

*Medical Imaging 2023*

---

# ***Ultrasonic Imaging and Tomography***

**Christian Boehm**

**Nick Bottenus**

*Editors*

**22–23 February 2023**

**San Diego, California, United States**

*Sponsored by*

SPIE

*Cooperating Organizations*

American Association of Physicists in Medicine (United States)

Radiological Society of North America

World Molecular Imaging Society

Society for Imaging Informatics in Medicine (United States)

International Foundation for Computer Assisted Radiology and Surgery

Medical Image Perception Society (United States)

*Published by*

SPIE

**Volume 12470**

Proceedings of SPIE, 1605-7422, V. 12470

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.

The papers in this volume were part of the technical conference cited on the cover and title page. Papers were selected and subject to review by the editors and conference program committee. Some conference presentations may not be available for publication. Additional papers and presentation recordings may be available online in the SPIE Digital Library at [SPIDigitalLibrary.org](http://SPIDigitalLibrary.org).

The papers reflect the work and thoughts of the authors and are published herein as submitted. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon.

Please use the following format to cite material from these proceedings:

Author(s), "Title of Paper," in *Medical Imaging 2023: Ultrasonic Imaging and Tomography*, edited by Christian Boehm, Nick Bottenus, Proc. of SPIE 12470, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 1605-7422

ISSN: 2410-9045 (electronic)

ISBN: 9781510660458

ISBN: 9781510660465 (electronic)

Published by

**SPIE**

P.O. Box 10, Bellingham, Washington 98227-0010 USA

Telephone +1 360 676 3290 (Pacific Time)

[SPIE.org](http://SPIE.org)

Copyright © 2023 Society of Photo-Optical Instrumentation Engineers (SPIE).

Copying of material in this book for internal or personal use, or for the internal or personal use of specific clients, beyond the fair use provisions granted by the U.S. Copyright Law is authorized by SPIE subject to payment of fees. To obtain permission to use and share articles in this volume, visit Copyright Clearance Center at [copyright.com](http://copyright.com). Other copying for republication, resale, advertising or promotion, or any form of systematic or multiple reproduction of any material in this book is prohibited except with permission in writing from the publisher.

Printed in the United States of America by Curran Associates, Inc., under license from SPIE.

Publication of record for individual papers is online in the SPIE Digital Library.

**SPIE. DIGITAL  
LIBRARY**

[SPIDigitalLibrary.org](http://SPIDigitalLibrary.org)

---

**Paper Numbering:** A unique citation identifier (CID) number is assigned to each article in the Proceedings of SPIE at the time of publication. Utilization of CIDs allows articles to be fully citable as soon as they are published online, and connects the same identifier to all online and print versions of the publication. SPIE uses a seven-digit CID article numbering system structured as follows:

- The first five digits correspond to the SPIE volume number.
- The last two digits indicate publication order within the volume using a Base 36 numbering system employing both numerals and letters. These two-number sets start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B ... 0Z, followed by 10-1Z, 20-2Z, etc. The CID Number appears on each page of the manuscript.

# Contents

vii *Conference Committee*

---

## ULTRASOUND RECONSTRUCTION

---

- 12470 03 **First imaging results with the new generation of the KIT 3D ultrasound tomography device**  
[12470-1]
- 12470 05 **Improving three-dimensional automated breast ultrasound resolution with orthogonal images**  
[12470-3]
- 12470 06 **Ultrasound time reversal imaging of extended targets using a broadband white noise constraint processor** [12470-4]

---

## ULTRASOUND BEAMFORMING AND SIGNAL PROCESSING

---

- 12470 09 **Distributed aberration correction in handheld ultrasound based on tomographic estimates of the speed of sound** [12470-7]
- 12470 0A **Real-time element position tracking of flexible array transducer for ultrasound beamforming**  
[12470-8]
- 12470 0B **Real-time 3D ultrafast shear wave absolute vibro-elastography** [12470-9]

---

## ULTRASOUND + IMAGE-GUIDED PROCEDURES: JOINT SESSION WITH CONFERENCES 12466 AND 12470

---

- 12470 0C **3D ultrasound to investigate synovial blood flow in 1<sup>st</sup> carpometacarpal osteoarthritis**  
[12470-11]

---

## ULTRASOUND IMAGE QUANTIFICATION AND CLASSIFICATION

---

- 12470 0E **Quantitative imaging with a single probe in abdominal ultrasound** [12470-13]
- 12470 0F **Quantitative methods for molecular ultrasound imaging** [12470-14]
- 12470 0G **Hemoglobin microbubbles and the prediction of different oxygen levels using RF data and deep learning** [12470-15]

---

## ULTRASOUND WAVEFORM TOMOGRAPHY

---

- 12470 OI **Shape optimization for transcranial ultrasound computed tomography** [12470-18]
- 12470 OJ **Impact of starting model on waveform inversion in ultrasound tomography** [12470-19]
- 12470 OK **3D full-waveform inversion in ultrasound computed tomography employing a ring-array** [12470-20]

---

## APPLICATIONS OF MACHINE LEARNING IN ULTRASOUND

---

- 12470 OM **A deep-learning-based image reconstruction method for USCT that employs multimodality inputs** [12470-22]
- 12470 ON **Feature-aggregated spatiotemporal spine surface estimation for wearable patch ultrasound volumetric imaging** [12470-23]
- 12470 OO **Augmenting endometriosis analysis from ultrasound data using deep learning** [12470-25]
- 12470 OP **A deep learning framework to estimate elastic modulus from ultrasound measured displacement fields** [12470-26]

---

## POSTER SESSION

---

- 12470 OQ **Deep ultrasound denoising without clean data** [12470-28]
- 12470 OR **Optimal view detection for ultrasound-guided supraclavicular block using convolutional neural networks** [12470-29]
- 12470 OS **A freehand 3D ultrasound carotid scanning system for point-of-care ultrasonography** [12470-30]
- 12470 OT **Ultrasound-based dominant intraprostatic lesion classification with swin transformer** [12470-31]
- 12470 OU **Adoption and evaluation of a multistatic Fourier-based synthetic aperture radar method for ultrasound imaging** [12470-32]
- 12470 OV **Radiomic feature robustness evaluations in ultrasound imaging** [12470-33]
- 12470 OW **Ultrasound breast tumor detection based on vision graph neural network** [12470-34]
- 12470 OX **Evaluating imaging reproducibility of portable ultrasound devices with histogram analysis: a phantom study** [12470-35]
- 12470 OY **Improved right ventricular strain estimation in rats using anisotropic diffusion filtering** [12470-36]

- 12470 0Z **Deep-learning-based skull-induced artifact reduction for transcranial ultrasound imaging: simulation study (Cum Laude Poster Award)** [12470-37]
- 12470 10 **A deep learning approach for patchless estimation of ultrasound quantitative parametric image with uncertainty measurement** [12470-24]

---

**DIGITAL POSTER SESSION**

- 12470 11 **Lamina landmark detection in ultrasound images: a preliminary study** [12470-10]
- 12470 12 **Comparing flow in helical and straight stents using 2D ultrasound particle image velocimetry** [12470-16]
- 12470 13 **ADC-Net: Adaptive Detail Compensation Network for prostate segmentation in 3D transrectal ultrasound images** [12470-27]