendly platform reduces overall testing complexity. It helps

you work smarter and with a high degree of flexibility, while reducing the risk of errors. Our full products include analysis and post-processing software, transducers for both sound and vibration, sound level meters, analyzers, shakers and controllers. Brüel & Kjær also offers world-class service and calibration, educational seminars and application consulting. We look forward to seeing you.

## BSWA Technology Co., Ltd.

**Booth # 703**
BSWA Technology Co., Ltd.
1002-1003, North Ring Center,
#18 Yumin Road, Xicheng District
Beijing 100029, China
**Phone** 86-10-5128-5118
**Email** liuwei@bswa.com.cn
**www.bswa-tech.com**

Established in 1998, BSWA Technology Co., Ltd. is an acoustical company covering the businesses of:
- Manufacturing the world class measurement microphones and accelerometers.
- Developing sound and vibration measurement devices and system.
- Designing and building anechoic chambers.
- Acoustical and vibration consulting.

BSWA will exhibit the following products:
- Microphones and Accelerometers
- Microphone Array System
- Binaural Recording & Playback System Based on iPhone
- Material Testing System—Impedance Tube System
- Real Time Analyzers

## CAE Software & Systems

**Booth # 205**
**North America** P. O. Box 1255
Prior Lake, MN 55372 USA
**Main Office** Linteler Straße 23, 33334
Gütersloh Germany
**Phone** North America 1-952-368-3590
**Main Office** +49 5241 21142-0
**Email** NorthAmerica - sales@anvllc.com
**Main Office** - info@cae-systems.de
**www.cae-systems.de/en/**

CAE will be presenting their new hand held and affordable SoundCam Acoustic Camera that features 64 microphones and integrated display and battery. They will also be showing their Bionic series of acoustic cameras.

## Cambridge Sound Mangement

**Booth # 211**
404 Wyman St., Suite 200
Waltham, MA 02451 USA
**Phone** 1-877-MASKING
**Email** info@cambridgesound.com
**www.cambridgesound.com**

Cambridge Sound Management, Inc., the world's largest provider of sound masking solutions, manufactures QtPro and DynasoundPro sound masking systems to help organizations across multiple industries protect speech privacy, reduce noise distractions, and increase workplace productivity. Cambridge Sound Management's proprietary sound masking technology works by emitting a uniform, barely perceptible background sound at the frequencies of human speech.

Cost effective and easy to install, their sound masking, office paging, and background music systems are deployed in hundreds of millions of square feet of space throughout the world including commercial organizations, healthcare facilities, financial services, government agencies, and educational institutions.

## CDM

**Booth # 702**
1177 Avenue of the Americas, 7th Fl.
New York, NY 10036 USA
**Phone** 1-717-575-9405
**Email** info@cdm-systems.com
**www.cdm-systems.com**

CDM is a global leader in architectural acoustics and vibration isolation. Our diversified and complete product portfolio allows us to offer unique solutions:

a) Floating floors with jack-up mounts or discrete pad systems
b) Complete box-in-box designs, including wall and ceiling isolation clips or ties
c) Building base isolation with springs, spring boxes (pre-compressed option available), natural rubber bearings, and mixed-cell polyurethane foams
d) Gym and sports flooring systems with the patented dBooster™ technology for additional damping and low frequency attenuation
e) Custom isolators for equipment, elevators, pools, bowling alleys, curtain walls, medical equipment (i.e. MRIs)

Please stop by our booth to learn about the full product portfolio and applications we serve.

## CertainTeed Ceilings

**Booth # 605**
CertainTeed Corp, 20 Moores Rd.
Malvern, PA 19355 USA
**Phone** 1-302-555-1212
**Email** Alexandria.Christian@saint-gobain.com
**www.certainteed.com/ceilings**

CertainTeed Ceilings makes it easier to specify, purchase and install the right ceiling systems for the space with a portfolio of products designed to maximize acoustic performance and visual appeal.
From All-Purpose Acoustic Ceiling Panels to High-Performance, Specialty and Custom Engineered Solutions and Suspension Systems, CertainTeed Ceilings creates a comfortable environment for the occupants acoustically, meets design goal aesthetically and fits within the budget affordably.

## Cirrus Research plc

**Booth # 611**
Acoustic House, Bridlington Rd.
Hunmanby, North Yorkshire, YO14 0PH
**Phone** +441723891655
**Email** sales@cirrusresearch.com
**www.cirrusresearch.co.uk**

Cirrus Research is a world leader in the creation of noise measurement instruments. Since 1970, Cirrus' mission has been to make it simple to analyse noise. Today, thousands of companies around the world are using our instruments to help them comply with the Standards and Regulations that govern noise. Our innovative approach to product design has helped redefine the way the world looks at noise measurement instruments.

## Commercial Acoustics

**Booth # 305**
5960 W. Washington St.
Phoenix, AZ 85043 USA
**Phone** 1+602-233-1211
**Email** rbullock@mfmca.com
**www.mfmca.com**

Manufacturer of custom and standard acoustical louvers, enclosures and silencers for commercial, industrial and institutional applications. We also perform acoustical analysis in conjunction with custom solutions for sound sensitive projects.

## Damping Technologies, Inc.

**Booth # 514**
55656 Currant Rd.
Mishawaka, IN 46545 USA
**Phone** 1-513-779-2237
**Email** tom.lewis@damping.com
**www.damping.com**

DTI designs and produces application-specific passive damping systems primarily for the aerospace industry. DTI also tests viscoelastic damping materials via ASTM E-756 and SAE J1637 on a contract basis. DTI will be exhibiting its VBT 2 System, which provides automated measurement of damping material properties with design capability.

## DataKustik GmbH

**Booth # 511**
Dornierstr. 4, 82205 Gilching, Germany
**Phone** +49 8105 77467 0
**Email** info@datakustik.com
**www.datakustik.com**

DataKustik GmbH is a software company known for its software products CadnaA, CadnaR and Bastian. The strength of the software is its accuracy and usability. Additionally to the software development, DataKustik GmbH undertakes intensive research projects in the field of immission protection and sound propagation. CadnaA is a powerful software for calculation, assessment, prediction and presentation of environmental noise. CadnaR is a state-of-the-art software tool for those dealing with the acoustic planning and the noise mitigation at workplaces. It combines intuitive modeling techniques with efficient calculation procedures.

## DEWESoft LLC

**Booth # 712**
10730 Logan St., Whitehouse, OH 43571 USA
**Phone** 1-855-339-3669
**Email** sales.us@dewesoft.com
**www.dewesoft.com**

DEWESoft, the next evolution in data acquisition instrumentation, offers a full suite of hardware for in-vehicle and lab data acquisition applications. Scalable from four to thousands of channels our instruments are available as small USB and EtherCat devices, stand-alone battery-powered systems, rack-mounted configurations, and ruggedized field-ready solutions. Powered by the latest DEWESoft X software, we acquire and control many

multi-domain test sets that include analog in/out, digital in/out, video, CAN, FlexRay, XCP, GPS, and much more. DEWESoft is designed to handle a variety of applications such as: ride handling, brake testing, durability testing, road load, E-mobility, power quality, combustion analysis, pass-by-noise, NVH testing, order tracking, torsional vibration, balancing, real-time kinematics, ACC, ISO lane change, and more. DEWESoft hardware and software are used around the world in a variety of fields ranging from auto manufacturers and construction equipment, to aeronautical development and telemetry. And with our Dynamic Signal Analysis capabilities you'll be able do more all on one computer. For more information about DEWESoft please visit us at www.DEWESoft.com.

## Eckel Industries, Inc.

**Booth # 502**
100 Groton Shirley Rd., Ayer, MA 01432 USA
**Phone** 1-978-772-0840
**Email** sandy@eckelusa.com
**www.eckelusa.com**

Anechoic Chambers, Noise Control Products and Systems

## Ecore

**Booth # 304**
715 Fountain Ave, Lancaster, PA 17601 USA
**Phone** 1-717-295-3400
**Email** sharon.paley@ecoreintl.com
**www.ecoreintl.com**

Ecore transforms reclaimed materials into performance surfaces that make people's lives better. We have acoustic test data and support for all of your flooring needs.

## EIS Group

**Booth # 206**
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**Phone** 248-381-8040
**Email** info@esi-group.com
**www.esi-group.com**

ESI is a pioneer and world-leading provider in Virtual Prototyping, leveraging the physics of materials. Established in more than 40 countries worldwide, ESI helps industrial clients shorten their product development cycle by eliminating the need for physical prototypes. ESI VA One provides a simulation environment for vibro-acoustic analysis and design.

## EMS Brüel & Kjær

**Booth # 801**
2330 East Bidwell Street, Suite 210
Folsom, CA 95630 USA
**Phone** 1- 916-265-7714
**Email** bryce.docker@emsbk.com
**www.emsbk.com**

EMS Brüel & Kjær is a global provider of continuous, unattended environmental monitoring solutions. Our managed services and products deliver environmental intelligence to help clients achieve business outcomes and growth.

More than 250 airports—and hundreds of organizations in other market sectors—use our services to manage environmental impact and build community support.

Our Business as a Service (BAAS) model means we simplify operations for customers. By providing a complete service, we eliminate the need to purchase, integrate and maintain complex solutions.

EMS Brüel & Kjær systems monitor a range of environmental elements including noise, vibration, dust and air quality.

Tailored for specific industries – such as Airports, Transportation, Mining, Construction, Energy and Cities – our solutions provide data for numerous purposes including regulatory compliance and community outreach.

## ETS-Lindgren

**Booth # 607**
1301 Arrow Point Dr.
Cedar Park, TX 78613 USA
**Phone** 1-512-531-6400
**Email** sales@ets-lindgren.com
**www.ets-lindgren.com**

ETS-Lindgren is the global leader in the design, manufacture, and installation of acoustic chambers and enclosures. Our product line includes anechoic, hemi-anechoic, reverberation, predictable field, adjustable field, and small device chambers for all precision, engineering, and survey grade measurements.

For more information, visit us at www.ets-lindgren.com.

## Free Field Technologies

**Booth # 706**
MSC Software Belgium FFT - rue Emile Francqui 9 - 1435 Mont Saint Guibert - Belgium
**Phone** +32 10451226
**Email** info@fft.be
**www.fft.be**

Free Field Technologies (FFT), an MSC Software Company, is a leading global company focused on acoustic simulation and engineering services. Actran, FFT' software suite, leads numerous technology trends of vibro-acoustic and aero-acoustic modelling. Used by key actors of the Automotive, Aerospace, Home Appliance and Heavy Equipment industries, Actran helps engineers reduce noise and improve the sound quality of their products.

Actran is chosen for both its powerful general purpose simulation features and its unique capabilities to address specific industrial needs. Technology synergies with most structural FEA codes and CFD software match the increasing demand on multi-disciplinary coupled simulation. Visit www.fft.be.

## Freudenberg Performance Materials

**Booth # 816**
3500 Industrial Dr., Durham, NC 27704 USA
**Phone** 1-919-620-7074
**Email** bill.mordecai@freudenberg-pm.com
**www.freudenberg-pm.com**

Freudenberg Performance Materials is a leading global manufacturer of innovative technical textiles offering differentiated value propositions to a broad range of markets and applications such as Apparel, Automotive, Building Interiors, Construction, Energy, Hygiene, Medical, Shoe and Leather goods as well as Specialties.

## FSorb

**Booth # 705**
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Healthy, Safe & Affordable Acoustical Wall & Ceiling Panels

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**Email** americas@optis-world.com
**www.optis-world.com**

Experts in sound quality , GENESIS offers unique solutions to analyse the perception of sound.

## Getzner USA

**Booth # 606**
8720 Red Oak Blvd, Suite 400
Charlotte, NC 28217 USA
**Phone** 1-704-401-5693
**Email** jessica.scarlett@getzner.com
**www.getzner.com**

Getzner USA, headquartered in Charlotte, N.C., is a subsidiary of Getzner Werkstoffe located in Austria. The expert in manufacturing elastic solutions for applications in railway, construction, industrial and acoustic businesses, Getzner has almost 50 years of experience designing polyurethanes to last and perform at the highest level. Getzner's material has versatility in usage as a vibration mitigation material, an elastic component to improve the service life of bedded components and minimize the need for maintenance and repairs on tracks, vehicles, structures and machines, or as a functional component such as a gasket. The material is available in two cellular polyurethane versions in multiple densities — Sylomer® (open cell) and Sylodyn® (closed cell), as well as in a high damping version — Sylodamp®. By reducing noise and vibrations, Getzner is making a valuable contribution towards enhancing the quality of individuals' living and working conditions.

## GRAS Sound and Vibration

**Booth # 401**
2234 East Enterprise Parkway
Twinsburg, OH 44087 USA
**Phone** 1-330-425-1201
**Email** sales@gras.us
**www.gras.us**

Founded in 1994 by Danish acoustics pioneer Gunnar Rasmussen, GRAS Sound & Vibration is a worldwide leader in the sound and vibration industry. We develop and manufacture state-of-the-art measurement microphones and related equipment to industries where acoustic measuring accuracy and repeatability is of utmost importance. This includes applications and solutions for customers within the fields of aerospace, automotive, audiology, consumer electronics, and other high-demanding industries.

Our measurement microphones are developed to support critical areas of R&D, QA and production and therefore must undergo the most thorough tests. Using a series of "Highly Accelerated Life Tests", GRAS microphones are designed to live up to the high quality, durability and accuracy that our customers have come to expect and trust.

## Hangzhou Aihua Instruments Co., Ltd.

**Booth # 308**
No. 37 Xianlin Road, Xiangxin Town
Hangzhou Zhejiang Province, China
**Phone** +86 571 85021931
**Email** yqf@hzaihua.com
**www.hzaihua.com**

Hangzhou Aihua Instruments Co., Ltd. founded in 1992, has been the main and innovative manufacturer of acoustic and vibration measurement instruments in China. We provide solutions of outdoor noise monitor and focus on designing and developing advanced and user-friendly sound level meters, measurement microphones and preamplifiers.

## HEAD acoustics

**Booth # 704**
6964 Kensington Rd.
Brighton, MI 48116 USA
**Phone** 1-248-486-0099
**Email** info@headacoustics.com
**www.headacoustics.com**

HEAD acoustics will showcase its latest-generation mobile acoustic measurement device, SQobold. Attendees will have the chance to experience this new 4-channel measurement system, which packs all the essential tools acousticians need into one small package. SQobold has all the basic sound level meter functions including spectral displays and can record and store up to four channels of data along with GPS and video to fully document the location of recordings. Binaural recording and calibrated playback are provided via the BHS II Headset, allowing you to recreate a soundscape as if you were there. SQobold can even act as an analyzer with onboard FFT and psychoacoustics calculations. Also on display will be the popular ArtemiS Suite sound and vibration analysis software featuring a new Compact Analysis option with commonly used features integrated into an intuitive user interface; ideal for the new or infrequent user as it requires almost no training to get results.

## HOMASOTE

**Booth # 314**
932 Lower Ferry Rd.
West Trenton, NJ 08628 USA
**Phone** 1-800-257-9491
**Email** sgleason@homasote.com
**www.homasote.com**

To explore the Sensitive… Sound… Solution… Visit Homasote Company at booth # 314!

## IAC Acoustics, A Division of Sound Seal

**Booth # 204**
401 Airport Rd., North Aurora, IL USA
Phone 1-630-270-1790
**Email** jchagnon@soundseal.com
dcullum@soundseal.com
**www.iacacoustics.com**
**www.soundseal.com**

IAC Acoustics, a division of Sound Seal, offers Acoustic metal solutions for Industrial, Architectural and Medical Applications. The industrial offering includes both in-plant

and outdoor enclosures, outdoor noise barriers,anechoic chambers and HVAC products. The architectural products include acoustical doors, windows, music practice rooms and studio packages. The Medical offering includes mini and full size audiology booths and test chambers. Sound Seal has been committed to controlling noise in every environment since 1978. With 40 years of noise control expertise, Sound Seal can offer the technical expertise and support to help solve any noise problem. Our dedicated staff will work with you and your project team to be sure to help specify products that not only meet or exceed your acoustical requirements but will offer the finest aesthetic finishes for your client's budgets.

## INCE 1
### *Noise News International*
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11130 Sunrise Valley Dr., #350
Reston, VA 20191 USA
**Phone** 1-703-234-4124
**Email** cathy@inceusa.org
**www.inceusa.org**

## NNI
*Noise News International* is the electronic newsletter of I-INCE.

## INCE 2
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Spray-Applied Thermal & Acoustical Finishes: K-13, SonaSpray "fc", SonaKrete. Custom Colors Available! Made from 80% Recycled Content—UL Green Guard Gold Certified —LEED Certified—Factory Mutual Approved —Class A, Class 1 Fired-Rated.

## INTER-NOISE 2019 MADRID
**Booth # 201**
**Phone** +34 954 224 095
**Email** internoise2019@bcocongresos.com
**www.internoise2019.org**

The Congress INTER-NOISE 2019 will be held in Madrid, Spain, 16 to 19 June 2019, hosted by the Spanish Acoustical Society (SEA) on behalf of the I-INCE.

## Jamison Door Company

**Booth # 614**
P. O. Box 70, Hagerstown, MD 21741 USA
**Phone** 1- 800-532-3667
**Email** aar@jamisondoor.com
**www.jamisondoor.com**

The Jamison Door Company manufactures acoustical doors for all sound applications. Products include swing, horizontal sliding, and vertical sliding doors in single or double types. Whether the issues are test chambers, sound reduction, or other difficult applications, Jamison is ready to engineer and provide innovative solutions for effective noise control.

## Keene Building Products

**Booth # 102**
5885 Landerbrook Dr.
Mayfield Heights, OH 44124 USA
**Phone** 1-440-605-1020
**Email** lag@keenebuilding.com
**www.keenebuilding.com**

KEENE has continually innovated new construction tools in an effort to improve product performance for the market. At first, KEENE only manufactured entangled net products in applications that had coatings and concrete all around them. Today, our diverse capabilities include blending powders and creating chemicals. In addition to our expertise in plastics extrusion we've expanded our expertise to floor preparation products, below grade systems, roofing, plastic fabricating and 3D filament.

## Kinetics Noise Control

**Booth # 412**
6300 Irelan Place, Dublin, OH 43017
**Phone** 1-614-889-0480
**Email** sales@kineticsnoise.com
**www. kineticsnoise.com**

Kinetics Noise Control, Inc. has extensive experience designing and manufacturing innovative products to control noise and vibration. Kinetics produces the industry's largest selection of innovative products and solutions to control airborne noise, isolate structure-borne vibration, enhance room acoustics, create quiet spaces, and restrain non-structural building systems. Kinetics features an experienced staff of professional engineers, customer support, and sales representatives worldwide.

## KRIEGER SPECIALTY PRODUCTS

**Booth # 302**
4880 Gregg Rd., Pico Rivera, CA 90660 USA
**Phone** 1-562-695-0645
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For over 80 years Krieger Specialty Products has been a leading manufacturer of specialized door and window products. Our product line includes doors and windows for sound control, blast and bullet resistance, radio frequency, tornado, and hurricane applications. Plus, all Krieger doors are manufactured to your requested size, style, and finish.

## Mason Industries

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**Email** jsadler@mason-ind.com
**www.mason-ind.com**

Manufacturers of Vibratoin Control Products, Acoustical Floating Floor Systems, Rubber and Stainless Expansion Joints, Seismic Restraint Systems, Rubber and Spring for Buildings and Railroads.

## MBI Products Company, inc.

**Booth # 803**
801 Bond St., Elyria, OH 44035 USA
**Phone** 1-440-322-6500
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MBI has been a leader in the acoustical industry since 1965. MBI manufactures acoustical products for sound absorption in all types of facilities. Products include Cloud-Lite® Baffles, Lapendary® Panels, Colorsonix® Wall Panels, San Pan® Sanitary Acoustical Panels, and Shadow-Coustic® Pads.

## Microflown Technologies

**Booth # 505**
Tivolilaan 205, 6824 BV Arnhem
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**Phone** + 31 88 001 0811
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**www.microflown.com**

Innovative NVH testing solutions for sound source localization & soundfield visualization.

## Microtech Gefell GmbH & Novastar Solutions

**Booth # 203**
Georg-Neumann-Platz/35200 Plymouth Rd.
Livonia, MI 48150 USA
**Phone** 49+ (0)36649-882-0/1
+734-453-8003
**Email** n.schrader@microtechgefell.de
gh@novastar.net
**www.microtechgefell.de/www.novastar.net**

The Microtech Gefell GmbH is manufacturer of high quality measurement and studio microphones since 1928. Besides microphones the company offers calibration and services for all manufactured products. The measurement technique include 1“, ½“ and ¼“ measurement capsules, measurement preamplifiers for different connection techniques (Conventional Lemo, ICP®, Phantom P 48 XLR, Digital USB AES 42 XLR), outdoor and environmental microphones, microphone arrays, sound intensity probes, power supplies and calibration devices. Novastar’s A2LA Certified Calibration Laboratory supports manufacturers and engineering companies by keeping test and measurement instruments calibrated – including a free and easy- to-use customer portal for asset management.

## Mull-It-Over Products

**Booth # 313**
4275 White St., Grandville, MI 49418 USA
**Phone** 1-616-730-2162
**Email** marianne@mullitoverproducts.com
**www.mullitoverproducts.com**

Mull-It-Over Products has created an innovative sound barrier mullion trim cap that minimizes sound transfer between rooms in buildings with glass facades. The mullion trim cap increases the STC rating of the mullion from STC 28

to STC 60. Mull-It-Over Products has finally solved the partition wall to glass curtain wall transition detail. The Mull-It-Over trim cap looks great, allows for differential movement between systems and is easy to install while minimizing the risk of code violation and client dissatisfaction.

## Navcon Engineering Network

**Booth # 407**
701 W. Las Palmas Dr.
Fullerton, CA 92835 USA
**Phone** 1-714-441-3488
**Email** forschner@navcon.com
**www.navcon.com**

Navcon Engineering Network is presenting information on commercial products (SoundPLAN, SIDLAB, INSUL, Zorba, dBSea & IRIS), technical seminars (Environmental Noise & Modal Testing) and consulting services (Noise & Vibration Measurement, Analysis & Control).

SoundPLAN is a 3D ray tracing software used for indoor and outdoor noise propagation prediction (Road & Railroad & Interior Noise Modeling, Mining Operation, Wind Energy Projects, Urban Planning, Environmental Assessment, Noise Analysis, Noise Control Optimization, ...).

SIDLAB is a combination of software and hardware solution for the analysis and measurement of sound generation and propagation inside duct networks.

dBSea is ideal is a software solution for the investigation of underwater acoustic problems involving single or multiple sources.

INSUL is a software program used for predicting the sound insulation of walls, floors, ceilings and windows.

IRIS is a powerful and user-friendly measurement system for capturing and analyzing room impulse responses in 3D. Measure standard acoustical parameters such as EDT, T20, T30, G, LF, LFC, LLG, D50, C50, C80, Ts, ST Early and ST Late in accordance with ISO 3382-1.

ZORBA is a software program used for predicting the sound absorption of common acoustic materials such as fiberglass, mineral wool or polyester.

## Noise Barriers, LLC

**Booth # 306**
2001 Kelley Ct., Libertyville, IL 60048 USA
**Phone** 1-847-843-0500
**Email** info@noisebarriers.com
**www.noisebarriers.com**

Premier supplier of High Performance Noice control products and complete Systems, including Doors, Windows, Studio's, Performing Arts Centers.

## Norsonic

**Booth # 311**
Gunnersbråtan 2, N-3409 Tranby, Norway
**Phone** +47 32 85 89 00
**Email** info@norsonic.com
**www.norsonic.com**

Norsonic is one of the world's leading manufacturers of precision measurement instruments for sound and vibration applications. Since 1967, Norsonic has developed products in compliance with EU, US and other Standards and in close consultation with customers in more than 35 countries around the world. Our vision is to supply our customers with the most innovative sound and vibration instrumentation of the highest quality. Norsonic Calibration Laboratory (NCL) is an international accredited laboratory.

## NTI Audio

**Booth # 504**
P. O. Box 231209, Tigard, OR 97281 USA
**Phone** 1-503-684-7050
**Email** americas@nti-audio.com
**www.nti-audio.com**

NTI Audio has a range of products for audio and noise measurement. Our customers are noise consultants, manufacturers of audio devices, and makers of other products where noise is an issue.

## Odeon A/S

**Booth # 506**
Odeon A/S, SCION DTU, Diplomvej Bldg. 381
DK-2800 Kgs. Lyngby, Denmark
**Phone** 4588708845
**Email** sales@odeon.dk
**www.odeon.dk**

ODEON A/S is developing and distributing the Room acoustic simulation software ODEON. ODEON is used for acoustic simulations in all kinds of environments like Concert halls, industrial environments etc.

3D models can be created in Google SketchUp, imported from other CAD software in .dxf or .3ds formats or created using Odeon's own modelling tools. Materials, sources, receivers etc. are handled smoothly in ODEON's user friendly interface. Results are room acoustical parameters presented in graphs and maps, miscellaneous graphs, e.g. decay curves, 3D Reflection Paths and reflectograms and provide realistic presentations of what the room acoustics of a project sounds like.

## Ono Sokki Co., Ltd.

**Booth # 513**
3-9-3 Shin-Yokohama, Kohoku-ku, Yokohama
222-8507, Japan
**Phone** +81-45-935-3918
**Email** overseas@onosokki.co.jp
**www.onosokki.co.jp/English/english.htm**

Founded in 1954, Ono Sokki is a measuring instrument manufacturer focused on the tasks of applying digital technology to measurement applications, and has a proud history in that field. Ono Sokki was first in Japan (in 1973) to apply digital technology to the developmentof a practical FFT analyzer, a valuable tool in the reduction of noise and vibration. Ono Sokki also provides various acoustic measurement and analysis products such as a microphones, sound intensity probes, sound level meters and other measurement and analysis systems which are used for capturing sound flow, detecting sound and environmental noise, or sound evaluation etc. We can offer a total system related acoustic measurement and analysis.

## OROS

**Booth # 411**
502 Shaw Rd., B -101
Dulles, VA 20166-9435 USA
**Phone** 1-703-478-3204
**Email** Info@OROSInc.com
**www.OROS.com**

OROS, measuring noise & vibration for more than three decades, is tuning in to showcase its latest technology. Long renowned for high-end, real-time analyzers, OROS offers the full spectrum of acoustic measurement capability. Specifically: holography; sound

power; acoustic intensity; overall acoustic levels (multichannel SLM) and sound quality. Reinforcing its position as a trendsetter in portable analyzers with unparalleled versatility, OROS offers All-in-1 Instruments for acoustic applications. Visit us at booth # 213 to find the latest in OROS' innovative noise & vibration measurement technology.

## Overly Door Company

**Booth # 115**
574 West Otterman St.
Greensburg, PA 15601 USA
**Phone** 1-800-979-7300
**Email** Overly@overly.com
**www.overly.com**

For over 50 years Overly Door Company has been a leader in the design and manufacture of Acoustical metal and wood door assemblies and fixed window systems.

## Owens Corning, LLC

**Booth # 103**
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**Phone** 740-321-6865
**Email** Kevin.herreman@owenscorning.com
**www.owenscorning.com**

For 80 years, Owens Corning has been a leader in insulation, roofing, and fiberglass composites. Although we are global in scope, with 19,000 people in 37 countries, we are human in scale. With world class acoustic products and testing facilities, Owens Corning can partner with you to develop noise control solutions. Owens Corning Acoustic and Insulation Product Testing Laboratories is an accredited testing facility for Acoustics, Fire, and Thermal product evaluation.

## PAC International, LLC.

**Booth # 508**
9130 Sw Pioneer Ct., Suite B
Wilsonville, OR 97070 USA
**Phone** 1-866-774-2100
**Email** info@pac-intl.com
**www.pac-intl.com**

PAC International's combination of UL testing, Acoustical Testing, and propietary manufacturing process makes the RSIC line of Noise Control Products the highest level of noise control for use in multi family, single family, and any commercial applicatiion.

## PCB Piezotronics

**Booth # 414**
3425 Walden Ave., Depew, NY 14043 USA
**Phone** 1-716-684-0001
**Email** info@pcb.com
**www.pcb.com**

PCB® Piezotronics, Inc. provides engineered sensors to measure sound, vibration, pressure, force, strain, load, & torque. Larson Davis, a PCB Division, specializes in sound level meter and noise monitoring solutions. We are committed to Total Customer Satisfaction with in-stock Platinum products, experienced global distribution network, & SensorLine™ 24-hour technical support.

## Pinta acoustic

**Booth # 812**
2601, 49th Avenue North, Suite 400
Minneapolis, MN 55430 USA
**Phone** 1-800-662-0032
**Email** sales@pinta-acoustic.com
**www.pinta-acoustic.com**

Pinta acoustic part of pinta elements specialised in foam sound insulation. A USA manufacturer that adress needs in architectural acoustic, medical, industrial (hvac, train insulation etc).

## Polytec, Inc

**Booth # 709**
16400 Bake Parkway, Irvine, CA 92618 USA
**Phone** 1-949-943-3033
**Email** info@polytec.com
**www.polytec.com**

Polytec is the world's leading manufacturer of laser based, non-contact vibration measurement systems. We offer systems for applications such as ODS, modal analysis, material characterization and FE Correlation to name a few. To expand its product offering, Polytec has found a perfect partner in gfai tech, the manufacturer of the original Acoustic Camera. An Acoustic Camera is a sound source characterization and localization tool. It is used in applications such as noise reduction, room acoustics, wind tunnel noise characterization and pass-by measurement to name a few. Visit our booth to learn how we are helping engineers in your industry with their noise and vibration measurement needs.

## Prosig

**Booth # 612**
190 Gordon St.
Elk Grove Village, IL 60007 USA
**Phone** 1- 847-228-0985
**Email** ProsigUSA@prosig.com
**www.prosig.com**

Prosig was founded in 1977 by members of Institute of Sound & Vibration Research at Southampton University in the UK. The company's goal was and remains; to provide customers with the best available products for noise and vibration measurement.

The DATS-tetrad and DATS-solo systems and integrated software is used for mobile and laboratory noise & vibration measurement tasks and the PROTOR vibration condition monitoring provides long term condition monitoring for power stations and other large plant.

Our systems are designed using knowledge gained over 40 years of solving acoustic and vibration problems for the likes of NASA, Dow, Ford, British Aerospace, GM, Siemens, Sharp, BMW and Airbus as well as F1 teams, air forces, power generators, universities and military organisations around the world.

The company is focused on producing reliable, high quality measurement solutions that allow their customers to achieve best practice by using the latest tools available to the test engineer.

## Pyrok, Inc
**Booth # 604**
24 Barry Dr. NE, White, GA 30184
**Phone** 1-914-27-5135
1-914-777-7070
**Email** andrew@pyrok.com
howard@pyrok.com
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Pyrok finishes are the finest acoustical plaster and acoustical perforated drywall finishes available. Their beauty, durability and adaptability to a wide variety of substrates and design configurations make them the preferred choice of designers and architects, for interior construction and renovation projects.

## Regupol Acoustics
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11 Ritter Way, Lebanon, PA 17042 USA
**Phone** 1-717-675-2190
**Email** acoustics@regupol.com
**www.regupol-acoustics.com**

Regupol Acoustics, a division of Regupol America, is a worldwide leader in the noise control field with over 50 years of experience. Regupols' portfolio includes some of the most prestigious projects worldwide. Our products are designed for use in residential, commercial, and industrial applications.

## RION Co., Ltd.
**Booth # 602**
3-20-41 Higashimotomachi, Kokubunji, Tokyo 1858533 Japan
**Phone** +81-42-359-7888
**Email** r-hosoi@rion.co.jp
www.**rion-sv.com**

RION is a Japanese brand of sound and vibration measuring instruments.
Its current range of products includes hand-held sound level meters and vibration meters as well as aircraft and environmental noise monitors for permanent installation.

## Rockfon
**Booth # 610**
4849 S. Austin Ave., Chicago, IL 60638 USA
**Phone** 1-800-323-7164
**Email** cs@rockfon.com
**www.rockfon.com**

Rockfon® is a leading provider of acoustic stone wool and metal ceiling solutions and suspension systems.

## Scantek, Inc.
**Booth # 309**
6430 Dobbin Rd., Suite C
Columbia, MD 21045 USA
**Phone** 1-410-290-7726
**Email** info@scantekinc.com
**www.scantekinc.com**

Scantek, Inc. is a worldwide leader in sound and vibration instrumentation sales, rental, and calibration. Scantek sells, services, and rents the

finest products and provides expert support on their use. The Scantek Calibration Laboratory is accredited for microphones, calibrators, sound level meters, dosimeters, sound and vibration FFT, and real-time analyzers, preamplifiers and signal conditioners, accelerometers, velocity sensors, vibration meters, and vibration exciters. Scantek, Inc is a wholly owned subsidiary of Norsonic AS.

## Sensidyne LP/Svantek

**Booth # 512**
1000 112th Circle N, Ste 100
St Petersburg, FL 33716 USA
ul. Strzygłowska 81 04-872 Warszawa, Poland
**Phone** 1-800-451-9444
(+48) 22 51 88 320
**Email** sv@sensidyne.com/marketing@svantek.com.pl
**www.sensidyne.com/ www.svantek.com**

Sensidyne will be exhibiting the comprehensive range of Svantek sound and vibration products. Included are two new all in one environmental monitors and a range of hand held instruments for all acoustic and building vibration tasks. SVANTEK is a Polish company established in 1990. We design and manufacture professional instrumentation for sound & vibration measurement and analysis. Our instruments are well known around the globe for their accuracy and reliability. But it is continuous usage of the latest technological achievements that makes us the leading innovative sound & vibration manufacturer. Every sound or vibration instrument offered by Svantek can be delivered with an ISO/IEC 17025 calibration certificate. Our accredited laboratory uses state-of-the-art calibration technology and instrumentation and offers the highest levels of knowledge and competence with all its services. Our mission is to deliver the best quality products for sound & vibration measurement.

## Sigicom, Inc.

**Booth # 109**
2649 E. Mulberry St. Unit #17
Fort Collins, CO 80524 USA
**Phone** 1-970-493-1552
**Email** jim.krebs@sigicom.com
niclas.johansson@sigicom.com
**www.sigicom.com**

Sigicom provides intrumentation to perform unattended remote monitoring of noise, vibration and other related parameters around construction sites.

## SINUS Messtechnik GmbH

**Booth # 106**
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**Phone** +49 341-244-29-0
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**Phone** 1-360-432-9840
**Email** marketing@soundplan.com
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**www.us-svi.com**

USVI provides consulting and product sale for noise and vibration isolation or mitigation.

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# AUTHOR INDEX

*Indicates Organizers/Chairs

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# NOTES

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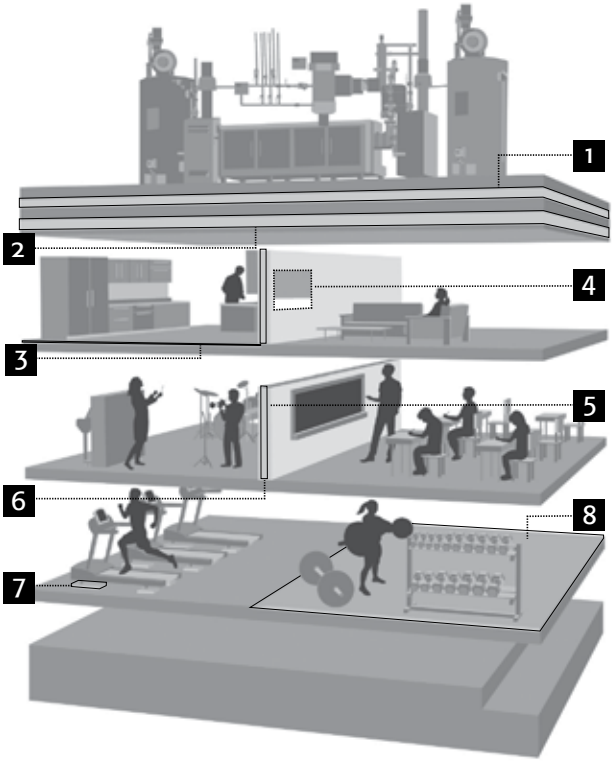


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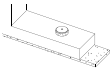

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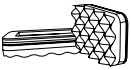

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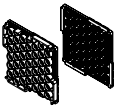

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- M.Eng. in Acoustics (resident and distance)
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- 280 M.S. in Acoustics degrees
- 210 Ph.D. in Acoustics degrees

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## Website: *www.acs.psu.edu*

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**Details at *http://www.acs.psu.edu*** *Distance Education tuition is **$2,625** per course*

### COURSES OFFERED EVERY FALL SEMESTER (August – December):

**ACS 597, Signal Analysis for Acoustics and Vibration:** data acquisition, measurement techniques, spectral analysis, 2-channel measurements, signal enhancement, multiple-sensor techniques, acoustic metrics

### COURSES OFFERED EVERY SPRING SEMESTER (January – May):

**ACS 514, Electroacoustic Transducers:** theory, design, calibration, and applications of passive, linear, reciprocal, piezoelectric electroacoustic transducers for use in both air and water; microphones, loudspeakers, hydrophones, projectors.

**ACS 597, Advanced Signal Analysis:** time and frequency-domain representations; IIR and FIR digital filters; signal detection and classification; signal modulation, applications to modal analysis, structural health monitoring, source localization and classification, and outdoor sound propagation

### SPECIAL ELECTIVE COURSE – Fall 2019

**ACS 519, Sound-Structure Interaction**: structural vibration of beams, plates, and cylindrical shells; structural damping; coupling of structures with internal and external pressure fields, analytical and numerical techniques, statistical energy analysis, transmission loss, composite structures.

### SPECIAL ELECTIVE COURSE – TBA

**ACS 537, Noise Control Engineering:** noise levels, human hearing and noise criteria, instrumentation, absorption, outdoor sound, room acoustics, fan noise and HVAC, partitions and barriers, vibration isolation and control. (*Good prep for the INCE Board Certification Exam*).

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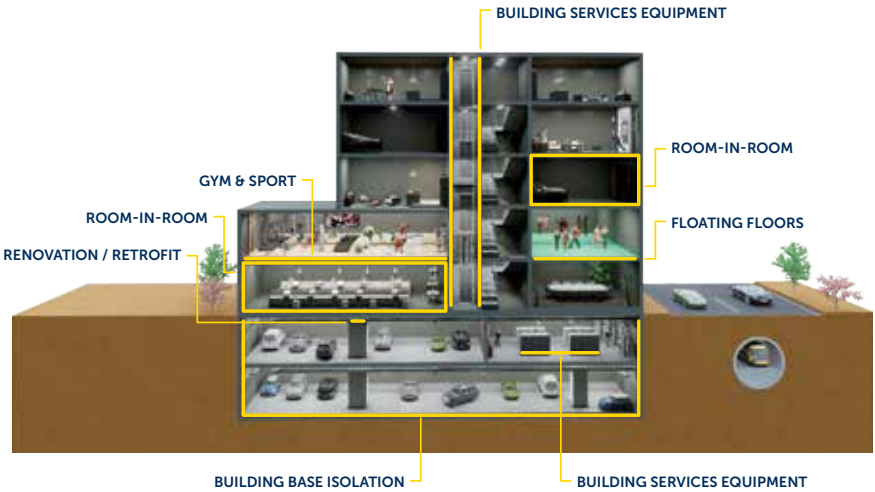


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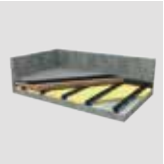

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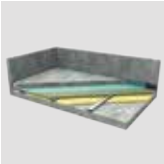

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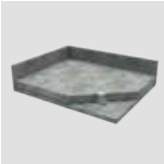

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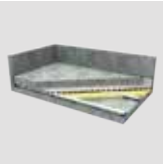

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