



*46th Annual International Symposium on*

# ULTRASONIC IMAGING AND TISSUE CHARACTERIZATION

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VIRTUAL MEETING  
JUNE 8 - JUNE 10, 2022

EVENT PROGRAM

# ABOUT UITC

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The annual International Symposium on Ultrasonic Imaging and Tissue Characterization has long been recognized as one of the world's leading forums concerned with ultrasonic technology for medical applications. Fifty-eight technical contributions will be presented this year. Many of the presentations will deal with clinical evaluation of novel methodologies and instrumentation for tissue characterization.

The program includes technical sessions on tissue parameters, tissue elasticity, ARFI, photoacoustics, imaging and imaging/robotics.

The Symposium provides a forum for discussion of new directions in state-of-the-art technology and research opportunities in ultrasonic and photoacoustic imaging and characterization of tissues. The meeting affords physicians, engineers and physical scientists a unique venue for sharing their contributions to this important area of technology development related to disease detection, diagnosis, staging, treatment planning and treatment monitoring.

## CONFERENCE CHAIRMAN

Timothy Hall  
University of Wisconsin-Madison

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Ivan Rosado-Mendez  
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VISUAL SONICS





# EVENT FLOW

Presentations have been organized into sessions with alike topics. Following all presentations in each session, the speakers will be invited to answer questions on their specific presentation.

For Full Abstract of Presentations, find attached to program.

## WEDNESDAY, JUNE 8, 2022

9:00 – 11:00

### SPECIAL SESSION ON SIMULATION SOFTWARE

9:00 – Field II Simulation for Fast, Flexible Insight into Ultrasound Design

*Nick Bottenus*

9:20 – Simulating Diagnostic and Therapeutic Ultrasound with FOCUS, the ‘Fast Object-Oriented C++ Ultrasound Simulator’

*Robert J. McGough, Jacob S. Honer*

9:40 – Fullwave Acoustical Simulations: Applications to Transcranial, Super-Resolution, and Lung Imaging

*Rebecca Jones, Thomas Kierski, Oleksii Ostras, Danai Soulioti, Gianmarco Pinton*

10:00 – Using SimSonic as a Tool for Simulating Ultrasound Propagation

*Brett Austin McCandless, Marie Muller*

10:20 – Simulating an Ultrasound Experiment with the Verasonics Vantage Software

*Peter Kaczkowski, Daniel Rohrbach, Miguel Bernal, Ron Daigle*

10:40 – Digital Prototyping Using Cloud Simulation, Design and Metrology – OnScale

*Tapiwa Mutasa, Andrew Tweedie, Kevin Chan, Ian Campbell, Chloe Allison*

11:00 – 11:15

### BREAK

11:15 – 12:15

### SOUND SPEED AND ATTENUATION

11:15 – One-Size Fits-All Reconstruction of Speed-of-Sound from Full-Synthetic Aperture Data

*Sergio Sanabria, Thurston Brevett, Arsenii Telichko, Rehman Ali, Jeremy Dahl*

11:30 – Global Average Speed of Sound Estimation from Common Midpoint Gathers of Non-Beamformed, Full-Synthetic Aperture Data

*Thurston Brevett, Sergio Sanabria, Arsenii Telichko, Rehman Ali, Jeremy Dahl*

11:45 – Regularized Linear Least-Squares Approach for Spatially Varying Attenuation Coefficient Estimation

*Jasleen Birdi, Jan D’hooge, Alexander Bertrand*

12:00 – Comparison of Conventional and Regularized Attenuation Estimation in the Presence of Aberration-Induced Clutter

*Hayley Whitson, Noushin Jafarpisheh, Ivan Rosado-Mendez, Hassan Rivaz, Timothy J. Hall*

12:15 – 1:15

### LUNCH BREAK

1:15 – 2:45

## ACOUSTIC BEAMFORMING

1:15 – Demystifying Real-Time Software Beamforming with GPUs: Code Updates and Demonstration

*Dongwoon Hyun, Jeremy Dahl*

1:30 – Rapid Frequency-Domain Beamforming Using the Chirp Scaling Algorithm

*Louise Zhuang, Jeremy Dahl, Howard Zebker, Marko Jakovljevic*

1:45 – Plane-Wave-Based RF Transverse Localization Algorithm Using Multiple Receive Apodizations

*Omar Yunis, Carl Herickhoff*

2:00 – Clinical Utility of Adaptive Frequency Selection for Optimizing Target Detectability

*James Long, Gregg Trahey*

2:15 – Numerical Spatial Impulse Response Calculations for Lossy Media

*Drew A. Murray, Robert J. McGough*

2:30 – Backscatter Covariance Decomposition Using Least Squares Estimators

*Rifat Ahmed, Peter Hoff, Andrew McCormack, Jordan Bryan, William Walker, Gregg Trahey*

2:45 – 3:00

## BREAK

3:00 – 4:15

## PHOTOACOUSTICS

3:00 – Quantitative Photoacoustic Imaging with PAttrace to Assess Treatment Response in a Preclinical Model of Breast Cancer

*Cayla Wood, Sangheon Han, Dmitry Nevozhay, Jennifer Meyer, Gaiane Rauch, Jason Cook, Konstantin Sokolov, Richard Bouchard*

3:15 – Clinically-Translatable High-Fidelity Photoacoustic Tomography Enhanced by Virtual Point Sources

*Yuqi Tang, Shanshan Tang, Chengwu Huang, Shigao Chen, Junjie Yao*

3:30 – Photoacoustic Imaging of Targeted Prostate Cancer: Contrast Agents and System-Level Optimization

*Yixuan Wu, Jeeun Kang, Kojciech G. Lesniak, Martin G. Pomper, Emad M. Boctor*

3:45 – Spectral System Denoising for In Vivo Spectroscopic Photoacoustic Neuroimaging

*Jeeun Kang, Yixuan Wu, Ernest M. Graham, Raymond C. Koehler, Emad M. Boctor*

4:00 – Deciphering the Effects of Placental Calcification, Vasculature, and Oxygenation on Fetal Growth with Multi-Parametric Ultrasound and Photoacoustic Imaging

*Skye A. Edwards, Ana Branco, Mary C. Wallingford, Srivalleesha Mallidi*

8:30 – 10:15

## BACKSCATTER

- 8:30 – Time Slope of Apparent Backscatter (TSAB) Measured In Vivo at the Femoral Neck  
*Brent K. Hoffmeister, Grant R. Jenson, Kiera L. Downey, Sarah Delahunt, Ann M. Viano*
- 8:45 – Effects of Scatterer Size Distribution and Densely Packed Cellular Structures on Quantitative Ultrasound Estimates  
*Olivier Lombard, Mylena Audenay, Emilie Franceschini*
- 9:00 – Collagen Structure Dominates Anisotropy of Ultrasonic Backscatter in the Myocardium  
*Lindsay Pittman, Arjun Chadha, Michelle Milne, Charles Chung*
- 9:15 – Regularized Constrained Optimization of Scatterer Size Distribution Estimation in Quantitative Ultrasound  
*Noushin Jafarpisheh, Ivan Rosado-Mendez, Hassan Rivaz*
- 9:30 – From Macro to Micro: Describing the Cervical Extracellular Matrix Through Ultrasound Speckle  
*Alexandra Christensen, Lindsey Carlson, Helen Feltovich, Ivan Rosado-Mendez, Timothy Hall*
- 9:45 – Two-Dimensional Mapping of the Reflection Coefficient and Acoustic Impedance of Brain  
*Cecille Labuda, Will Newman, Kiera Downey, Shona Harbert, Brent K. Hoffmeister*
- 10:00 – Detecting Differences in Collagen Microstructure Between Healthy and Diabetic Murine Tendon Using High-Frequency Quantitative Metrics Derived from the Angular Dependence of the Integrated Backscatter Coefficient  
*Sarah Wayson, Maria Helguera, Todd Jackson, Jim Chwalek, Denise Hocking, Diane Dalecki*

10:15 – 10:30

## BREAK

10:30 – 12:00

## VISCOELASTICITY 1

- 10:30 – Acoustic Radiation Forces across All Ultrasound Applications  
*Thomas Szabo*
- 10:45 – Characterization of Shear Wave Speeds Estimated with Time-of-Flight Calculations in Viscoelastic Media  
*Luke Wiseman, Matthew Urban, Robert McGough*
- 11:00 – Nonlinear Least-Squares Estimation of Shear Wave Speeds in Viscoelastic Media  
*Nicholas Bannon, Matthew Urban, Robert McGough*
- 11:15 – Transient Elastography at Very High Ultrasound Frequencies  
*Steve Beuve, Lenin Chinchilla, Anthony Novell, Jean-Luc Gennisson*
- 11:30 – Viscoelastic Imaging of Tumors through Ultrasound: Full-Waveform Approach  
*Abdelrahman Elmeliegy, Murthy Guddati*
- 11:45 – Appropriate Rheological Models for Elastography in Soft Tissues: Comprehensive Experimental Investigations  
*Sedigheh Poul, Juvenal Ormachea, Gary Ge, Kevin Parker*

12:00 – 1:15

## IMAGING

- 12:00 – Intraoperative Planning of tFUS-Based Neuromodulation in Humans  
*Richard Bouchard, Xuefeng Zhang, Junqian Xu, Joo-won Kim, Michelle Avendano Ortega, Sameer Sheth, Wayne Goodman*
- 12:15 – Functional Ultrasound Imaging of the Primary Visual Cortex of Ferrets  
*Wentao Hu, Silei Zhu, Farran Briggs, Marvin M. Doyley*

12:30 – Calibrating Acquisition-Related Data Mismatches by Using Transfer Functions

*Ufuk Soylu, Michael L. Oelze*

12:45 – Multi-Stage Investigation of Deep Neural Networks for COVID-19 B-Line Feature Detection in Simulated and In Vivo Ultrasound Images

*Lingyi Zhao, Benjamin Frey, Tiffany Clair Fong, Muyinatu A. Lediju Bell*

1:00 – Predicting Long-Term Toxicity in Breast Radiotherapy Using Ultrasound Radiomics

*Jing Wang, Boran Zhou, Xiaofeng Yang, Jolinta Lin, Karen Godette, Shannon Kahn, Mylin A. Torres, Tian Liu*

1:15 – 2:15

## LUNCH BREAK

2:15 – 4:00

## VISCOELASTICITY 2

2:15 – Reverberant Shear Wave Approach for Liver Elastography: Viscoelastic Phantoms and Finite Element Models

*Sedigheh Poul, Juvenal Ormachea, Kevin Parkerc*

2:30 – Monitoring Information Density is Key to Guiding Fine-Scale Learning in Data-Driven Elasticity Imaging Methods

*Will Newman, Cameron Hoerig, Yiliang Wang, Jamshid Ghaboussi, Michael Insana*

2:45 – 3D Acoustic Radiation Force Impulse (ARFI) Screening and Image-Guided Targeted Biopsy of the Prostate: Technical Successes and Limitations to Date in an Ongoing Clinical Trial

*Derek Chan, Spencer Moavenzadeh, Thomas Polascik, Mark Palmeri, Kathryn Nightingale*

3:00 – Shear Wave Speed and Attenuation Can Monitor Response to Radiotherapy in Mice with Colorectal Tumors

*Reem Mislati, Taylor Uccello, Scott Gerber, Marvin Doyley*

3:15 – Comparison Between the Plane Wave and Widely Focused Imaging Beam Sequences for Harmonic Motion Imaging (HMI) in Experimental Phantoms

*Yangpei Liu, Niloufar Saharkhiz, Elisa Konofagou*

3:30 – Ultrasound Method for Estimation of Inflation Pressure Sustained by the Urinary Bladder

*David Rosen, Azra Alizad, Mostafa Fatemi*

3:45 – Estimating Uncertainty in Elastic Modulus Reconstructions in Compression Elastography

*Daniel Gendin, Yuqi Wang, Rohit Nayak, Assad Oberai, Timothy Hall, Azra Alizad, Mostafa Fatemi, Paul Barbone*

4:00 – 4:15

## BREAK

4:15 – 5:15

## VISCOELASTICITY 3

4:15 – Cardiovascular Health Classification Using Arterial Dispersion Ultrasound Vibrometry

*Hadiya Harrigan, Tuhin Roy, Murthy Guddati, Matthew Urban, James Greenleaf, Wilkins Aquino*

4:30 – Viscoelasticity Estimation of Arterial Walls Using Shear Wave Elastography

*Tuhin Roy, Murthy Guddati*

4:45 – Characterization of Arterial Wall Inhomogeneities Using Spectral Analysis of Axial Wall Velocity: A Feasibility Study in PVA Phantoms

*Parth Gami, Cosima Liang, Nima Mobadersany, Elisa Konofagou*

5:00 – A Theoretical Framework for Pulse Wave Imaging

*Cosima Liang, Nima Mobadersany, Elisa Konofagou*

**9:00 – 10:30**

**IMAGING 2**

**9:00 – Human Observer Sensitivity to Temporal Noise in Ultrasound Imaging**

*Matthew Huber, Katelyn Flint, Gregg Trahey*

**9:15 – Prostate Biopsy Needle Deflection Variance and Prediction**

*Spencer Moavenzadeh, Derek Chan, Thomas Polascik, Mark Palmeri, Kathryn Nightingale*

**9:30 – Evaluation of the Effectiveness of TGC Compensation by Using the Equalization Approach in Ultrafast Ultrasound Doppler Images Obtained at High Frequencies Ultrasound**

*Lenin Chinchilla, Steve Beuve, Anthony Novell, Jean-Luc Gennisson*

**9:45 – A Neural Network Based Approach for Ultrasound Localization Microscopy**

*Xilun Liu, Mohamed Almekkawy*

**10:00 – Analysis on the Radial Synthetic Aperture Focusing for Low-Cost 3D Transrectal Ultrasound Imaging to Regulate Scanning Angle Disorientation**

*Hyunwoo Song, Jeeun Kang, Emad Boctor*

**10:15 – Wearable Ultrasound for Rehabilitation Applications**

*Ahmed Bashatah, Afsana Hossain Rima, Erica King, Antarijot Jaur, Samuel Acuna, Parag Chitnis, Siddhartha Sikdar*

**10:30 – 10:45**

**BREAK**

**10:45 – 12:00**

**ARPA-H & NIH FUNDING (Presentations, Q&A)**

**ARPA-H**

*Renee Cruea, MPA*

*Executive Director, Academy for Radiology & Biomedical Imaging Research*

*Coalition for Imaging & Bioengineering Research*

**Presentations and Q&A with NIH Representatives**

*Solita Chiayeng, PhD*

*Chief of the Molecular Imaging Branch, NCI Cancer Imaging Program*

*Ileana Hancu, PhD*

*Program Director, Image Guided Intervention Branch, NCI Cancer Imaging Program*

*Alvin Yeh, PhD*

*Program Director, Division of Biophysics, Biotechnology and Computational Biosciences*

*National Institute of General Medical Sciences*