



*6th European Symposium on
Ultrasonic Characterization of
Bone, ESUCB 2015*

10-12 June, Corfu, Greece

Technical program



WEDNESDAY, 10 JUNE 2015

18:00-18:45 Registration

18:45 Conference opening

Welcome by Prof. Dimitrios I. Fotiadis and Prof. Vassilis Chrysikopoulos

19:00-19:45 Invited lecture

Prof. Keith Wear: Signal Processing Methods for Through-Transmission Measurements of Cancellous Bone

Center for Devices and Radiological Health, U.S. Food and Drug Administration, Silver Spring, MD, USA

Chair: Dimitrios I. Fotiadis



19:45-22:00 Welcome Cocktail (Conference Lobby)

THURSDAY, 11 JUNE 2015

08:00-10:00, Session Th.1

Numerical simulations I

Chairs: Pascal Laugier and Kay Raum

Th 1.1 08:00-08:20: Ultrasonic propagation of reflected waves in cancellous bone: Application of Biot theory.

M. Sadouki, M. Fellah, Z.E.A. Fellah E.Ogam, C. Depollier

Th 1.2 08:20-08:40: Information theory framework to reconstruct Biot constants of trabecular bone from ultrasound.

Guillermo Rus, Michal Pakula, Quentin Grimal, Pascal Laugier

Th 1.3 08:40-09:00: The Effect of Viscoelastic Absorption on the Fast and Slow Wave Modes in Cancellous Bone.

Yoshiki NAGATANI, Vu-Hieu NGUYEN, Salah NAILI, Guillaume HAÏAT

Th 1.4 09:00-09:20: Numerical Simulations of Electric Fields in Bone Induced by an Ultrasound Wave Using a Piezoelectric Finite-Difference Time-Domain Method.

Atsushi Hosokawa

Th 1.5 09:20-09:40: The effect of cortical bone porosity on ultrasonic backscattering parameters.

Theodoros Gortsas, Konstantinos Grivas, Demosthenes, Polyzos, Vassiliki Potsika, Vasilios Protopappas, Dimitrios Fotiadis, Kay Raum

Th 1.6 09:40-10:00: In-silico evaluation of cortical porosity by tangential axial transmission.

Vassiliki Potsika, Vasilios Protopappas, Dimitrios Fotiadis, Theodoros Gortsas, Konstantinos Grivas, Demosthenes Polyzos, Kay Raum



10:00-10:30 Coffee Break (Conference Lobby)

10:30-12:30, Session Th.2

Propagation models

Chairs: Michal Pakula and Mami Matsukawa

Th 2.1 10:30-10:50: On the modeling of wave propagation in cancellous bone.

Michal Pakula

Th 2.2 10:50-11:10: Effect of circumferential wave on two wave phenomenon in human distal radius model.

Takuma Hachiken, Isao Mano, Yuka Matsuura, Yusuke Okamura, Mami Matsukawa

Th 2.3 11:10-11:30: To what extent randomly layered material can be used for modelling ultrasonic wave propagation in cancellous bone.

Michal Pakula, Mieczyslaw Cieszko

Th 2.4 11:30-11:50: An analytical study on guided wave propagation in bone-mimicking plates using Mindlin's Form II gradient elasticity.

Maria G. Vavva, Demoshenes Polyzos, Leonidas N. Gergidis, Dimitrios I.Fotiadis, Antonios Charalambopoulos

Th 2.5 11:50-12:10: The fundamentals of low-frequency ultrasound for diagnosis of bone tissue.

Mieczyslaw Cieszko, Michal Pakula

Th 2.6 12:10-12:30: Ultrasonic wave properties of human bone marrow in elderly people.

Ryohei Ueda, Satoshi Kawasaki, Akihiko Hasegawa, Akifumi Fujita, Teruhisa Mihata, Masashi Neo, Mami Matsukawa

12:30-13:30, Session Th.3**Backscattering**

Chairs: Dimitrios Fotiadis and Kay Raum

Th 3.1 12:30-12:50: Influence of signal selection on ultrasonic backscatter and in cancellous bone assessment.

Chengcheng Liu, Tao Tang, Dean Ta, Weiqi Wang, Bo Hu

Th 3.2 12:50-13:10: Numerical Simulation of high-frequency Ultrasound Scattering on Articular Cartilage Cellular Structure.

Jana Hradilova, Martin Schöne, Kay Raum, Vassiliki T. Potsika, Dimitrios I. Fotiadis, Demosthenes Polyzos

Th 3.3 13:10-13:30: Bone Phantoms for the observation of the fast and slow waves.

Fabien Mézière, Emmanuel Bossy, Arnaud Derode, Petra Juskova Jason, Woittequand Laurent Malaquin, Marie Muller



13:30-14:30 Buffet Lunch (Conference Lobby)

14:30-16:30, Session Th.4**Guided waves I**

Chairs: Claus-C. Glüer and Reinhard Barkmann

Th 4.1 14:30-14:50: Physical Models of Cortical Bone Conditions, Fabricated by a 3D Printer to Test for Sensitivity of Axial Transmission Technique.

Alexey Tatarinov, Vladimir Panov

Th 4.2 14:50-15:10: Discrimination of fractured from non-fractured post-menopausal women using guided wave-based ultrasound: A pilot clinical study.

Jean-Gabriel Minonzio, Quentin Vallet, Nicolas Bochud, Adrien Etcheto, Karine Briot, Sami Kolta, Christian Roux, Pascal Laugier

Th 4.3 15:10-15:30: Model to estimate the sound velocity in a circular wave guide in a through transmission measurement setup from multiple receivers.

Kerstin Rohde, Reinhard Barkmann, Melanie Dauschies, Claus-C. Glüer, Georg Schmitz

Th 4.4 15:30-15:50: Dispersion Extraction of Ultrasonic Guided Waves in Cortical Bone: A Comparison between the SVD-based Method and Linear Radon Transform.

Kailiang Xu, Jean-Gabriel Minonzio, Dean Ta, Didier Cassereau, Bo Hu, Weiqi Wang, Pascal Laugier

Th 4.5 15:50-16:10: Sparse Inversion SVD Method for Dispersion Extraction of Ultrasonic Guided Waves in Cortical Bone.

Kailiang Xu, Jean-Gabriel Minonzio, Dean Ta, Bo Hu, Weiqi Wang, Pascal Laugier

Th 4.6 16:10-16:30: Ultrasound Biomarkers of Cortical Bone to Assess the Strength of Human Bones: An ex-vivo Study.

Quentin Vallet, Jean-Gabriel Minonzio, Nicolas Bochud, Yohann Bala, Francois Duboeuf, Rémy Gauthier, Edison Zapata, Hélène Follet, David Mitton, Pascal Laugier



16:30-17:00 Coffee Break (Conference Lobby)

17:00-17:40, Session Th.5

Nonlinear acoustics

Chairs: Guillermo Rus and Dean Ta

Th 5.1 17:00-17:20: Single-transmitter setup on nonlinear mixing to measure acoustic nonlinearity of first order.

J. Melchor, L. Peralta, G. Rus, N. Saffari, J. Soto

Th 5.2 17:20-17:40: Effect of elastic modulus on the nonlinear ultrasonic Lamb waves in cortical bone: A numerical study.

Zhenggang Zhang, Feng Xu, Dean Ta



20:00-22:00 Dinner (Corfu Sailing Club)



We meet at the entrance of the Conference Hall (walking distance approximately 750 meters, 9 minutes)

FRIDAY, 12 JUNE 2015

08:00-08:45 Invited lecture

Dr. Bradley Treeby: Ultrasound simulations with k-Wave

Biomedical Ultrasound Group Department of Medical Physics and Biomedical Engineering University College London

Chair: Demosthenes Polyzos

08:45-09:45, Session F.6

Guided waves II

Chairs: Demosthenes Polyzos and Pascal Laugier

F 6.1 08:45-09:05: A genetic algorithms-based optimization method for estimating thickness and porosity of cortical bone from guided wave measurements.

Nicolas Bochud, Jean-Gabriel Minonzio, Quentin Vallet and Pascal Laugier

F 6.2 09:05-09:25: An anisotropic bilayer model to gain insight into in-vivo guided wave measurements.

Nicolas Bochud, Jean-Gabriel Minonzio, Quentin Vallet and Pascal Laugier

F 6.3 09:25-09:45: Excitability of Ultrasonic Lamb Waves in a Cortical Bone Plate: a Simulation Study.

Tho N.H.T. Tran, Lawrence H. Le, Vu-Hieu Nguyen and Mauricio D. Sacchi

09:45-10:45, Session F.7

Numerical Simulations II

Chairs: Mami Matsukawa and Reinhard Barkmann

F 7.1 09:45-10:05: Numerical Estimation of Femoral Neck Cortical Bone Thickness based on Time Domain Topological Energy and Sparse Signal Approximation.

Chao Han, Didier Cassereau, Jean-Gabriel Minonzio, Pascal Laugier and Quentin Grimal

F 7.2 10:05-10:25: A Mathematical model for bone healing predictions under the ultrasound effect.

Maria G. Vavva, Konstantinos Grivas, Demosthenes Polyzos, Dimitrios. I. Fotiadis, Aurélie Carlier, Liesbet Geris, Hans Van Oosterwyck

F 7.3 10:25-10:45: High-frequency cortical backscatter reveals cortical microstructure – a simulation study.

Gianluca Iori, Kay Raum, Vassiliki T. Potsika, Theodoros Gortsas, Dimitrios I. Fotiadis,



10:45-11:15 Coffee Break (Conference Lobby)

11:15-13:15, Session F.8**Clinical applications and novel instrumentation I***Chairs: J. Kaufman and Reinhard Barkmann*

F 8.1 11:15-11:35: Ex-vivo Measurements of Quantitative Ultrasound and Micro-CT Parameters on Intact Human Femoral Heads.

Marco Peccarisi, Tommaso De Marco, Antonio Greco, Francesco Conversano, Sergio Casciaro

F 8.2 11:35-11:55: Ultrasound Osteoporosis Score: A Novel Parameter for the Estimation of Spine Mineral Density.

Sergio Casciaro, Francesco Conversano, Paola Pisani, Ernesto Casciaro, Maurizio Muratore

F 8.3 11:55-12:15: A new QUS sensor measuring guided waves SOS and anisotropy using bidirectional transmission.

Melanie Dauschies, Kerstin Rohde, Claus-Christian Glüer, Reinhard Barkmann

F 8.4 12:15-12:35: Ultrasonic Bone Assessment in *Tursiops truncatus*: A proposed means for monitoring marine ecosystem health.

James Powell, Gangming Luo & Jonathan J. Kaufman

F 8.5 12:35-12:55: Multisite ultrasound axial transmission study in postmenopausal women using optimized first arriving signal velocity measurements.

J. Schneider, P. Varga, K. Raum, T. Zippelius, E. Hoff, P. Strube, J.G. Minonzio, P. Laugier

F 8.6 12:55-13:15: An Introduction to Measurements of Human Cortical Bone Elasticity using Resonant Ultrasound Spectroscopy.

Xiran Cai, Simon Bernard, Johannes Schneider, Peter Varga, Kay Raum, Pascal Laugier, and Quentin Grimal

13:15-14:00 Invited lecture & IEEE EMBS Award

Prof. Konstantinos Malizos: *Fracture healing monitoring*

Department of Medicine, School of Health Sciences, University of Thessalia, Larissa, Greece.

Chair: *Dimitrios I. Fotiadis*

14:00-15:00, Session F.9**Clinical applications and novel instrumentation II**

Chairs: *Pascal Laugier and Kay Raum*

[F 9.1](#) 14:00-14:20: Three-dimensional investigation of the relationship between orientation and microelastic properties of mineralized collagen fibrils in human osteonal bone.

Susanne Schrof, Peter Varga, Bernhard Hesse, Admir Masic, Kay Raum

[F 9.2](#) 14:20-14:40: Impact of Chemical Composition on Microscale Elastic Properties of Cortical Bone – A Site-Matched FTIR-SAM Study.

Anja Müller, Bernhard Hesse, Hiram Castillo-Michel, Marine Cotte, Kay Raum

[F 9.3](#) 14:40-15:00: Mechanosensitive Response of Murine C2C12 Myoblasts to a Novel Focused Low-Intensity Pulsed Ultrasound (FLIPUS).

Regina Puts, Karen Ruschke, Anke Kadow-Romacker, Soyoung Hwang, Klaus-Vitold Jenderka, Petra Knaus and Kay Raum



15:00-15:30 Light Lunch (Conference Lobby)



16:00-19:30 Visit to Achilleion Museum



Transfer with buses from the entrance of the Conference Hall

20:00-22:30 Dinner (“TRIPA” Traditional Tavern)



Return by buses at the entrance of the Conference Hall

SATURDAY, 13 June 2015

09:00-14:00, Workshop-Part A

Numerical Modeling of Ultrasound Wave Propagation in Bones

ISoBEM 09:00-10:30

Prof. Demosthenes Polyzos

Department of Mechanical Engineering & Aeronautics, Division of Applied Mechanics and Biomechanics, University of Patras, Greece

k-Wave 10:30-12:00

Dr. Bradley Treeby

Biomedical Ultrasound Group Department of Medical Physics and Biomedical Engineering University College London, United Kingdom



12:00-12:30 Coffee Break (Conference Lobby)

Simsonic 12:30-14:00

Florian Lyonnet

Sorbonne Universités, CNRS, INSERM, Laboratoire d'Imagerie Biomédicale, Paris, France

14:00-15:00, Workshop-Part B

Modeling in micro-surgery

Lecture on modeling of micro-surgery within the Interreg Project “Micro”.

Ansys 14:00-15:00

Georgia Karanasiou

Institute of Molecular Biology and Biotechnology, Foundation for Research and Technology-Hellas, Greece