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RECENT ADVANCES in ACOUSTICS & MUSIC : THEORY & APPLICATIONS

Proceedings of the 10th WSEAS Int. Conf. on
ACOUSTICS & MUSIC: THEORY & APPLICATIONS (AMTA '09)

Prague, Czech Republic, March 23-25, 2009

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Preface

This year the 10th WSEAS International Conference on ACOUSTICS & MUSIC: THEORY & APPLICATIONS (AMTA '09) was held in Prague, Czech Republic. The Conference remains faithful to its original idea of providing a platform to discuss theoretical and applicative aspects of computational acoustics, environmental acoustics, sound insulation, noise control engineering, mathematical models in music, computers in music composition, pattern recognition in music etc. with participants from all over the world, both from academia and from industry.

Its success is reflected in the papers received, with participants coming from several countries, allowing a real multinational multicultural exchange of experiences and ideas.

The accepted papers of this conference are published in this Book that will be indexed by ISI. Please, check it: www.worldses.org/indexes as well as in the CD-ROM Proceedings. They will be also available in the E-Library of the WSEAS. The best papers will be also promoted in many Journals for further evaluation.

A Conference such as this can only succeed as a team effort, so the Editors want to thank the International Scientific Committee and the Reviewers for their excellent work in reviewing the papers as well as their invaluable input and advice.

The Editors

Table of Contents

Plenary Lecture 1: Analogies in Melodies of Early Christian Liturgical Chant Originating From Different Cultural Domains 9
Eugene Kindler

Plenary Lecture 2: Real and Virtual Sound Quality in Room and Musical Acoustics 10
Lamberto Tronchin

Plenary Lecture 3: Macrosonics: Sound as a Source of Energy 11
Juan A. Gallego-Juarez

The Subjective Evaluation in the Auralisation Technique 13
Lamberto Tronchin, Kristian Fabbri, Valerio Tarabusi

Is Noise Sensitivity Influenced by Musical Factors? 19
Marek Franek

Modality in the Hymns of the Armenian Church 23
Haig Utidjian

Modal Analysis of Different Types of Classical Guitar Bodies 30
Ioan Curtu, Mariana D. Stanciu, Nicolae C. Cretu, Calin I. Rosca

Automated Visual Surveillance in Computer Vision 36
B. Anandampilai, K. Krishnamoorthy

Analogies in Melodies of Early Christian Liturgical Chant Originating from Different Cultural Domains 45
Eugene Kindler

Experimental Research Regarding the Dynamic Behaviour of the Classical Guitar 53
Ioan Curtu, Mariana D. Stanciu, Raimond Grimberg, Adriana Savin

Introducing Musical Language Learning in Pre-School Education (3 to 5 Years Old) 59
Ma Del Rosario Castanon, Carlos Vivaracho-Pascual

Timbre Music and the Birth of New Cult-Sound 65
Juraj Ruttkay

The Challenge of Making a Recording for the Contemporary Violin Playing: Robert Davidson's *Message Ground: Violin Duo or Solo Violin with Digital Delay or CD* 68
Ang-Cheng Kris Ho, Yu-Chang Hu

Post-Communial Sticheron in the Byzantine-Slavic Liturgical Formularies: Musical and Liturgical Aspects 74
Simon Marincak

Influence of the Heat Treatment and the Ultrasonic Waves Attenuation at the 34MoCrNi14 Steel 79
Mihai Demian, Gabriela Demian, Luminita Grecu, Valentin Grecu

Romanian Contributions to the Applications of Mathematics in Music 83
Gheorghe Dutica, Razvan Raducanu

Studies about Noise Pollution in Urban Areas 87
Gabriela Demian, Mihai Demian, Luminita Grecu, Valentin Grecu

An Italian High Speed Train Noise Analysis in an Open Country Environment 92
J. Quartieri, A. Troisi, C. Guarnaccia, T. Lenza, P. D'Agostino, S. D'Ambrosio, G. Iannone

Analysis of Noise Emissions by Trains in Proximity of a Railway Station 100
J. Quartieri, A. Troisi, C. Guarnaccia, T. Lenza, P. D'Agostino, S. D'Ambrosio, G. Iannone

Room Acoustics Experimental Study: Characterization of the Sound Quality in a New Built Church 108
J. Quartieri, S. D'Ambrosio, C. Guarnaccia, G. Iannone

Stratification in Musical Texts Based on Rank-Frequency Distribution of Tone Pitches 116
Ioan-Iovitz Popescu, Zuzana Martinakova-Rendekova, Gabriel Altmann

Authors Index 120

Plenary Lecture 1

Analogies in Melodies of Early Christian Liturgical Chant Originating from Different Cultural Domains

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Abstract: The Christian liturgical chant of the first millennium was forgotten many centuries ago and (more or less) deciphered in relatively recent epoch – e.g. Latin chant in the second half of the XIX century, Byzantine chant after the First World War, Russian kondakarian chant and Armenian medieval chant after the Second World War. The difficulties came from Different modes of graphical recording of that music and – for the modern feeling – different relations between spoken speech and sung texts caused extreme difficulties in the modern studies. The consequence is that some relations between the geographic and/or linguistic types of that chant are studied only from the literary and liturgical point of view (i.e. the melodic aspects are completely neglected), while from the musical point of view the particular types of that chant were often understood as separate subjects of culture. Since 1962, the author has studied various types of the mentioned music by means of formal grammars and since 1980 has been director of a small singing group Musica Poetica that presented those chants at concerts; surprising analogies among melodies of chants arisen in different linguistic and liturgical domains appeared, testifying on common roots of those musical types (Christian religion and classical Greek-Roman musical culture). The analogies will be presented in the lecture both in graphical way (in transcription in modern notation) and in acoustical way as well, with context to the general properties of the relating musical types (Latin, Greek-Byzantine, Syro-Byzantine, Armenian and Palaeoslavic).

Brief Biography of the Speaker: Eugene Kindler was born in 1935, studied mathematics at Charles University in Prague, (Czechoslovakia) and then computer science at the Research Institute of Mathematical Machines in Prague. He is the author of the first Czechoslovak ALGOL 60 compiler and the first Czechoslovak simulation language and compiler (COSMO, Compartmental System Modeling). Charles University granted him PhDr in logic and RNDr (Rerum Naturalium Doctor) in the theory of programming, Czechoslovak Academy of Science granted him CSc (Candidate of Sciences) in mathematics and physics. During 1958-1966 he worked with the Research Institute of Mathematical Machines, then with the Institute of Biophysics of the Faculty of General Medicine of Charles University (until 1973) and then with the Faculty of Mathematics and Physics of the same University (until 2006). In parallel, he worked with a new University of Ostrava. Since 2006 he has been pensioned, collaborating with the same Ostrava University as external specialist in various research projects and in doctoral studies.
During 1967-1973 he was responsible for special projects on information processing in radiation security and during 1973-1989 he was head of teams oriented to the fundamental research of modeling techniques. During 1995-2000 he represented Czech Republic activities at two COPERNICUS projects sponsored by the European Commission and oriented to sea harbor modernizing with use of modern information technology. Beside many shorter professional stays at foreign institutions, he worked as visiting professor with the University of Pisa (Italy, one year around 1969) and with West Virginia University (Morgantown, USA, one year around 1993), as invited professor and then as holder of French government professor scholarship with Blaise Pascal University (Clermont-Ferrand, 9 moths, around 1995 and 1998) and with the University of South Brittany (Lorient, France, 3 times one months in 2002-2004), and as a hosting lecturer with Humboldt University (Berlin, 3 months in 1983). His main professional interest is object-oriented simulation of discrete event systems, namely of those using their own private models for anticipating their future states. His private hobby is the chant originated during the first millennium A.D. in Europe and certain Near East Asian countries.

Plenary Lecture 2

Real and Virtual Sound Quality in Room and Musical Acoustics

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Abstract: The not-linear and multi-channel convolution algorithms for musical and room acoustics auralisation is actually considered the most suitable technique for correctly reproducing the sound characteristics of a musical instrument or a room. The initial simple convolution from a dry signal with a mono impulse response moved to a multi-channel convolution and therefore to a more complex system. On the other hand, the new technology has allowed the definition of a new set of physical parameters that could be able to correctly describe the sound characteristics of the system. During this lecture, the results of a world-wide campaign of acoustic measurement of impulse responses in ancient Italian musical instruments and different special theatres and auditoria are presented. The application of a new technique in virtual 3D sound reconstruction is presented. Furthermore, the methodology is compared with other techniques of 3D sound reproduction. The possibility to enhance the spatial reproduction of sound quality in musical instruments and real spaces and the comprehensibility of spatial parameters is finally considered and presented in different cases.

Brief Biography of the Speaker: Dr Lamberto Tronchin is Assistant Professor in Environmental Physics from the University of Bologna and is recognised internationally as a leading authority on the subject of sound and acoustics.
A pianist himself, with a diploma in piano from the Conservatory of Reggio Emilia, Dr Tronchin's principal area of research has been musical acoustics and room acoustics. He is the author of more than 140 papers and is Chair of the Musical Acoustics group of the Italian Association of Acoustics.
Dr Tronchin is a member of the Scientific Committee of the CIARM, the Inter- University Centre of Acoustics and Musical research, has chaired sessions of architectural and musical acoustics during several international symposiums, been a referee for a number of International journals and is Chair of Organising and Scientific Committees of IACMA (International Advanced Course on Musical Acoustics).
He was a visiting researcher at the University of Kobe in Japan, a visiting professor at the University of Graz in Austria and Special honoured International Guest at the International Workshop, 'Analysis, Synthesis and Perception of Music Signals', at Jadavpur University of Kolkata, India in 2005.
Dr Tronchin holds a Masters Degree in Building Engineering and a PhD in Applied Physics (Architectural Acoustics) from the University of Bologna. He has completed advanced courses on the Mechanics of Musical Instruments at CISM, Udine, Italy and on Noise and Vibration at the University of Southampton in the UK where he has also worked as a visiting researcher. He has held a post Doctoral Scholarship in Room Acoustics.

Plenary Lecture 3

Macrosonics: Sound as a Source of Energy

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Abstract: The field of high-amplitude acoustic waves, regardless of frequency, is known as Macrosonics. As well known, Acoustics may be divided into three main branches according to the frequency spectrum and the hearing characteristics imposed by the frequency. These are: Infrasonics (0-20 Hz), Sonics (20Hz-20kHz) and Ultrasonics (higher than 20 kHz).
Besides frequency other wave parameters, as intensity, may influence broadly the generation, propagation and application of acoustic waves. Therefore another division of the acoustic field could be into two branches such as low and high-amplitude acoustics. Low-amplitude waves are those wherein the primary objective is transmitting information through or about the medium, without modifying it. On the contrary, high-amplitude waves are those which may produce permanent changes in the propagation medium and that, generally, are used to this purpose.
Macrosonics is then the part of Acoustics devoted to high-amplitude waves and their applications. As high-amplitude waves are finite amplitude waves, their behaviour must be described by the equations of the nonlinear acoustics. The applications of macrosonic waves are generally based on the adequate exploitation of the nonlinear phenomena associated to the high amplitudes, such as wave distortion, acoustic saturation, radiation pressure, streaming, cavitation in liquids and the formation and motion of dislocations in solids.
This lecture will review the later advances in the generation and application of macrosounds as well as the basic phenomena there involved.

Brief Biography of the Speaker: Juan A. Gallego-Juarez, is a Research Professor at the Spanish Council for Scientific Research (CSIC) where he is Former Director of the Institute of Acoustics and of the Center for Physics Technologies and founder of the group of Ultrasonics. His research work has always been related to ultrasonics, particularly high-power ultrasonics, transducers and applications.
He is the author of over 200 publications and 40 patents and holds an honorary doctorate from the University of Santiago de Chile. He was a member of the Board of the International Commission on Acoustics since 1999 until 2007, Chairman of the 19th International Congress on Acoustics 2007 and Organizer of the Ultrasonics International 89. He is a member of the Steering Committee of the International Congress on Ultrasonics and of the Board of the Spanish Acoustical Society. He is a Fellow of the Acoustical Society of America and of the British Institute of Acoustics. He is Associate Editor for Ultrasonics of the European Journal Acta Acustica/Acustica.

Authors Index

Altmann, G. 116
Anandampilai, B. 36
Castanon, M. D. 59
Cretu, N. C. 30
Curtu, I. 30, 53
D'Agostino, P. 92, 100
D'Ambrosio, S. 92, 100, 108
Demian, G. 79, 87
Demian, M. 79, 87
Dutica, G. 83
Fabbri, K. 13
Franek, M. 19
Grecu, L. 79, 87
Grecu, V. 79, 87
Grimberg, R. 53
Guarnaccia, C. 92, 100, 108
Hu, Y. C. 68
Iannone, G. 92, 100, 108
Kindler, E. 45
Kris Ho, A. C. 68
Krishnamoorthy, K. 36
Lenza, T. 92, 100
Marincak, S. 74
Pascual, C. V. 59
Popescu, I. 116
Quartieri, J. 92, 100, 108
Raducanu, R. 83
Rendekova, Z. M. 116
Rosca, C. I. 30
Ruttkay, J. 65
Savin, A. 53
Stanciu, M. D. 30, 53
Tarabusi, V. 13
Troisi, A. 92, 100
Tronchin, L. 13
Utidjian, H. 23