

Institute of Acoustics

# 6th International Conference on Auditorium Acoustics 2006

May 5 – 7, 2006  
Copenhagen, Denmark

Volume 28 Part 2

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571  
[www.proceedings.com](http://www.proceedings.com)

ISBN: 978-1-60423-586-9

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

# Table of Contents

Friday 5 May 2006

- 1 [Stage acoustics in concert halls – early investigations](#)  
M Barron & J J Dammerud, University of Bath
- 13 [Optimising stage acoustics by the aid of electro acoustics](#)  
E Bogh Brixen, EEB-consult & C Wolter, The Royal Danish Theatre, Denmark
- 18 [Canopy arrays: density, size, shape and position](#)  
P D'Antonio, RPG Diffusor Systems, USA & T J Cox, University of Salford
- N/A Danish Radio Byen – a new cultural center in Copenhagen  
K Boye-Møller, TV Byen
- 24 [Acoustical design of the new Danish Radio Concert Hall](#)  
Y Toyota, M Komoda and A Hakoziaki, Nagata Acoustics Inc
- 28 [The drama of the silent movie: control of noise from stage machinery in the Operaen Copenhagen](#)  
R Harris, Arup Acoustics
- 36 [The acoustic design of the Donald Gordon Theatre, Cardiff and Operaen, Copenhagen](#)  
J P Newton, Arup Acoustics
- 44 [Real time walkthrough auralisation – the first year](#)  
B-I Dalenbäck, CATT & M Strömberg, Valeo Graphics, Sweden
- 50 [Spatial impression of music signals after convolution technique – for psycho-acoustical experiment using a stereo dipole](#)  
R Shimokura, L Tronchin, A Cocchi & V Tarabusi, Bologna University, Italy
- 58 [Effectiveness of 3D auralisation to evaluate room acoustic enhancement in theatre restoration](#)  
L Tronchin & R Shimokura, University of Bologna, Italy
- 66 [Is reverberation time adequate for testing the acoustical quality of unroofed auditoriums?](#)  
D Paini, Politecnico di Milano, Italy & A Ch Gade & J H Rindel, Technical University of Denmark
- 74 [Reverberation time and mean absorption in concert halls](#)  
J-D Polack, Universite Pierre et Marie Curie, CNRS, France

- 82 [Extracting room acoustic parameters from music](#)  
T Cox, P Kendrick, University of Salford, Y Zhangy, J Chambers, University of Cardiff, F Li, Manchester Metropolitan University

### Poster Session

- 89 [A study of coupled volumes in opera houses during restorations](#)  
N Prodi & R Pompoli, University of Ferrara, Italy
- 97 [Simulation of surface diffusion and diffraction in open-air theatres](#)  
K Chourmouziadou, & J Kang, University of Sheffield
- 109 [Recent investigations about some objective acoustical parameters](#)  
R Shimokura, M C Cesare & A Cocchi, University of Bologna, Italy
- 117 [Château de Versailles opera house: a wooden construction with resonating cavity](#)  
D E Commins, Commins Acoustic Workshop & F Didier, Château de Versailles, France
- 125 [Comparison between indoor sound pressure level forecasting models](#)  
G A Degan, D Lippiello, M Pinzari, Università degli Studi Roma Tre
- 131 [Comparison of acoustical characterisation of the stage and the rehearsal room of the Niccolò Paganini Theatre](#)  
A Astolfi, M Giovannini & L Dellatorre, Politecnico di Torino, Italy & S Geroso, Istituto Nazionale di Ricerca Metrologica, Italy
- 139 [The acoustics of the renovated auditorium of the production centre of the Italian Radio and Television \(RAI\) in Naples, Italy](#)  
R Dragonetti, C Ianniello and R Romano, University of Naples, Italy
- 147 [The acoustics of orchestra rehearsal rooms: a case history in the Teatro Lirico in Cagliari](#)  
A R Farnetani, N Prodi & R Pompoli, University of Ferrara, Italy
- 155 [From “knocking ghost” to excellent acoustics – the new Tonhalle Dusseldorf: innovative design of a concert hall refurbishment](#)  
K Lorenz, Peutz Consult GmbH, Germany & M Vercammen, Peutz bv, The Netherlands
- 163 [Västerås Concert Hall – a hall with diffusion chambers](#)  
J-I Gustafsson, Jan-Inge, Akustikon

- 165** [Determination of absorption coefficients for use in room acoustic computer models](#)  
T E Gulsrud, Kirkegaard Associates, USA
- 170** [An omni-directional sound source for impulse response measurements and auralisation](#)  
P Kogan & N Prodi, University of Ferrara, Italy
- 178** [Acoustic test with 1:10 scale model for the new Danish Radio Concert Hall](#)  
M Komoda, A Hakozaiki & Y Toyota, Nagata Acoustics Inc
- 186** [The new theatre in Zwollw \(NL\): acoustical design & Scale model study](#)  
M P M Luykx & R A Metkemeijer, Peutz Consultants, Netherlands
- 193** [An approach to electroacoustics in the review of the acoustical parameters in concert halls](#)  
R D Ottobre & M R López, Madrid Polytechnic University
- 195** [Performance and rehearsal hall for children: collaboration between architecture and acoustic students](#)  
K Şaher, Delft University of Technology, The Netherlands, K Angelakis, J Alvarez, Technical University of Denmark
- 203** [Sound field reconstruction and evaluation of the west hall auditorium at the Institute of Technology Bandung – Indonesia](#)  
J Sarwono, D Kurniadi & R Saputro, Institute of Technology Bandung, Indonesia
- 210** [Evaluation of the scattered sound field by using the autocorrelation function of impulse responses](#)  
S T Sato & J Y Jeon, Hanyang University, Korea
- 218** [Saint James Church acoustic study for the installation of a pipe organ](#)  
J Segura , J Navasquillo, E Navarro, Universitat de València, J Romero, A Gimenez, S Cerda, Universitat Politècnica de València, Spain
- 223** [Low frequency limits of reflector arrays](#)  
M Skålevik, Brekke & Strand akustikk, Norway
- 239** [The design of acoustical enhancements and diffusion in the Opera House of Treviso, Italy](#)  
L Tronchin, University of Bologna, Italy

- 247 [Effects of changing the amount of absorption in a computer model of Queen's Hall, Copenhagen, Denmark](#)  
M C Vigeant, L M Wang, University of Nebraska, USA & J H Rindel,  
Technical University of Denmark Denmark
- 255 [Acoustic analysis of Wigmore Hall, London, in the context of the 2004 refurbishment](#)  
T Wulfrank & R J Orłowski, Arup Acoustics
- 268 [Learning from the past](#)  
O Y Karaman, Dokuz Eylul University, Turkey
- 276 [Pitch coherence as a measure of apparent distance and sound quality in performance spaces](#)  
D Griesinger, Harman Speciality Group, USA
- 286 [Scattering from a Hemisphere on a Plane –a Validation of the Boss Model for Applications in Room Acoustics](#)  
Georgios Natsiopoulos and Mendel Kleiner  
Chalmers University of Technology, Sweden
- 293 [Auralisation of orchestras in concert halls using numerous uncorrelated sources](#)  
I B Witew, J Paprotny & G K Behler, RWTH Aachen University, Germany

**Saturday 6 May 2006**

- 297 [The Alberta Jubilee Halls reborn with up-to-date acoustics](#)  
N Jordan & J H Rindel, Technical University of Denmark
- 305 [Acoustics and sound design of the reconstructed Frauenkirche in Dresden](#)  
W Ahnert, ADA Acoustic Design, Germany
- 316 [The virtual reconstruction of the ancient Roman concert hall in Aphrodisias, Turkey](#)  
J H Rindel, Technical University of Denmark
- 324 [The acoustic design of the Syddansk Universitet Koncertsal](#)  
R J Orłowski, Arup Acoustics
- 330 [Research into sound levels on concert hall platforms and the effect of an absorbent acoustic screen for orchestra players](#)  
A James, Adrian James Acoustics

- 338 [Assessment of the acoustic perception of musicians](#)  
A Astolfi, L Dellatorre, M Giovannini, M Filippi, Politecnico di Torino, Italy & S Geroso, Istituto Nazionale di Ricerca Metrologica, Italy
- 346 [Scattering from a hemisphere on a plane - – a validation of the boss model for applications in room acoustics](#)  
G Natsiopoulous & M Kleiner, Chalmers University of Technology, Sweden
- 353 [Experimental study on musician's evaluation of stage acoustics using a 3-D sound field simulation](#)  
K Ueno, University of Tokyo & H Tachibana, Chiba Institute of Technology, Japan
- 361 [Rooms for chamber music](#)  
J Meyer, Music Academy Detmold, Germany
- 369 [The design of variable acoustics at the new concert hall of the "Muziekgebouw Aan 't IJ" in Amsterdam, Netherlands](#)  
M P M Luykx & R A Metkemeijer, Peutz Consultants, Netherlands
- 383 [Perth Concert Hall](#)  
D W Templeton, BDP Acoustics

**Sunday 7 May 2006**

- 391 [Sound strength in small halls](#)  
J R Hyde, Consultant, USA & H Moller, Akukon Oy Consulting Engineers, Finland
- 401 [The esplanade in medicine hat, Canada: from plenum to flytower](#)  
J O'Keefe, Aercoustics Engineering Ltd, Canada
- 409 [Geometry reduction in room acoustics modelling](#)  
S Siltanen, T Lokki & L Savioja, Helsinki University of Technology, Finland
- 417 [Recent experiences in using room acoustic scale models](#)  
A C Gade, Technical University of Denmark
- 425 [Optimising balcony overhangs](#)  
S Chiles, Marshall Day Acoustics, NZ & M Barron, University of Bath
- 435 [Sounds architectural: architectural impact of sound enhancement systems](#)  
S Bridges, Renton Howard Wood Levin & R Cowell, Arup Acoustics
- 442 [The acoustic design of the Sutluce Congress Centre and Concert Hall](#)  
A Munro & C Walls, Munro Acoustics

**457** [Improvement of acoustic conditions of Parken, The Danish National Football Stadium in Copenhagen – in concert set-up](#)  
C M Petersen & S Ballisager, Carl Bro a/s, Denmark

**464** Abstracts