

National Conference on Noise Control Engineering (NOISE-CON 2022)

Soundscape Design

Lexington, Kentucky, USA
13-15 June 2022

Volume 1 of 2

Editors:

**David Copley
Patricia Davies
David Herrin**

**Yangfan Liu
Yutong “Tony” Xue
Gordon Ebbitt**

ISBN: 978-1-7138-5428-9

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2022) by Institute of Noise Control Engineering - USA (INCE-USA)
All rights reserved.

Printed with permission by Curran Associates, Inc. (2022)

For permission requests, please contact Institute of Noise Control Engineering - USA (INCE-USA)
at the address below.

Institute of Noise Control Engineering - USA (INCE-USA)
INCE-USA Business Office
11130 Sunrise Valley Drive
Suite 350
Reston, VA 20190
USA

Phone: +1 703 234 4124
Fax: +1 703 435 4390

ibo@inceusa.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

VOLUME 1

Experimental Investigations on the Acoustical Performance of Open-Celled Metal Foams Under Grazing Flow	1
<i>Mary Drouin, Bhisham Sharma</i>	
Design, Development, and Validation of Acoustic Insulation Packages for Business and VIP Aircraft	12
<i>Fredrick Vance, Jared Young</i>	
Modeling Acoustic Impedance and Atmospheric Absorption Around Airports Using High-Fidelity Weather Data	22
<i>Emma Shaw, Victor Sparrow</i>	
Hydraulic Source Ripple and Source Impedance in 3D Acoustic FEM Model.....	29
<i>Xin Hua, Pratik Patel, Zachary Tuyls</i>	
Evaluation of Nighttime Helicopter Noise in an Urban Neighborhood.....	37
<i>AnnMarie Hirsh, Jeffrey Babich</i>	
Navy Aircraft Sound Monitoring Study	43
<i>Micah Downing, Jonathan Gillis, Ben Manning, Josh Mellon, Matthew Calton</i>	
Auralizing Comparable Structural Vibration Measurements to Inform Design Decisions	55
<i>John Strong, Christopher Springthorpe</i>	
Challenges Testing High Transmission-Loss Walls in a Laboratory	63
<i>Elliott Dick, Benjamin Shafer, David Berg</i>	
The Application of Frequency Response Function Methods Along with Heavy/hard Force Pulse Data in the Mitigation of Fitness Activities.....	69
<i>Ethan Brush, Matthew Golden</i>	
Effects on Repeatability and Shape of the Force Pulse Due to Shape, Height, Mass, and Angle of Heavy/hard Weight Drops.....	79
<i>Matthew Golden, Paul Gartenburg, Faiz Musafere, Jordan Strybos</i>	
Horizontal Impact Sound Transmission Measurements	90
<i>Jeffrey Fullerton, Alexander Maurer</i>	
Quantitative Comparisons of Resilient Channel Designs in Walls and Ceilings.....	99
<i>Wayland Dong, John LoVerde</i>	
A Multi-Stage Filter for Separating Speech from Background Noise	106
<i>Curtis Garner, Jonathan Blotter, Scott Sommerfeldt, Tyler Sanders</i>	
An Improved Two-Stage Dereverberation Method Based on Bayesian Estimation of a Speech Source.....	115
<i>Arun Prakash Singh, Nachiketa Tiwari</i>	

Advancing Support for Cause-And-effect Models by Estimating the Kurtosis Statistic Using Fractional-octave-band Filters	129
<i>Edward Zechmann</i>	
Acoustical Impacts on Hard Disk Drive Dynamics.....	141
<i>Charles Oppenheimer, Chris Peterson</i>	
Large-Scale Anechoic Characterization of Small Caliber Firearm Impulse Noise	152
<i>Steven Campbell, Alan Wall, Corey Taylor, Frank Mobley, Reese Rasband</i>	
Warmstarting the Constrained Optimal Filter Design Problem for Active Noise Control Systems in Conic Formulation.....	162
<i>Yongjie Zhuang, Zhuang Mo, Yangfan Liu</i>	
Validation of Acoustic Directivity Patterns from Static and Dynamic Flight Measurements	173
<i>Frank Mobley, Steven Campbell</i>	
Change of Community Noise and Noise Impact with Changes in Air-Taxi Fleet Compositions Over a Longer Period of Time.....	187
<i>Michael Bauer</i>	
Preliminary Evaluation of Transportation Noise Masking of UAV Noise	196
<i>Judith Rochat, Herbert Singleton, Keith Yoerg</i>	
Feasibility Study for Remote Psychoacoustic Testing of Human Response to Urban Air Mobility Vehicle Noise	206
<i>Siddhartha Krishnamurthy, Stephen Rizzi</i>	
Noise Metrics of the Time-Varying Acoustic Far-field of Rotors.....	218
<i>Woutijn Baars, Edoardo Grande, Daniele Ragni</i>	
Acoustic Measurement Practices for UAS and UAM	230
<i>David Josephson</i>	
Measurement and Characterization of Multirotor Unmanned Aerial System Noise	236
<i>Eric Greenwood, N. Blaise Konzel</i>	
A Different Method of Partition Wall Isolation.....	247
<i>Kevin Herreman, Corey Taylor</i>	
High-Performance Steel-framed Wall and Floor/Ceiling Assemblies.....	255
<i>Mike Raley, Benjamin Shafer</i>	
Alternative to Resilient Channel.....	267
<i>Kevin Herreman, Corey Taylor</i>	
Hybrid Experimental-Numerical Methodology for Assessment of the Building Isolation Performance.....	275
<i>Hamid Masoumi, Bradley Hunt</i>	
Evaluation and Optimization of Acoustics of a Multipurpose Room to Improve Speech Intelligibility	282
<i>Peter Oyekola, William Rogers, James Fedorka, Nathaniel Colemon, Nathan Woodard, Mehedi Al-Barkat, Mohan Rao</i>	
Case Study: Compilation of Doorwall Designs for Speech Privacy.....	292
<i>William Rosentel, Peter Holst</i>	

A Novel Multi-Gradient Direction FxLMS Algorithm with Output Constraint for Active Noise Control.....	300
<i>Yabing Cheng, Pingyu Ge, Shuming Chen, Chao Li, Yao Jiang</i>	
Testing Listeners' Ability to Localize Virtual Sources Using Sparse Loudspeaker Arrays and Comparison with Spherical-Head Model Predictions	312
<i>Nathaniel Wells, Tyler Sanders, Scott Sommerfeldt</i>	
Numerical Modeling of Noise and Vibration Due to Discharge in Hermetic Compressors	318
<i>Dazhuang He, Yangfan Liu, Davide Ziviani, Ray W. Herrick Laboratories</i>	
Efficient Simulations for the Democratization of Duct Transmission Loss Analysis	334
<i>Karim Hamiche, Aamir Marvi, Ford Motor Company</i>	
Noise Propagation and Attenuation in L-Shape Duct with Flow.....	346
<i>Masaaki Mori</i>	
Validation Studies of a Homogenized Ribbed-Panel Model in an SEA Context	357
<i>Abderrazak Mejd, Luca Alimonti, Chad Musser</i>	
Electric Machine Noise and Vibration Prediction and Validation Through Test	367
<i>Keyu Chen, Marcus Hartwig, Shahram Amoozegar</i>	
Highlights of Aeroacoustic Tests of a Metal Spacecraft Cabin Ventilation Fan Prototype.....	375
<i>David Stephens, Jonathan Goodman, Rebecca Buehrle, Arman Mirhashemi, Lisa Koch, Tony Shook, Daniel Sutliff, Christopher Allen, Christopher Matty</i>	
The Application of Tuned Mass Dampers to the Tire Pavement Test Apparatus to Minimize the Impact of Rig Resonance.....	385
<i>Kyosung Choo, Won Hong Choi, J. Stuart Bolton, Matthew Black, Sangbeom Woo</i>	
Surrogate Modeling of Open-Celled Metal Foam Sound Absorbers with Stepwise Property Gradients	396
<i>Manish Mahajan, Amulya Lomte, William Johnston, Bhisam Sharma</i>	
Developing and Testing a Physics-Guided Machine Learning Neural Network to Predict Tonal Noise Emitted by a Propeller.....	406
<i>Arthur Wiedemann, Christopher Fuller, Kyle Pascioni</i>	
Sound Pressure Level Reduction in McCrone Micronizing Mill Using Sound Enclosure Treatment.....	418
<i>Gavin Dies, Mohan Rao</i>	
Investigation of an Alternative Force Input Method for Impact Sound Rating	425
<i>Edwin Yazbec, Matt Specht, Dylan Kiefer, Ryan Harrington, Jacob Marchi, Sunit Girdhar, James DeClerk, Andrew Barnard</i>	
Prediction of Flow Properties of Granular Porous Materials for Acoustic Applications.....	436
<i>Bharath Kenchappa, Kunigal Shivakumar</i>	
Battery Energy Storage System Facility Implementation Noise Control and Sound Abatement Considerations	448
<i>Mark Storm, Jonathan Leech</i>	
Sound Emissions in Solar and Battery Energy Storage Projects	459
<i>Kenneth Kaliski, Robert O'Neal, Mark Bastasch</i>	

Standardizing Wind Turbine Sound Predictions	469
<i>Mark Bastasch</i>	

VOLUME 2

A Proposed Method for Measuring Noise from Wind Farms for the Purpose of Determining Compliance with Applicable Limits and the Comparison of Results to ISO 9613-2 Predictions	473
<i>Justin Bowers, Michael Hankard, Jeff Cerjan</i>	
Verification of Sound Modeling Results for a Wind Energy Project	485
<i>Robert O'Neal, Mark Bastasch, Clint Cyr</i>	
Computational Investigation into the Effect of Material Properties on Aeroacoustics Based Damage Detection from Wind Turbine Blades.....	493
<i>Caleb Traylor, Murat Inalpolat</i>	
Wayside Noise Measurements of Diesel Multiple Unit Rail Vehicles in Revenue Service	504
<i>David Towers</i>	
Dynamic Mechanical Analysis of Rubber Based Products in Under Ballast Mat Rail Applications	511
<i>Colin Bradley, Josh Havin, Faiz Musafere</i>	
Design-Build Case Study Project Neon NDOT.....	520
<i>Scott Noel, Jessica Goza-Tyner</i>	
Measurements of Train Vibration Impacts on Vibration Sensitive Facilities.....	525
<i>Blong Xiong</i>	
A Possible Mitigation Measures for Urbanized Residential Care Homes for Elderly (RCHE) – Acoustic Window with Natural Ventilation	533
<i>Man Sum Lam, May Hang Grace Kwok, Siu Ming Cheung, Joanne Wai Yin Ng, Wing Yee Tang</i>	
Speedup of FTMM (finite-Size Transfer Matrix Method) Calculations Through Machine Learning Techniques.....	541
<i>Tom Burns</i>	
Review of Concepts Relating to Measurement Quality.....	546
<i>Elliott Dick</i>	
Applying Lean Construction Principles to Noise Mitigation Design	555
<i>Laura Fennema</i>	
An Angle-Error Model for Enveloping Surface Sound Power Measurements.....	562
<i>Seth Bard</i>	
Finding Damping Loss Factor Using Circle-Fit Method on Nyquist Diagrams.....	574
<i>Ricardo De Alba Alvarez, Malcolm Kelly, Colin Hale, Pete Marinelli</i>	
Studying Footfall Vibration Criteria in a Changing Market and the Effects on Structural Design	582
<i>Caitlin Ormsbee</i>	
Application of Stockbridge Type Tuned Mass Damper on the Chillers for Mitigating the Tonal Structure-Borne Noise in Hotel Guest Room Under the Chiller Plant Room.....	588
<i>Neo Cheung, Jackel Law, Yu Tin Tang</i>	

A Finite Difference Approach for Predicting Acoustic Behavior of the Poro-Elastic Particle Stacks	595
<i>Zhuang Mo, Guochenhao Song, J. Stuart Bolton</i>	
Effect of Reflections in HVAC Acoustics Analysis	607
<i>Mina Nashed, Tamer Elnady, Mats Abom</i>	
An Experimental Study of Flow-Induced Noise from Perforated Pipes.....	619
<i>Seth Donkin, David Herrin</i>	
Simulation of Perforations Using Distance-Based Linearized Navier-Stokes-Fourier.....	631
<i>Xin Yan, David Herrin, Nikhil Ghaisas</i>	
Automotive OEM Acoustics - The Ideal Application for Carbon Neutral Solutions	640
<i>Richard Brouckaert</i>	
Auralization of Road Noise CAE Simulation Results for Interactive Sound Quality Evaluations.....	648
<i>Rabah Hadjit, Fredrik Sjogren, Athanasios Poulos, Cyril de Walque</i>	
Quantification of the Noise Control Benefit Realized by Installing an Aerodynamic Fairing to a Passenger Vehicle.....	655
<i>Dan Hemme</i>	
Dynamic Force Measurement to Assess NVH Performance of Electric Motors.....	665
<i>Song He, William Omell, Michael Gandham</i>	
Tire Test Stand Measurements for Blocked Forces Identification and Tire Noise Auralization	673
<i>Rabah Hadjit, Bret Engels, Markus Brandstetter, Athanasios Poulos</i>	
Case Study of Office Noise and Vibration Annoyance Due to Building Water Pumps for HVAC Equipment	684
<i>Richard Ruhala, Laura Ruhala</i>	
Breakout from HVAC Ductwork	693
<i>Jerry Lilly, Jerry Lilly</i>	
Predicting and Visualizing Duct Borne Noise with Building Information Modeling Software	705
<i>Samuel Underwood, Lily Wang</i>	
Scaled Down Measurement of HVAC Duct Insertion Loss and Comparison to Simulation.....	712
<i>Caoyang Li, David Herrin</i>	
A Simple Four-Pole Solution with FEM/BEM Validation to Estimate the Effectiveness of Compact Resonators in Large Silencers	720
<i>H. Zhou, T. W. Wu, P. Wang, J. P. Engel</i>	
Outdoor Unit Split Fan Noise Prediction Using a Hybrid Lighthill Analogy Method	727
<i>Ali Nikparto, Alexis Talbot, Asad Sardar</i>	
Cryptocurrency Mining Noise: the Cost of Progress?	736
<i>Erich Thalheimer</i>	
Novel Approach to Noise Mitigation: a Case Study Demonstrating a Collaborative Approach Between Noise Consultant and Noise Solution Supplier for Economical and Practical Implementation.....	743
<i>Jagannath Rajasekaran</i>	

Rooftop Acoustic Barrier Design Without the Need for Roof Penetrations	752
<i>Michael Bolduc, Jagannath Rajasekaran</i>	
Controlling Noise from Tunnel Ventilation Fans	757
<i>Karl Peterman, Dan LaForgia</i>	
Revitalising Soundscape of 'holy Cross' Sacred Grove - Baradi, Goa: Acoustic Environment's Affective and Metaphysical Heritage	766
<i>Menino Allan S.M. Peter Tavares</i>	
Establishing the Appropriate Maximum Sound Pressure Levels in Absence of a Noise Ordinance for a Residential Community Near an Indoor Firing Range	778
<i>Mark Bartus II, Jeffrey Babich</i>	
Underwater Shipping Noise Impacts to Marine Life: a Global Issue	783
<i>Michael Bahtiarian</i>	
Traffic Noise Reduction Attributed to Roadside Vegetation: Ohio Case Study.....	794
<i>Ben Sperry, Elizabeth Myers, Sarah Maracz, Judy Rochat, Karel Cubick</i>	
Acoustically Soft Ground as a Highway Traffic Noise Reduction Strategy.....	805
<i>Judith Rochat, Karel Cubick</i>	
Solid Safety Barriers as a Highway Traffic Noise Reduction Strategy	814
<i>Karel Cubick, Judith Rochat</i>	
Noise Mitigation Strategies for Vacuum Excavators	825
<i>Keith Yoerg, Shannon McKenna</i>	
Managing Construction Vibrations Near Sensitive Facilities.....	831
<i>Ethan Brush, Marc Newmark</i>	
Using Updated Roadway Construction Noise Model Acoustical Noise Data for Simplified Construction Noise Predictions.	839
<i>Paul Burge, Roger Wayson, Cole Martin</i>	
Panel Contribution Analysis Combined with Scale Modeling for Assessing Equipment Noise	847
<i>D. W. Herrin, Gong Cheng</i>	
Mitigation Assessment of Complex Noise Sources – An Acoustical Camera Approach.....	856
<i>Samuel Pendyala, Jacob Poling</i>	
Case Study: Power Facility Noise Measurement Surveys Before and After New Equipment Installation.....	862
<i>Mike Greene, Connor Burke</i>	
Sound Level Measurement Accessories	874
<i>Corey Fuzak</i>	
Determination and Utilization of Blocked Forces	882
<i>David Herrin, Keyu Chen</i>	
The Boom in Life Science Development and Its Impacts on Community Noise	890
<i>Marc Wallace, Matthew Riegert, Patricia Rosa</i>	

A Case Study in Building HVAC Systems Noise Control for the Air-Conditioning Retrofit of a Historic Theatre	900
<i>Nathan Sevenser</i>	
Coordination Issues for Concrete Floating Floors; San Francisco Conservatory of Music Bowes Center, Case Study	912
<i>Cristina Miyar, Anthony Shou</i>	
Compilation of Restaurant Acoustics Data Logged in Omaha, Nebraska	922
<i>Samuel Underwood, Lily Wang</i>	
Case Study- Modeling Restaurant Noise in a 4-story Atrium with Adjacent Offices	927
<i>Rachel Parlock</i>	
Rainfall Noise Simulation and Mitigation.....	935
<i>David Nelson</i>	
Progress on Developing a New SAE Damping Standard for the Ground Vehicle Industry	941
<i>Pranab Saha</i>	
Acoustic and Structural Damping Properties of Fibrogranular Composites Made of Jute and Crumb Rubber	950
<i>Amiya Mohanty, Raja Kumar</i>	
Additive Manufacturing of Ceramic Porous Structures for Acoustical Applications.....	961
<i>David Nevarez-Saenz, Ted Adler, Wei Wei, Bhisham Sharma</i>	
Modeling the Acoustic Behavior of Stepwise Gradient Porous Structures	968
<i>Amulya Lomte, Bhisham Sharma</i>	

Author Index