

Acoustics Laboratory (2012-2016)



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Research Interests:

- Inverse Technique in Vibro-acoustics
- Product Sound Quality,
- Design of Low Noise/Vibration Machines
- Localized Generation of Vibration Field for ICT Applications

Facts:

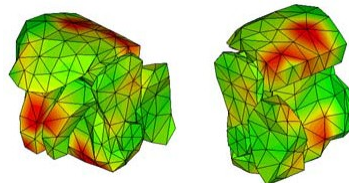
- No of Endowed MScs = 55
- No of Endowed PhDs = 30
- No of Total Publications = 523 (Journal papers, Conference papers)
- No of Books Written = 2 (John Wiley, Springer)
- No of Plenary Talks = 6
- No of Patents = 24
- No of Industrial Contract Projects (excl. small contracts) = 114
- No of Awards = 15

RECENT RESEARCH ACTIVITIES

Various key issues in sound and vibration areas are interested as research topics.

1) Inverse Technique for Identifying Vibro-acoustic Sources

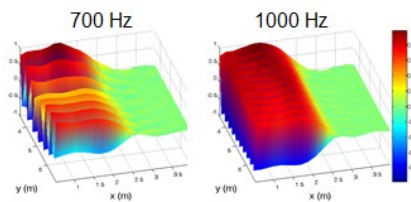
- Nearfield acoustical holography
- Vector analysis & synthesis
- In-duct source identification
- Acoustic pyrometry



[Inversely estimated vib velocity of an engine]

(2) Control of Sound Field by Array Actuators

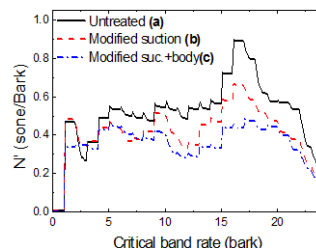
- Rendering of desired vibro-acoustic source & field
- Tailored control of reproduced sound field; focusing & steering



[Zonal control of sound field]

(3) Optimal Design of Product SQ by Psycho-acoustics

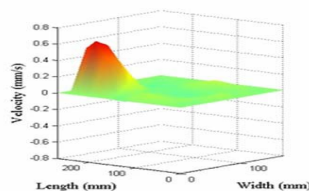
- Sound quality analysis & evaluation
- Design & synthesis for good SQ
- Development of SQ metric



[Effective SQ control of a vacuum cleaner]

(4) Generation of Localized Vibration

- Vibration generation on thin panel
- Haptic sensation, Auditory sensation



- [Generation of vib only at 1/9 of a plate]

RECENT PUBLICATIONS [2015-2016]

- [1] YH Heo, JG Ih, H Boden, " Acoustic Source Identification of an Axial Fan in a Duct Considering the Rotation Effect," JASA, vol.140, 145-156, July 2016
- [2] WH Cho, JG Ih, T Toi "Positioning Actuators in Efficient Locations for Rendering the Desired Sound Field Using Inverse Approach," J. of Sound Vib, Vol.358, 1-19, Dec 2015.
- [3] YH Heo, JG Ih, H Boden, "In-duct identification of a rotating sound source with high spatial resolution," J. of Sound Vib, vol.357, 51-73, Nov. 2015
- [4] JH Woo, JG Ih, "Vibration rendering on a thin plate with actuator array at the periphery," J. of Sound Vib, vol.349, 150-162, Aug. 2015
- [5] TK Kim, JG Ih, "Inverse Estimation of the Temperature Field Within a Gas-filled Duct Section by Use of Acoustic Data," Meas Science & Tech, vol.26, 6074-6089, May 2015

OTHER ACHIEVEMENTS [2012-2016]

- [1] Microphone Arrays for Source Identification and Sound Field Visualization, Book publication by Wiley, ISBN 978-0-470-82729-9
- [2] Plenary Talk, ISNVH7, 'Inverse techniques for the identification and control of vibro-acoustic source parameters of automotive systems' Graz, Austria, 2012
- [3] Acoustic inverse estimation: Imaging of sound source and indirect measurement of physical parameters, NRF Project, 2012-15
- [4] System for identifying the Sound Source Localization by Using Multiple 3D Intensity Probes, Korean Patent, 2015
- [5] Acoustic Warning Device for Electric-motor driven Vehicle and Warning Sound Generation Method Using the Same, Korean Patent, 2015
- [6] Vibration control at specified zone by double-layered actuator array, Korean Patent, 2016

JG Ih: Work Experience Related to the Automotive NVH



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VEHICLE NVH RELATED SPECIALTIES

- Identification of Noise/Vib. Sources
- Sound Quality: Design & Evaluation
- Optimal Allocation of Trim Material
- Intake/Exhaust Silencing System
- Source/Path Isolation
- Holistic Vehicle NVH Development

VEHICLE NVH RELATED CAREER

- Section Chief/Manager, NVH Group, Daewoo Motor Co; NVH developm't of passenger car fleets (Royal Salon, LeMans, Espero, etc.)
- Tech Consulting Board Member, Hyundai Motor Co; 2002-2005
- Tech Consulting Board Member, Kumho Tire Co; 1991-92, 1995-96
- Board Member of Scientific Committee, Int Styrian NVH Cong (ISVNH), Graz, Austria; 2013-

SOME RECENT ACTIVITIES

Note: The following list shows a few selected items on vehicle NVH only:

EX. of PAST CONTRACT PROJECTS

- [1] "Design of noise absorption/insulation and integrated thermal management system for electric vehicle" Ministry of Education, Science & Tech, 2011– 2016
- [2] "Systematic Analysis for Realizing the Target Sound Quality of Vehicle Interior Noise" Hyundai-Kia Motors Co, 2009–2010
- [3] "Analysis of a Marine Silencer for Reducing Low Frequency Noise" Samsung Heavy Ind. Co, 2009–2009
- [4] "Optimization of Exhaust Muffler Positions for the Minimization of Low Frequency Noise" Faurecia Exhaust Sys Korea, 2008
- [5] "Measurement of Source Parameters of Engine Exhaust Systems" Sejong Ind Co, 2007–2008
- [6] "Reduction of Diesel Engine Noise" Hyundai Heavy Ind Co, 2006–2008
- [7] "A Study on the Improvement of Tire Induced Road Noise" NGV Co. & Hyundai Motor Co, 2006–2007
- [8] "Evaluation of Engine Noise Change Due to the Variation of Engine Oil" SK Co, 2005
- [9] "Development of a Sound Quality Analysis System for Electrical Motors" Daewoo Precision Co, 2004–2005
- [10] "Measurement of Acoustic Source Parameters of Engine Intake/Exhaust Systems" Hyundai Motor Co, 2004–2005

EX. of PUBLICATIONS IN VEH NVH

- [1] "Optimal Design of the Exhaust System Layout for Suppressing the Low-freq ..." Int J of Auto Tech, vol.12, 617-630, Aug 2011
- [2] "Quality Evaluation of Car Window Motors Using the Sound Quality Metrics" Int J of Auto Tech,

vol.12, 443-450, June 2011

- [3] "Sound Quality Evaluation of the Booming Sensation for Passenger Cars" Applied Acoustics, vol. 70, 309-320, Feb 2009
- [4] "Prediction of Intake Noise of an Automotive Engine in Run-up Condition" Applied Acoustics, vol.70, 347-355, Feb 2009
- [5] "Effect of Non-uniform Perforation in the Long Concentric Resonator on Transmission ..." J of Sound Vib, vol.311, 280-296, Mar 2008

EX. of PATENTS ON VEH NVH

- [1] "Acoustic Warning Device for Electric-motor Driven Vehicle and Warning Sound Generation Method Using the Same" Korean Patent Pending, No 10-2014-0036420, March 2014
- [2] "Pneumatic Tire" Korean Patent, No 10-1184826, Sep 2012
- [3] "Active Sound Warning System for A Vehicle" Korean Patent, No 10-1159797, June 2012
- [4] "Idealized Sound Source System for the Virtual Acoustic Source" Korean Patent, No 10-1098563, Dec 2011

EX. of INVITED TALKS ON VEH NVH

- [1] "Refinement of Road-induced Noise" Hyundai-Kia Motors Tech Seminar, Suwon, Korea; Nov. 2013
- [2] "Inverse Identification of In-duct Source Parameters for the Quiet Design of Fluid Machinery" School of Mech Eng, Shanghai Jiatong Univ, Shanghai, China; Oct 2013
- [3] "Inverse Techniques for the Automotive Vibro-acoustic Systems" Dept of Automotive Eng, Tsinghua Univ, Beijing, China; June 2012
- [4] "Motor Vehicle NVH" Dept of ME, Canterbury Univ, Christchurch, New Zealand; Sep. 2006
- [5] "Prediction of Sound Transmission Loss of the Porous Woven Hose for Engine Intake Systems" N&V, Ride Comfort, Veh Eng Div, Comp & Sys Dev Center, Toyota Motor Co, Toyota, Japan; April 2001