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The 2024 I-INCE Practice of Noise Control School

For Students and Other Young Professionals Registered at Inter-Noise 2024 Congress
(By Invitation Only. If you are interested in attending, email senos@itu.edu.tr)
Sunday 25th August, 2024, 7:45am-12:15pm

7:45am-8:00am Sign-In and Introduction

8:00am-9:00am
Noise Control Standardization: The Backbone of Best Practice
Douglas Manvell, CEO and Founder, DMdB, Charlottenlund, Denmark

9:00am-10:00am
Setting up and conducting tests to develop models of human response to machinery noise
Patricia Davies, Professor of Mechanical Engineering, Ray W. Herrick Labs., Purdue University, USA.

10:00am-11:00am
Mitigation of the Tire Air Cavity Mode by the use of Porous Linings
Stuart Bolton, Professor of Mechanical Engineering, Ray W. Herrick Labs., Purdue University, USA.

11:00am-12:00pm
Friction Induced Noise and Vibrations
Osman Taha Sen, Associate Professor of Mechanical Engineering, Istanbul Technical University, Turkey.

12:00pm-12:15pm Closing Remarks and Photographs

Session 1: 8:00am-9:00am

Douglas Manvell, CEO and Founder, DMdB, Charlottenlund, Denmark; Chair of ISO Technical Committee 43 on Acoustics.
Web page: https://www.DMdBSoundAdvice.com/

Bio: Douglas Manvell is CEO and founder of DMdB, based in Denmark, and is Chair of ISO Technical Committee 43 on Acoustics. He has 30 years' experience with noise and vibration control applications and solutions at market leading companies such as Brüel & Kjær, has spent over 20 years with environmental noise policy standardization and legislation including EU Noise Policy and the Environmental Noise Directive, and has 25 years' experience both with environmental noise calculation software and with international conferences and exhibitions. The author of over 70 papers and session chair at several conferences, he is also Guest lecturer at the Danish Technical University, Environmental Acoustics (MSc module) 2006-2017, 2021-2023. DMdB is a dynamic and agile consultancy providing professional services within noise and vibration control. Based on over 30 years in the business of solutions for noise and vibration control, particularly in environmental noise and vibration, and in standards and legislation, DMdB provides knowledge of and experience in applications, regulations and solutions; a wide and strong network within the global noise and vibration control community; and as Chairman of ISO Acoustics, insight into standardization. He is also a Fellow of the UK Institute of Acoustics.

Noise Control Standardization: The Backbone of Best Practice

Summary: Standards form the backbone of best noise control practice. Doug will describe the role of standards and how they interface with legislation, why standards are important, how standards are developed and maintained and by whom, as well as why and how to get involved. He will cover the roles of and interactions between global, regional, industry-specific and national standardization, and the links with research. He will describe the path he took from graduation at Surrey University in UK to becoming convenor of the ISO Working Group on Environmental Noise Assessment and the Chair of the ISO Technical Committee 43 on Acoustics. He will provide examples from his vast experience with standardization to illustrate the topic in an entertaining and enlightening manner.

Session 2: 9:00am-10:00am

Patricia Davies, Professor of Mechanical Engineering, Ray W. Herrick Labs., Purdue University, USA. Former INCE/USA President 2007-2009, and I-INCE VP for Technical Activities 2018-2023.
Web page: https://engineering.purdue.edu/ME/People/ptProfile?resource_id=12475

Bio: Prof. Davies joined Purdue in 1987 after completing her Ph.D. at the Institute of Sound and Vibration Research at the University of Southampton in the UK. She was Director of the Ray W. Herrick Laboratories 2005-2019. Herrick Labs. started in 1958 specifically to have graduate students involved in research sponsored by industry. Part of her research is focused on the development of models to predict how people perceive and are affected by machinery noise. Such models can be coupled with machinery sound prediction models and used to optimize machinery sound design. In this research she has collaborated with colleagues in hearing sciences and psychology, and much of this research has been funded by industry. She teaches classes in dynamics, measurements, controls and signal processing. She is a fellow of INCE/USA and of the Acoustical Society of America. She received ASME's Per Brüel Gold Medal for Noise and Vibration in 2016.

Setting up and conducting tests to develop models of human response to machinery noise

Summary: Conducting good experiments, with the aim of developing models of human response to noise, is quite difficult, and often involves conducting a series of experiments with each experiment producing new information that inspires further research to refine the models. Judgements of sounds are highly context dependent, and experimenters are always trying to balance the benefits of human response measurements in the actual setting of the machines making the sound, and the benefits of conducting tests in highly controlled settings where the sounds and environmental variables can be controlled. The statistical requirements to develop robust models of human response are very similar to those when developing other types of models. Development of an information-rich dataset for model estimation will be discussed, and some industry-sponsored sound quality research will be presented.

Session 3: 10:00am-11:00am

Stuart Bolton, Professor of Mechanical Engineering, Ray W. Herrick Labs., Purdue University, USA.
Web page: https://engineering.purdue.edu/ME/People/ptProfile?resource_id=11026

Bio: J. Stuart Bolton received his undergraduate degree in Mechanical Engineering from the University of Toronto, and his Master's and Ph.D. degrees from Southampton University's Institute of Sound and Vibration Research (I.S.V.R.). In 1984, Professor Bolton joined the Faculty of the School of Mechanical Engineering at Purdue University where he performs his research at the Ray W. Herrick Laboratories. Professor Bolton maintains an active research program in Noise Control and related topics including Acoustical Materials, Sound Field Visualization, and Acoustical and Structural Wave Propagation. In 2020 Professor Bolton was awarded the ASME Per Brüel Gold Medal in Acoustics and Noise Control.

Mitigation of the Tire Air Cavity Mode by the use of Porous Linings

Summary: In EVs, tire/road noise is arguably the most significant contributor to vehicle interior noise. The Tire Air Cavity Resonance (TACR) is a significant contributor to structure-borne road noise, and it is particularly troublesome since the resonance produces a peak in a narrow frequency range, typically near 200 Hz, with a relatively high amplitude, which is easily detectable by the human ear. In this presentation, the action of porous linings applied to the interior surface of a tire's treadband is described based on theoretical, numerical and experimental analysis, and it is shown how porous linings very effectively mitigate the effects of the TACR.

Session 4: 11:00am-12:00pm

Osman Taha Sen, Associate Professor of Mechanical Engineering, Istanbul Technical University, Turkey.
I-INCE VP for Professional Programs
Web page: https://adl.itu.edu.tr

Bio: Osman Taha Sen is currently a faculty at the Department of Mechanical Engineering at Istanbul Technical University, Turkey. He received his bachelor's and master's degrees in 2005 and 2007, respectively, from the Mechanical Engineering Department at Istanbul Technical University. He received his Ph.D. degree in Mechanical and Aerospace Engineering at the Ohio State University in 2012 under the supervision of Prof. Dr. Raj Singh. He got tenured with Assoc. Prof. title at the same university on 2023. His research interests mainly focus on mechanical vibrations, acoustics, friction induced vibrations, nonlinear dynamics, experimental mechanics, signal processing, and automotive NVH. He received the Leo Beranek Student Medal for Excellence in the Study of Noise Control, awarded by INCE/USA in 2012 and the Young Professionals Award, awarded by I-INCE in 2013.

Friction Induced Noise and Vibrations

Summary: By definition, friction is the force that resists the relative motion of solid surfaces, fluid layers and material elements that move relative to each other. Though, no motion is required for the friction force to occur. There are significant differences in character between the friction force that occurs in the presence of relative motion (kinetic friction force) and the friction force that occurs in the absence of motion (static friction force). The friction force is a non-conservative force, which means that part of the available kinetic energy is always converted into heat energy. This means that mechanical energy is not conserved. In this presentation, some important characteristics of friction phenomenon will be explained. Furthermore, the relationships between some important noise and vibration problems and physics of friction will be examined. Recent findings obtained on a bench test setup will be shared. The parameters leading to instability on the system will be explained.