PROCEEDINGS OF SPIE

International Conference on Optical and Photonic Engineering (icOPEN 2022)

Chao Zuo
Shijie Feng
Haixia Wang
Qian Kemao
Editors

24–27 November 2022
ONLINE, China

Organized by
Optics and Photonics Society of Singapore (Singapore)
Nanjing University of Science & Technology (China)

Co-organized by
Zhejiang University of Technology (China)

Published by
SPIE

Volume 12550

Proceedings of SPIE 0277-786X, V. 12550

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

International Conference on Optical and Photonic Engineering (icOPEN 2022), edited by Chao Zuo, Shijie Feng, Haixia Wang, Qian Kemao, Proc. of SPIE Vol. 12550, 1255001
© 2022 SPIE · 0277-786X · doi: 10.1117/12.2669925

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 SPIEDigitalLibrary.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 *International Conference on Optical and Photonic Engineering (icOPEN 2022)*, edited by Chao Zuo, Shijie Feng, Haixia Wang, Qian Kemao, Proc. of SPIE 12550, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X
ISSN: 1996-756X (electronic)

ISBN: 9781510661905
ISBN: 9781510661912 (electronic)

Published by
SPIE
P.O. Box 10, Bellingham, Washington 98227-0010 USA
Telephone +1 360 676 3290 (Pacific Time)
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. 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
SPIEDigitalLibrary.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

xi *Conference Committee*

3D COMPUTER VISION

12550 02 **Robot grasping detection technology based on 3D structured light** [12550-21]

12550 03 **A novel multi-frequency phase fusion strategy for phase unwrapping algorithm with improved noise immunity** [12550-85]

12550 04 **A non-target calibration method of structured light system parameters against temperature variation** [12550-91]

12550 05 **Measurement point cloud registration method for complex mechanical parts based on improved ICP** [12550-93]

12550 06 **Depth constraints in two-step calibration method based on line features** [12550-119]

3D IMAGE ACQUISITION AND DISPLAY

12550 07 **Comparison between optical markers and physical markers-assisted panoramic 3D measurement** [12550-48]

12550 08 **Dynamic 3D face acquisition based on feature points matching and active binocular vision** [12550-79]

12550 09 **An automated 3D shape measurement method for turbine blade using a 6-axis robot** [12550-86]

12550 0A **Deep learning-based single-shot absolute phase retrieval using a triangular-wave embedded fringe coding strategy** [12550-108]

ADVANCED LASER PROCESSING AND MANUFACTURING

12550 0B **Ultrafast laser ablation of aramid fiber-reinforced polymers and its application in satellite antenna** [12550-14]

ADVANCED OPTICAL MEASUREMENT METHODS AND TECHINQUES

12550 0C **End-to-end optimization of a diffractive spectral imaging system with coded aperture** [12550-3]

12550 0D **Three-channel micro-polarization array simultaneous phase-shifted interferometry method** [12550-9]

12550 0E **Optical transmission through thick biological tissue using optical modulation** [12550-10]

12550 0F **Laser speckle interferometry and its application in acoustic-to-seismic coupling** [12550-12]

12550 0G **Bright-field and dark-field image fusion for shape-from-focus in microscopy** [12550-18]

12550 0H **Thermography of surface temperature of explosion fireball by visible and infrared band** [12550-41]

12550 0I **Simulation and experimental verification of infrared-based heat flux sensor** [12550-42]

12550 0J **From fringe phases or from pixel shifts: a comparative study of depth-measuring modes in fringe projection profilometry** [12550-44]

12550 0K **PCA-based bend feature selection applied in defect detection of ice cream stick** [12550-45]

12550 0L **Measurement viewpoint planning method for sheet metal parts with strong reflection** [12550-53]

12550 0M **Fringe projection based 3D contour measurement method for holes on sheet metal parts** [12550-59]

12550 0N **Parameter identification of 6-DOF manipulator** [12550-64]

12550 0O **Validity analysis of four-surface measurement algorithm based on wavelength-shifting interferometry** [12550-73]

12550 0P **View planning for inspection of sheet metal parts based on Markov decision process** [12550-80]

12550 0Q **Application of the phase-stitching technique in an external-modulated FMCW laser ranging system** [12550-95]

12550 0R **Research on the optical video extensometer with large field of view and high accuracy** [12550-107]

12550 0S **Camera vibration correction of stereo-DIC systems for field measurements** [12550-113]

BIOMEDICAL OPTICS AND IMAGING

12550 0T **Application of EMCCD in the small-optical fiber endoscope imaging detection system** [12550-39]

12550 0U **Illumination parameter estimation of structured illumination microscopy based on principal component analysis** [12550-122]

DIFFRACTIVE AND FREEFORM OPTICS

12550 0V **Near-field focusing properties of microcylinders decorated with engineered metallic surface patches** [12550-8]

DIGITAL HOLOGRAPHY AND QUANTITATIVE PHASE IMAGING

12550 0W **Closed-loop feedback control for droplet-based microfluidics: a characteristic investigation on passive and on-demand droplet generation** [12550-31]

12550 0X **Adaptive optical quantitative phase imaging for robust long-term live-cell observation** [12550-66]

12550 0Y **Remote acquisition of sound wave in transparent sound insulation screen by common-path digital holography** [12550-77]

12550 0Z **3D Measurement of rough objects based on dual wavelength digital holography** [12550-83]

12550 10 **Extended focusing in dual-wavelength digital holography** [12550-84]

12550 11 **Cell segmentation and dry mass characterization based on slightly off-axis holographic imaging** [12550-120]

FIBER OPTICS AND SENSING TECHNOLOGY

12550 12 **Depolarization analysis and compensation in spun birefringent optical fibers with fiber half-wave plate** [12550-11]

IMAGE CORRELATION BASED DEFORMATION MEASUREMENT AND NEW DEVELOPMENT AND APPLICATIONS OF DIGITAL IMAGE/VOLUME CORRELATION

12550 13 **A torsional axis measurement method based on the adaptive window shape DIC** [12550-22]

12550 14 **Multi-point measurement using DIC based on UAV platform** [12550-49]

12550 15 **Research on synchronous measurement technique of temperature and deformation fields based on fluorescent speckles** [12550-50]

12550 16 **A ticket-voting-based strain calculation method for digital volume correlation** [12550-54]

12550 17 **Modal shapes measurements of a rotating disc using stroboscopic 3D digital image correlation and down-sampling strategy** [12550-78]

12550 18 **Measurement of transparent profile using multispectral 3D digital image correlation** [12550-90]

IMAGE PROCESSING AND DEEP LEARING

12550 19 **Super-cavitation contour extraction method based on multi-scale space** [12550-1]

12550 1A **Image registration method for full-Stokes-vector division-of-aperture polarimetric camera** [12550-2]

12550 1B **An image stitching algorithm with improved Sigmoid function weights** [12550-23]

12550 1C **Fusion-based restoration method for uneven illumination images in deep sea** [12550-28]

12550 1D **Research on transparent object measurement based on multi-wavelength ray tracing technology** [12550-34]

12550 1E **An energy-efficient quantized inference framework for electro-photonic computing system** [12550-62]

12550 1F **A metal surface defect detection method based on attention mechanism and softpool** [12550-82]

12550 1G **Noise reduction of fingertip OCT image based on generated unpaired high-quality datasets** [12550-97]

12550 1H **Phase demodulation of single frame projection fringe pattern based on deep learning** [12550-98]

12550 1I **A ROI based self-supervised strategy for retinal image analysis** [12550-104]

12550 1J **Combined method of face super-resolution and rotation** [12550-110]

12550 1K **Surface defect detection of metal castings based on Centernet** [12550-111]

12550 1L **Ps-4net: a deep learning solution for in-line holography** [12550-121]

LENSLESS IMAGING

12550 1M **Lensless coaxial digital holographic imaging based on open-source hardware and deep learning** [12550-4]

12550 1N **Dual-wavelength phase imaging for lensless digital holographic microscopy with a filter** [12550-7]

12550 1O **Lensless light field imaging with angular resolution improvement** [12550-56]

12550 1P **Light field camera decoding based on two-plane ray model** [12550-76]

12550 1Q **Fourier ptychographic microscopy reconstruction with an untrained deep neural network** [12550-103]

NONDESTRUCTIVE EVALUATION WITH INFRARED THERMOGRAPHY

12550 1R **Non-destructive testing of debonding defects in thermal barrier coating system using laser infrared thermography** [12550-43]

NON-DESTRUCTIVE TESTING AND INSPECTION

12550 1S **Dual-surface li-ion battery deformation measurement by temporal electronic speckle pattern interferometry** [12550-94]

12550 1T **Studies on the infrared thermography technique for quantitative nondestructive evaluation of surface crack and delamination of multilayer structures** [12550-114]

OPTICAL FUNCTIONAL MATERIALS AND DEVICES, OPTICAL COMPONENT AND SYSTEM SIMULATION

12550 1U **Study on removal characteristics of double-sided rapid polishing machine** [12550-27]

12550 1V **Simulation study on residual stress and fatigue life of piston motor's blind hole rolling strengthening** [12550-33]

12550 1W **Study on process optimization of precision boring plunger hole** [12550-51]

12550 1X **Simulation and design of cascade modulator based on lithium niobate thin film** [12550-57]

12550 1Y **Influence of ion beam incidence angle on thermal effect** [12550-100]

OPTICAL METROLOGY

12550 1Z **Accuracy analysis of fringe projection profilometry using raytracing algorithm and BP neural network** [12550-38]

12550 20 **An error compensation method for 3D measurement of step edge in fringe projection profilometry** [12550-55]

12550 21 **Real-time 3D face reconstruction based on geometry** [12550-58]

12550 22 **Influence of projector pixel arrangement on 3D measurement error under different defocusing degree** [12550-60]

12550 23 **Combined line laser 3D measurement method based on binocular vision** [12550-65]

12550 24 **Transparent anisotropic films measurement with a polarized angle-resolved spectroscopy** [12550-71]

12550 25 **Full-field film thickness measurement method based on reflection spectrum using AOTF** [12550-88]

12550 26 **Cylindrical CGH wavefront calibration method based on transmission holography** [12550-117]

PHOTOMECHANICS

12550 27 **3D shape, deformation and strain measurement on complex structure using DIC-assisted fringe projection profilometry** [12550-70]

12550 28 **Deflection analysis of IPMC actuators under AC voltages using DIC method** [12550-105]

QUANTITATIVE PHASE IMAGING

12550 29 **Decoupling of complex refractive index in transport of intensity diffraction tomography microscopy** [12550-81]

SINGLE-PIXEL IMAGING AND SENSING

12550 2A **Robustness analysis of parallel single-pixel imaging** [12550-96]

TERAHERTZ SCIENCE AND TECHNOLOGY AND ULTRAFAST LASERS AND APPLICATIONS

12550 2B **Ultrafast laser processing of fiber-reinforced polymers used in spacecrafts: recent advances in application** [12550-15]

12550 2C **Wavelength tunable self-mode-locking optically pumped semiconductor disk laser** [12550-32]

12550 2D **Wavelength tunable self-mode locking semiconductor disk laser** [12550-46]

12550 2E **Terahertz spatial filter based on enhanced optical transmission in the subwavelength aperture** [12550-63]

12550 2F **Design and fabrication of terahertz Dammann grating** [12550-72]

12550 2G **An intensity-density associative clustering method for big millimeter-wave image data** [12550-99]

Conference Committee

Conference General Chairs

Anand Asundi, d'Optron Pte Ltd. (Singapore)
Qian Chen, Nanjing University of Science and Technology (China)

Conference Chairs

Chao Zuo, Nanjing University of Science and Technology (China)
Shijie Feng, Nanjing University of Science and Technology (China)
Haixia Wang, Zhejiang University of Technology (China)
Kemao Qian, Nanyang Technological University (Singapore)

Technical Committee

Aydogan Ozcan, University of California (United States)
Baoli Yao, Xi'an Institute of Optics and Precision Mechanics of the Chinese Academy of Sciences (China)
Bing Pan, Beihang University (China)
Canlin Zhou, Shandong University (China)
Caojin Yuan, Nanjing Normal University (China)
Chengliang Zhao, Soochow University (China)
Chenxing Wang, Southeast University (China)
Dawei Zhang, University of Shanghai for Science and Technology (China)
Dayong Wang, Beijing University of Technology (China)
Dongliang Zheng, Nanjing University of Science and Technology (China)
Fucai Zhang, Southern University of Science and Technology (China)
Gunther Notni, Fraunhofer IOF (Germany)
Guoan Zheng, University of Connecticut (United States)
Guohai Situ, Shanghai Institute of Optics and Fine Mechanics (China)
Guoqiang Li, Zhejiang Lab (China)
Hao Yan, Shanghai Jiao Tong University (China)
Haofeng Hu, Tianjin University (China)
Huijie Zhao, Beihang University (China)
Huimin Xie, Tsinghua University (China)
Jianglei Di, Guangdong University of Technology (China)
Jiangtao Xi, University of Wollongong (Australia)
Jiasong Sun, Nanjing University of Science and Technology (China)
Jinyang Liang, Institut national de la recherche scientifique (Canada)
Lei Chen, Nanjing University of Science and Technology (China)

Lei Lv, Henan University of Technology (China)
Liangcai Cao, Tsinghua University (China)
Lihong Ma, Zhejiang Normal University (China)
Limei Song, Tiangong University (China)
Lu Rong, Beijing University of Technology (China)
Maciek Trusiak, Warsaw University of Technology (Poland)
Mingjie Sun, Beihang University (China)
Peng Gao, Xidian University (China)
Ping Zhou, Southeast University (China)
Qican Zhang, Sichuan University (China)
Qingyang Wu, Shenzhen Technology University (China)
Qionghua Wang, Beihang University (China)
Ran Ye, Nanjing Normal University (China)
Sen Han, University of Shanghai for Science and Technology (China)
Shaohui Zhang, Beijing Institute of Technology (China)
Suodong Ma, Soochow University (China)
Ting-Chung Poon, Virginia Tech (United States)
Wang Guohui, Xi'an Technological University (China)
Wen Chen, Hong Kong Polytechnic University (China)
Wen Qiao, Soochow University (China)
Xiangchao Zhang, Fudan University (China)
Xiangjun Gong, South China University of Technology (China)
Xiaodi Tan, Fujian Normal University (China)
Xiaoli Liu, Shenzhen University (China)
Xiaopeng Shao, Xidian University (China)
Xinzhu Sang, Beijing University of Posts and Telecommunications (China)
Yan Hu, Nanjing University of Science and Technology (China)
Yanjun Fu, Nanchang Hangkong University (China)
Yilong Zhang, Zhejiang University of Technology (China)
Yingjie Yu, Shanghai University (China)
Yong Li, Zhejiang Normal University (China)
Yongkai Yin, Shandong University (China)
Yongtao Liu, Nanjing University of Science and Technology (China)
Yu Fu, Shenzhen University (China)
Yuhong Wan, Beijing University of Technology (China)
Zhengyu Jiang, South China University of Technology (China)
Zhongwei Li, Huazhong University of Science and Technology (China)
Zibang Zhang, Jinan University (China)
Zonghua Zhang, Hebei University of Technology (China)

Special Sessions Organizers

1 High-accuracy Optical Deformation Measurement of Large Engineering Structures
Xinxing Shao, Southeast University (China)

2 Image Correlation based Deformation Measurement
Zhenyu Jiang, South China University of Technology (China)

3 Lensless Imaging
Jiachen Wu, Tsinghua University (China)
Jiawei Sun, Technical University of Dresden (Germany)

4 Moiré Techniques and Applications
Qinghua Wang, National Institute of Advanced Industrial Science and Technology (Japan)
Zhanwei Liu, Beijing Institute of Technology (China)

5 New Developments and Applications of Digital Image/Volume Correlation
Bing Pan, Beihang University (China)

6 Nondestructive Evaluation with Infrared Thermography
Jianguo Zhu, Jiangsu University (China)

7 Quantitative Phase Imaging
Jianglei Di, Guangdong University of Technology (China)
Peng Gao, Xidian University (China)

8 Single-pixel Imaging and Sensing
Zibang Zhang, Jinan University (China)