# Table of Contents

**Friday 5 May 2006**

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

82 Extracting room acoustic parameters from music
T Cox, P Kendrick, University of Salford, Y Zhang, J Chambers, University of Cardiff, F Li, Manchester Metropolitan University

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, Universita degli Stdi 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 Hakozaki & 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
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

Acoustic analysis of Wigmore Hall, London, in the context of the 2004 refurbishment
T Wulfrank & R J Orlowski, Arup Acoustics

Learning from the past
O Y Karaman, Dokuz Eylul University, Turkey

Pitch coherence as a measure of apparent distance and sound quality in performance spaces
D Griesinger, Harman Speciality Group, USA

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

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

The Alberta Jubilee Halls reborn with up-to-date acoustics
N Jordan & J H Rindel, Technical University of Denmark

Acoustics and sound design of the reconstructed Frauenkirche in Dresden
W Ahnert, ADA Acoustic Design, Germany

The virtual reconstruction of the ancient Roman concert hall in Aphrodisias, Turkey
J H Rindel, Technical University of Denmark

The acoustic design of the Syddansk Universitet Koncertsal
R J Orlowski, Arup Acoustics

Research into sound levels on concert hall platforms and the effect of an absorbent acoustic screen for orchestra players
A James, Adrian James Acoustics
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

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

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

Rooms for chamber music
J Meyer, Music Academy Detmold, Germany

The design of variable acoustics at the new concert hall of the “Muziekgebouw Aan ‘tIJ” in Amsterdam, Netherlands
M P M Luykx & R A Metkemeijer, Peutz Consultants, Netherlands

Perth Concert Hall
D W Templeton, BDP Acoustics

Sunday 7 May 2006

Sound strength in small halls
J R Hyde, Consultant, USA & H Moller, Akukon Oy Consulting Engineers, Finland

The esplanade in medicine hat, Canada: from plenum to flytower
J O’Keefe, Aeroustics Engineering Ltd, Canada

Geometry reduction in room acoustics modelling
S Siltanen, T Lokki & L Savioja, Helsinki University of Technology, Finland

Recent experiences in using room acoustic scale models
A C Gade, Technical University of Denmark

Optimising balcony overhangs
S Chiles, Marshall Day Acoustics, NZ & M Barron, University of Bath

Sounds architectural: architectural impact of sound enhancement systems
S Bridges, Renton Howard Wood Levin & R Cowell, Arup Acoustics

The acoustic design of the Sutluce Congress Centre and Concert Hall
A Munro & C Walls, Munro Acoustics
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

Abstracts