PROCEEDINGS OF SPIE

7th International Symposium on Advanced Optical Manufacturing and Testing Technologies

Optical Test and Measurement Technology and Equipment

Yudong Zhang Wei Gao Editors

26–29 April 2014 Harbin, China

Sponsored by
COS—The Chinese Optical Society (China)
IOE—Institute of Optics and Electronics, Chinese Academy of Sciences (China)

Technical Cosponsor SPIE

Supporting Organizations
Ministry of Science and Technology of China (China)
Chinese Academy of Sciences (China)
National Natural Science Foundation of China (China)

Published by SPIE

Volume 9282

Proceedings of SPIE 0277-786X, V. 9282

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

7th International Symposium on Advanced Optical Manufacturing and Testing Technologies: Optical Test and Measurement Technology and Equipment, edited by Yudong Zhang, Wei Gao, Proc. of SPIE Vol. 9282, 928201 © 2014 SPIE · CCC code: 0277-786X/14/\$18 · doi: 10.1117/12.2084721

The papers included 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. The papers published in these proceedings 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 this book:

Author(s), "Title of Paper," in 7th International Symposium on Advanced Optical Manufacturing and Testing Technologies: Optical Test and Measurement Technology and Equipment, edited by Yudong Zhang, Wei Gao, Proceedings of SPIE Vol. 9282 (SPIE, Bellingham, WA, 2014) Article CID Number.

ISSN: 0277-786X ISBN: 9781628413571

Published by

SPIE

P.O. Box 10, Bellingham, Washington 98227-0010 USA Telephone +1 360 676 3290 (Pacific Time) · Fax +1 360 647 1445 SPIE.org

Copyright © 2014, Society of Photo-Optical Instrumentation Engineers.

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 copying fees. The Transactional Reporting Service base fee for this volume is \$18.00 per article (or portion thereof), which should be paid directly to the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923. Payment may also be made electronically through CCC Online 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. The CCC fee code is 0277-786X/14/\$18.00.

Printed in the United States of America.

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



Paper Numbering: Proceedings of SPIE follow an e-First publication model, with papers published first online and then in print and on CD-ROM. Papers are published as they are submitted and meet publication criteria. A unique, consistent, permanent citation identifier (CID) number is assigned to each article at the time of the first 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, print, and electronic versions of the publication. SPIE uses a six-digit CID article numbering system in which:

- The first four 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. The complete citation is used on the first page, and an abbreviated version on subsequent pages. Numbers in the index correspond to the last two digits of the six-digit CID Number.

Contents

Symposium Committee

xvii	Introduction
xix	AOMATT 2014 Sponsors
	ORAL SESSION
9282 02	Test diffraction properties of reflection waveguide holograms [9282-85] Y. Xie, Southeast Univ. (China), Science and Technology on Electro-optic Control Lab. (China), and Luoyang Institute of Electro-optical Equipment (China); MW. Kang, N. Zhang, Science and Technology on Electro-optic Control Lab. (China) and Luoyang Institute of Electro-optical Equipment (China); BP. Wang, Southeast Univ. (China)
9282 03	Subsurface damage detection and damage mechanism analysis of chemical-mechanica polished optics [9282-79] H. Ye, W. Yang, G. Bi, P. Yang, Y. Guo, Xiamen Univ. (China)
9282 04	Design of laser radar-based feature points measurement scheme [9282-3] B. He, Changchun Univ. of Science and Technology (China) and Changchun Univ. (China); Z. An, Changchun Univ. of Science and Technology (China)
9282 05	A new illumination source for Shack-Hartmann wavefront sensor [9282-49] Y. Qi, Z. Lu, Academy of Opto-Electronics (China); G. Ding, Academy of Opto-Electronics (China) and Hefei Univ. of Technology (China); J. Su, Academy of Opto-Electronics (China)
9282 06	Restoration of broadband light illumination image using phase diversity technology
	[9282-127] Q. Cheng, Changchun Institute of Optics, Fine Mechanics and Physics (China)
9282 07	The applied research and solar simulation spectral design based on pulse xenon lamp with coating film [9282-135] W. Chen, Q. Cheng, F. Zhang, Xiamen Univ. (China)
9282 08	High-accuracy inspection of defects and profile of wafers by phase measuring deflectometry [9282-11] H. Yue, Y. Wu, B. Zhao, Z. Ou, Y. Liu, Univ. of Electronic Science and Technology of China (China)
9282 09	Removal of surface figure deformation due to gravity in optical test [9282-94] W. Gu, Institute of Optics and Electronics (China), Univ. of Electronic Science and Technology of China (China), and Univ. of Chinese Academy of Sciences (China); F. Wu, Institute of Optics and Electronics (China); Y. Liu, Univ. of Electronic Science and Technology of China (China); X. Hou, Institute of Optics and Electronics (China)

9282 0A	Detection and analysis of 1/f noise correlation in semiconductor laser diodes [9282-1] H. Fan, F. Gao, Jilin Univ. (China); J. Cao, Changchun Institute of Optics, Fine Mechanics and Physics (China); S. Guo, Jilin Univ. (China)
9282 OB	Design and analysis of cryogenic infrared target [9282-130] Z. Hu, C. Wang, Z. Liu, Harbin Institute of Technology (China)
9282 OC	Analysis of power spectral density as a performance metric for TMT M3 [9282-83] F. Yang, QC. An, FG. Wang, Changchun Institute of Optics, Fine Mechanics and Physics (China); XY. Liu, Changchun Institute of Optics, Fine Mechanics and Physics (China) and Univ. of Chinese Academy of Sciences (China)
9282 0D	Accuracy enhancement of three-dimensional surface shape measurement using curvelet transform [9282-54] B. Zhao, H. Yue, Y. Wu, Z. Ou, Y. Liu, Univ. of Electronic Science and Technology of China (China)
9282 OE	Research on simulation and verification system of satellite remote sensing camera video processor based on dual-FPGA [9282-30] F. Ma, Q. Liu, X. Cui, Beijing Institute of Space Mechanics and Electricity (China)
9282 OF	Mirror pendulum pose measurement by camera calibration [9282-150] L. Li, Institute of Optics and Electronics (China), Univ. of Electronic Science and Technology of China (China), and Univ. of Chinese Academy of Sciences (China); W. Zhao, F. Wu, Institute of Optics and Electronics (China); Y. Liu, Univ. of Electronic Science and Technology of China (China)
9282 OG	Improvement on object detection accuracy by using two compound eye systems [9282-133] M. Ma, K. Wang, Univ. of Science and Technology of China (China)
9282 OH	Metrology research on PDMS phantoms for evaluating resolution performance of OCT systems [9282-55] B. Hao, W. Liu, Z. Hu, B. Hong, J. Li, National Institute of Metrology (China)
9282 01	Optomechanical design of near-null subaperture test system based on counter-rotating CGH plates [9282-52] Y. Li, S. Chen, National Univ. of Defense Technology (China) and Hu'nan Key Lab. of Ultra-Precision Machining Technology (China); B. Song, National Univ. of Defense Technology (China); S. Li, National Univ. of Defense Technology (China) and Hu'nan Key Lab. of Ultra-Precision Machining Technology (China)
9282 OJ	A sampling method to measure surface roughness of circular flat [9282-167] K. Meng, Institute of Optics and Electronics (China) and Univ. of Chinese Academy of Sciences (China); Y. Wan, F. Wu, Institute of Optics and Electronics (China); L. Shen, W. Song, Institute of Optics and Electronics (China) and Univ. of Chinese Academy of Sciences (China)

9282 OK

Autofocused dual wavelength digital holography for microstructure measurement

Y. Sun, D. Wang, S. Panezai, L. Rong, Y. Wang, Beijing Univ. of Technology (China)

9282 OL	Framework for freeform complex surface reconstruction by combining Zernike polynomials with radial basis function method [9282-58] J. Ye, Z. Gao, W. Wang, Nanjing Univ. of Science and Technology (China)
9282 OM	Realization of sub-micron radius of curvature measurement in vertical interferometer workstation [9282-160] E. Miao, R. Wang, W. Zhang, S. Peng, Changchun Institute of Optics, Fine Mechanics and Physics (China)
9282 ON	High-resolution digital holographic imaging by using a spatial light modulator [9282-29] B. Li, DY. Wang, YX. Wang, L. Rong, Beijing Univ. of Technology (China)
9282 00	Integration design of FPGA software for a miniaturizing CCD remote sensing camera [9282-102] N. Yin, Q. Li, P. Rong, N. Lei, M. Wan, Beijing Institute of Space Mechanics and Electricity (China)
9282 OP	Nonlinearity analysis in homodyne multi-pass interferometer with Jones matrix and correction with Fourier harmonic components method [9282-73] Q. Li, S. Li, Y. Shi, W. Li, S. Gao, National Institute of Metrology (China)
9282 0Q	A 4+1 phase shifting algorithm for rotating-compensator spectroscopic ellipsometry [9282-90] Z. Han, Nanjing Univ. of Science and Technology (China); Z. Xu, Univ. of Missouri-St. Louis (United States); L. Chen, Nanjing Univ. of Science and Technology (China)
	POSTER SESSION
9282 OR	Absolute flatness testing of large synchrotron optics [9282-18] W. Lin, Shanghai Institute of Applied Physics (China) and Graduate Univ. of Chinese Academy of Sciences (China); Y. He, L. Song, H. Luo, J. Wang, Shanghai Institute of Applied Physics (China)
9282 OS	Design and realization of test system for testing parallelism and jumpiness of optical axis of photoelectric equipment [9282-33] S. Shi, Z. Chen, S. Qin, C. Song, Y. Jiang, Bai Cheng Ordnance Test Ctr. of China (China)
9282 OT	Research of laser stealth performance test technology [9282-38] Z. Chen, S. Shi, F. Han, Y. Wu, C. Song, Bai Cheng Ordnance Test Ctr. of China (China)
9282 OU	Optimization design of fiber parameters in reflective fiber optic vibration sensor [9282-301] J. Lu, Ordnance Engineering College (China); Y. Jia, Beijing Information Science & Technology Univ. (China); T. Zhang, Y. Zhu, Air Defense Forces Academy (China)
9282 0V	Discuss the testing problems of ultraviolet irradiance meters [9282-8] J. Ye, F. Lin, Shanghai Institute of Measurement and Testing Technology (China)
9282 OW	A high precision optical angle measuring instrument for large optical axis offsets [9282-9] J. Xie, Z. Tan, Huazhong Agricultural Univ. (China)

9282 0X	A field test extend blackbody development and application [9282-60] Y. Zhang, Y. Dai, L. Hao, G. Li, Beijing Institute of Environmental Features (China)
9282 0Y	Computer-aided alignment for high precision lens [9282-31] L. Li, X. Fu, T. Ma, B. Wang, Institute of Optics and Electronics (China)
9282 OZ	A new initial alignment method of MIMU based on CCD [9282-123] K. Ma, Q. Ding, Q. Zhang, S. Chen, Science and Technology on Electro-optic Control Lab. (China) and Luoyang Institute of Electro-optical Equipment (China); Y. Wang, Luoyang Institute of Electro-optical Equipment (China)
9282 10	The optical surface defect inspection by fringe reflection [9282-164] W. Zhao, L. Li, Institute of Optics and Electronics (China)
9282 11	Three dimensional detection of rail shape based on self-adaptive filtering [9282-28] J. Li, X. Gao, Z. Wang, Q. Zhao, L. Luo, Southwest Jiaotong Univ. (China)
9282 12	Research on tracking approach to weak small targets under sky background [9282-86] J. Chen, D. Miao, W. Zhou, J. Shen, N. Chen, B. Kang, Sichuan Jiuzhou Electric Group Co., Ltd. (China)
9282 13	An autonomous orbit determination method for MEO and LEO satellite [9282-41] H. Zhang, J. Wang, G. Yu, J. Zhong, L. Lin, Institute of Optics and Electronics (China)
9282 14	Research on measurement and correction of a fish-eye image distortion [9282-32] Z. Wang, Y. Lei, Z. Zhang, Z. Zhang, H. Zhang, J. Huang, B. Yi, J. Liao, Xi'an Institute of Optics and Precision Mechanics (China)
9282 15	Experiment and analysis of computer generated hologram for testing aspheric surface [9282-157]
	S. Li, Institute of Optics and Electronics (China) and Univ. of Chinese Academy of Sciences (China); Q. Chen, F. Wu, Institute of Optics and Electronics (China)
9282 16	An improved gradient-integral method with hybrid iteration for surface measurement of free-form large astronomical mirrors [9282-47] S. Ma, Soochow Univ. (China); B. Li, Nanjing Institute of Astronomical Optics & Technology (China); Y. Wang, W. Song, W. Shen, Soochow Univ. (China)
9282 17	Off-axis aberration effect on beamwidth in multitarget compounding system [9282-62] Y. Shi, Harbin Institute of Technology (China) and Hubei Space Technology Academy (China); H. Hu, Hubei Space Technology Academy (China); B. Zuo, Z. Fan, Harbin Institute of Technology (China); C. Yu, Hubei Space Technology Academy (China)
9282 18	The influence factor analysis of misalignment variable in computer aided alignment
	[9282-16] C. Zhang, X. Zhao, W. Jiao, Beijing Institute of Space Mechanics and Electricity (China)

9282 19	High-frequency angular vibration calibration using the mirror assembly diffraction grating
	heterodyne laser interferometer [9282-6]

J. Xue, Beijing Institute of Technology (China) and Key Lab. of Science and Technology for National Metrology and Calibration (China); D. Zhang, X. Li, Key Lab. of Science and Technology for National Metrology and Calibration (China); W. Zhao, Beijing Institute of Technology (China)

9282 1A Study on method of radiometric calibration for precision measurement of micro size damage site [9282-168]

H. Yuan, Z. Peng, Chinese Academy of Engineering Physics (China); W. Wang, F. Chen, Harbin Institute of Technology (China); J. Tang, China Academy of Engineering Physics (China); B. Feng, G. Liu, B. Liu, Harbin Institute of Technology (China)

- 9282 1B **Calibration method for angular measurement of moiré patterns** [9282-303] F. He, J. Bai, K. Wang, X. Hou, J. Yao, Zhejiang Univ. (China)
- 9282 1C

 Research of autonomous celestial navigation based on new measurement model of stellar refraction [9282-51]

 C. Yu, Institute of Optics and Electronics (China) and Univ. of Chinese Academy of

Sciences (China); H. Tian, H. Zhang, B. Xu, Institute of Optics and Electronics (China)

- 9282 1D **Testing the spectrum of infrared emission reflected by several surfaces with a FTIR** [9282-19] X. Wang, R. Hu, M. Pang, H. Bai, W. Dong, Institute of NBC Defense (China)
- 9282 1E The multimode entangled state with three states superposition on the (N+1)-dimensional Hilbert space and their N-th power difference squeezing properties [9282-158] Z.-Y. Sun, C.-Y. Yang, D.-T. Geng, Air Force Engineering Univ. (China)
- 9282 1F **Study on high precision Shack-Hartmann wave sensor** [9282-98] Z. Liu, Y. Fu, Changchun Univ. of Science and Technology (China)

9282 1G A method which can enhance the optical-centering accuracy [9282-117]

X. Zhang, Xi'an Institute of Optics and Precision Mechanics (China) and Graduate Univ. of Chinese Academy of Sciences (China); X. Zhang, Y. Dai, Graduate Univ. of Chinese Academy of Sciences (China); T. Yu, Xi'an Institute of Optics and Precision Mechanics (China) and Graduate Univ. of Chinese Academy of Sciences (China); J. Duan, H. Li, Xi'an Institute of Optics and Precision Mechanics (China)

- 9282 1H Research on method for laser beam shape parameters detection [9282-69]
 - J. Su, Z. Bai, Xi'an Technological Univ. (China)

9282 11 New method for improving angle measurement precision of laser collimation system under complex background [9282-66]

X. Zhao, H. Chen, L. Tan, Z. Zhang, W. Cai, Xi'an Research Institute of High Technology (China)

9282 1J Arbitrary polarized beams generated and detected by one phase-only LC-SLM [9282-138] D. Chen, J. Qi, W. Wang, Y. Chen, G. Gu, D. Chu, Q. Zhang, H. Deng, S. Zhao, J. Han, R. Wang, New Star Institute of Applied Technology (China)

7202 IK	J. Ge, Nanjing Univ. of Science and Technology (China); J. Su, Nanjing Univ. of Science and Technology (China) and Xi'an Technological Univ. (China)
9282 1L	Scanning measurement system of transmissivity for large aperture optic components
	[9282-25] Y. Yang, Q. Yuan, Z. Shi, H. Ren, Y. Ma, China Academy of Engineering Physics (China); G. Li, Xi'an Institute of Applied Optics (China)
9282 1M	Design of twin computer-generated hologram for absolute testing of aspheric surfaces
	[9282-56] J. Feng, Institute of Optics and Electronics (China) and Univ. of Chinese Academy of Sciences (China); C. Deng, T. Xing, Institute of Optics and Electronics (China)
9282 1N	Study on the temperature gradient evolution of large size nonlinear crystal based on the
	fluid-solid coupling theory [9282-302] F. Z. Sun, P. Zhang, Y. C. Liang, L. H. Lu, Harbin Institute of Technology (China)
9282 10	A simple device for measuring the spectral transmittance of lens used in InGaAs image
	intensifier apparatus [9282-63] X. Bai, H. Guo, Kunming Institute of Physics (China), Science and Technology on Low-Light-Level Night Vision Lab. (China), and North Night-Vision Science & Technology Group Corp. Ltd. (China); L. Yin, Y. He, Z. Hou, Z. Miao, L. Yan, Science and Technology on Low-Light-Level Night Vision Lab. (China) and North Night-Vision Science & Technology Group Corp. Ltd. (China)
9282 1P	Research of infrared image optimization algorithm in optical read-out IR imaging [9282-22] J. Wu, T. Cheng, Q. Zhang, J. Gao, X. Wu, Univ. of Science and Technology of China (China)
9282 1Q	Research on site measuring uncertainty of the laser tracker [9282-136] W. Tang, X. Ye, S. Dong, The First Aircraft Design and Research Institute of AVIC (China)
9282 1R	Focal spot analysis of radially polarized femtosecond laser pulses [9282-5] W. Sun, W. Hu, J. Qi, W. Wang, J. Liao, W. Yi, H. Jia, X. Li, National Univ. of Defense Technology (China)
9282 1\$	Calibration for the errors resulted from aberration in long focal length measurement
	[9282-134] Y. Jiang, J. Luo, F. He, J. Bai, K. Wang, X. Hou, C. Hou, Zhejiang Univ. (China)
9282 1T	3D reconstruction with two webcams and a laser line projector [9282-23] D. Li, B. Hui, S. Qiu, G. Wen, National Univ. of Defense Technology (China)
9282 1U	Effect of illumination parameters on the quality of wavefront diffracted by pinhole [9282-48] G. Ding, Hefei Univ. of Technology (China) and Academy of Opto-Electronics (China); Y. Qi, Z. Lu, G. Liu, Academy of Opto-Electronics (China)
9282 1V	A novel Fiber Bragg grating strain sensor based on rhombus structure at high temperature [9282-153]
	X. Gao, Y. Liu, Z. Xia, Z. Yang, China Jiliang Univ. (China)

9282 1W	Design and application of FBG strain experimental apparatus in high temperature [9282-156] Z. Xia, Y. Liu, X. Gao, China Jiliang Univ. (China)
9282 1X	Analysis of the atmosphere back-scattering in active detecting [9282-53] M. Gong, Institute of Optics and Electronics (China) and Univ. of Chinese Academy of Sciences (China); T. An, S. Liu, Institute of Optics and Electronics (China)
9282 1Y	Model and calibrating of a 5-DOF objective [9282-114] Y. Cheng, L. Chen, L. Zhao, S. Hu, Institute of Optics and Electronics (China); J. Tong, Xuchang Vocational and Technical College (China)
9282 1Z	Simultaneous phase-shifting interferometry study based on the common-path Fizeau interferometer [9282-163] F. Liu, Institute of Optics and Electronics (China) and Univ. of Chinese Academy of Sciences (China); Y. Wu, Institute of Optics and Electronics (China)
9282 20	FSM model correlation identification method based on invert-repeated m-sequence [9282-21] L. Lei, Univ. of Chinese Academy of Sciences (China) and Institute of Optics and Electronics (China); Q. Wang, Institute of Optics and Electronics (China)
9282 21	A scene recognition method based on image complexity [9282-84] Q. Song, Institute of Optics and Electronics (China) and Univ. of Chinese Academy of Sciences (China); Z. Chen, Institute of Optics and Electronics (China); S. Sun, Kunming Boating Equipment Test and Research Ctr. (China); J. Hu, H. Cheng, Institute of Optics and Electronics (China) and Univ. of Chinese Academy of Sciences (China)
9282 22	Research of thin film damage testing based on photothermal deflection [9282-12] J. Han, L. Yang, J. Su, T. Wang, Xi'an Technological Univ. (China)
9282 23	Study of multi-channel optical system based on the compound eye [9282-59] Y. Zhao, Y. Fu, Z. Liu, Z. Dong, Changchun Univ. of Science and Technology (China)
9282 24	Optical system design of dynamic infrared scene projector based on DMD [9282-91] J. Lu, Y. Fu, Z. Liu, Y. Li, Changchun Univ. of Science and Technology (China)
9282 25	Region registration of large-scale IR/visual images based on improved SC algorithm [9282-162] X. Zhang, Xi'an Research Institute of High Technology (China) and Taiyuan Satellite Launch Ctr. (China); J. Li, Xi'an Research Institute of High Technology (China); Z. Zhang, Xi'an Communication Institute (China); Y. Du, Taiyuan Satellite Launch Ctr. (China)
9282 26	Design and characterization of a large aperture spectral radiance source integrating sphere for calibration of satellite remote sensors [9282-126] H. Wu, Y. He, C. Zheng, G. Feng, C. Chen, W. Dong, P. Li, Y. Wang, National Institute of Metrology (China)
9282 27	Research on the bending characteristic of long period fiber grating [9282-142] T. Geng, Z. Liu, W. Yang, R. Xue, S. Geng, T. Ye, Harbin Engineering Univ. (China)

9282 28	Axial strain sensor based on long-period fiber gratings [9282-143] T. Geng, S. Geng, W. Yang, T. Ye, Z. Liu, R. Xue, Harbin Engineering Univ. (China)
9282 29	Research on fabrication of helical-core fiber based on the coordinates of the centroid [9282-145]
	T. Geng, R. Xue, W. Yang, S. Geng, Z. Liu, T. Ye, Harbin Engineering Univ. (China)
9282 2A	Auto-measuring system of aero-camera lens focus using linear CCD [9282-61] Y. Zhang, Y. Zhao, S. Wang, Naval Aeronautical and Astronautical Institute (China)
9282 2B	Research of aerial camera focal pane micro-displacement measurement system based
	on Michelson interferometer [9282-89] S. Wang, Y. Zhao, S. Li, Naval Aeronautical Engineering Institute (China)
9282 2C	The monitoring and alarm system based on distributed temperature fiber sensing
	[9282-300] H. Zhao, Y. Zhao, Y. Zhang, S. Wang, Naval Aeronautical Engineering Institute (China)
9282 2D	Research on autofocusing method with automatic calibration for aerial camera based on
	imaging resolution [9282-80] Y. Zhao, H. Zhao, S. Li, Y. Zhang, Naval Aeronautical Engineering Institute (China)
9282 2E	Light field sensor and real-time panorama imaging multi-camera system and the design of
	data acquisition [9282-74] Y. Lu, J. Tao, K. Wang, Univ. of Science and Technology of China (China)
9282 2F	Hybrid phase retrieval method for annular pupil [9282-82] X. Chen, W. Shen, Soochow Univ. (China)
9282 2G	Laboratory radiometric calibration for the convex grating imaging spectrometer
	[9282-107] J. Zhou, X. Chen, Y. Chen, Y. Ji, W. Shen, Soochow Univ. (China)
9282 2H	High accurate subaperture testing [9282-36]
	F. Yan, Institute of Optics and Electronics (China) and Univ. of Chinese Academy of Sciences (China); B. Fan, X. Hou, F. Wu, B. Lei, Institute of Optics and Electronics (China)
9282 21	Research of real-time wavefront reconstruction and control based on multi-core DSP
	[9282-124] Z. Wang, Institute of Optics and Electronics (China), Key Lab. on Adaptive Optics (China),
	and Univ. of Chinese Academy of Sciences (China); L. Zhou, M. Li, H. Zhang, Institute of Optics and Electronics (China) and Key Lab. on Adaptive Optics (China)
9282 2J	The impact of polarization on grating performance of the lateral shearing interferometer
	[9282-76] Z. Yao, Institute of Optics and Electronics (China) and Univ. of Chinese Academy of Sciences (China); X. Liu, Nanjing Univ. of Science and Technology (China); T. Xing, Institute of Optics and Electronics (China)

9282 2K	Real-time implementation of camera positioning algorithm based on FPGA & SOPC [9282-40]
	M. Yang, Xi'an Institute of Optics and Precision Mechanics (China) and Univ. of Chinese Academy of Sciences (China); Y. Qiu, Xi'an Institute of Optics and Precision Mechanics (China)
9282 2L	Research on gesture recognition of augmented reality maintenance guiding system based on improved SVM [9282-7]
	S. Zhao, Hebei Univ. of Technology (China); Y. Zhang, Institute of Mechanical Technology (China); B. Zhou, Consultant (China); D. Ma, Institute of Mechanical Technology (China)
9282 2M	The optical-mechanical design of DMD modulation imaging device [9282-100] T. Li, X. Xu, Y. Qiao, L. Li, Y. Pan, Changchun Univ. of Science and Technology (China)
9282 2N	The effects of thermal field in interferometric measurements of radius of curvature [9282-161]
	J Mao, Institute of Optics and Electronics (China) and Graduate Univ. of Chinese Academy of Sciences (China); X. Hou, F. Wu, Institute of Optics and Electronics (China)
9282 20	Measurement of image plane illumination uniformity of photoelectric imaging system [9282-15]
	D. Kang, H. Yang, Xi'an Institute of Applied Optics (China); D. Sha, Beijing Institute of Technology (China); C. Jiang, Xi'an Institute of Applied Optics (China); M. Chen, X. Zhong, Beijing Aoptek Scientific Co., Ltd. (China); S. Ma, L. Yuan, Xi'an Institute of Applied Optics (China)
9282 2P	Calibrators measurement system for headlamp tester of motor vehicle base on machine vision [9282-71]
	Y. Pan, Changchun Univ. of Science and Technology (China); F. Zhang, Jiangsu Institute of Metrology (China); X. Xu, Changchun Univ. of Science and Technology (China); Z. Zheng, Bai Cheng Ordnance Test Ctr. of China (China)
9282 2Q	A new method of field MRTD test [9282-104] Z. Chen, Y. Song, X. Liu, W. Xiao, Mechanical Engineering College (China)
9282 2R	Research on intelligent testing technology of pulse laser rangefinder anti-jamming
	performance [9282-46] M. Xue, Z. Chen, W. Wang, X. Liu, C. Zhang, Y. Song, Mechanical Engineering College (China)
9282 2S	Warning system against locomotive driving wheel flaccidity [9282-39] P. Luo, West China Normal Univ. (China)
9282 2T	Stray light analysis and test of low-light-level panoramic imaging system [9282-57] F. Liu, L. Yan, Z. Yang, B. Zhang, K. Han, Xi'an Institute of Applied Optics (China)
9282 2U	Algorithm of sub-pixel image registration based on Harris corner and SIFT descriptor
	J. Zhu, G. Fan, Academy of Equipment (China)

9282 2V	Research of the key technologies in small target detection within starry background based on camera array [9282-109] S. Wang, Y. Li, L. Du, Z. Hou, The Academy of Equipment (China)
9282 2W	Study on the fiber grating sensors in concrete safety monitoring [9282-118] H. Liu, Y. Li, Y. Zhang, Jilin Jianzhu Univ. (China)
9282 2X	Laser beam riding artillery missiles guidance device is designed [9282-305] M. Yan, Z. Huo, W. Chen, Changchun Institute of Technology (China)
9282 2Y	Phase retrieval hybrid algorithm for optical surface testing of the high dynamic range error [9282-119] L. Feng, Institute of Optics and Electronics (China) and Univ. of Chinese Academy of Sciences (China); Z. Zeng, Y. Wu, Institute of Optics and Electronics (China)
9282 2Z	Vibration analysis of the Thomson Scattering diagnostics optical transmission system on EAST tokamak [9282-113] C. Shao, Q. Zang, J. Zhao, A. Hu, X. Han, H. Chen, L. He, T. Wang, Institute of Plasma Physics (China)
9282 30	Research on the aircraft level measurement by laser tracker [9282-137] X. Ye, W. Tang, C. Cao, The First Aircraft Design and Research Institute of AVIC (China)
9282 31	Quantitative detection of the colloidal gold immunochromatographic strip in HSV color space [9282-20] Y. Wu, Y. Gao, M. Du, Fuzhou Univ. (China)
9282 32	Optimized imaging polarimeter for measuring polarization properties of hyper number aperture lithography tools [9282-108] L. Li, Y. Li, Q. Chi, K. Liu, X. Zhang, J. Li, Beijing Institute of Technology (China)
9282 33	Aberration functions expanding in Zernike polynomial for lithographic lens [9282-43] H. Yang, Institute of Optics and Electronics (China) and Univ. of Chinese Academy of Sciences (China); H. Zhu, T. Xing, Institute of Optics and Electronics (China)
9282 34	A novel self-deployable baffle with vanes driven by rectangular section curving tape springs [9282-37] K. Du, Institute of Optics and Electronics (China) and Univ. of Chinese Academy of Sciences (China); S. Liao, H. Li, Institute of Optics and Electronics (China); Y. Zhang, Sichuan Bureau of Surveying, Mapping and Geoinformation (China)
9282 35	Grayscale adjustment method for CCD mosaic camera in surface defect detection system [9282-149] L. Yan, Y. Yang, X. Wang, S. Wang, P. Cao, L. Li, D. Liu, Zhejiang Univ. (China)
9282 36	Design of high-bandwidth FSM driving circuit of ATP system for laser communications [9282-131] J. Lin, Institute of Optics and Electronics (China) and Univ. of Chinese Academy of Sciences (China)

9282 37 Adaptive optics vision simulator based on **35** element bimorph deformable mirror [9282-116]

L. Zhao, Institute of Optics and Electronics (China), Key Lab. on Adaptive Optics (China), Univ. of Electronic Science and Technology of China (China), Chengdu Univ. of Information Technology (China), and Univ. of Chinese Academy of Sciences (China); Y. Dai, Institute of Optics and Electronics (China) and Key Lab. on Adaptive Optics (China); F. Xiao, J. Kang, Institute of Optics and Electronics (China), Key Lab. on Adaptive Optics (China), and Univ. of Chinese Academy of Sciences (China); H. Zhao, H. Bao, H. Zhou, Y. Zhou, Y. Zhang, Institute of Optics and Electronics (China) and Key Lab. on Adaptive Optics (China)

9282 38 Research on evaluation method of CMOS camera [9282-148]

S. Zhang, Institute of Optics and Electronics (China) and Univ. of Chinese Academy of Sciences (China); W. Han, Institute of Optics and Electronics (China); L. Cui, Institute of Optics and Electronics (China) and Univ. of Chinese Academy of Sciences (China)

9282 39 Source optimization using simulated annealing algorithm [9282-81]

H. Jiang, Institute of Optics and Electronics (China) and Univ. of Chinese Academy of Sciences (China); T. Xing, Institute of Optics and Electronics (China); M. Du, Institute of Optics and Electronics (China) and Univ. of Chinese Academy of Sciences (China)

9282 3A Discussion on a method of target's infrared feature extraction [9282-122]

W. Tian, Institute of Optics and Electronics (China) and Univ. of Chinese Academy of Sciences (China); Q. Li, J. Fu, Institute of Optics and Electronics (China); L. Cui, Institute of Optics and Electronics (China) and Univ. of Chinese Academy of Sciences (China)

9282 3B **Wavefront correction of model-based sensorless adaptive optics system** [9282-147] H. Yang, Huaihai Institute of Technology (China); J. Wu, China Univ. of Mining and

H. Yang, Huaihai Institute of Technology (China); J. Wu, China Univ. of Mining and Technology (China)

9282 3C Research on PSD-based spatial benchmark system [9282-128]

W. Xu, J. Gu, H. Luo, Y. Xia, Nanjing Univ. of Science and Technology (China)

Author Index

Proc. of SPIE Vol. 9282 928201-14

Symposium Committee

Honorary Chair

Bingkun Zhou, Chinese Optical Society (China)

Symposium General Chair

Liwei Zhou, Beijing Optical Society (China)

Symposium General Co-chairs

Jianlin Cao, Ministry of Science and Technology of China
H. Philip Stahl, NASA Marshall Space Flight Center (United States)
Yudong Zhang, Institute of Optics and Electronics (China)
Larry Stepp, Thirty Meter Telescope Project (United States)
Yingchun Liang, Harbin Institute of Technology (China)
Yu Yao, Harbin Engineering University (China)

International Academic Committee

Wenhan Jiang, Chair, Chinese Academy of Engineering (China) **Liwei Zhou**, Chinese Academy of Engineering (China) and Beijing Institute of Technology (China)

Harald Giessen, University of Stuttgart (Germany)

Junhua Pan, Chinese Academy of Engineering (China) and Soochow University (China)

Myung K. Cho, National Optical Astronomy Observatory (United States)

Organizing Committee

Yudong Zhang, Co-chair, IOE, CAS (China)

Jinghua Cao, Co-chair, Bureau of International Cooperation, CAS (China)

Libin Xiang, Co-chair, Shanghai Engineering Center for Microsatellites (China)

Yadong Jiang, Co-chair, University of Electronic Science and Technology (China)

Program Committee

Xiangdi Lin, Chair, Chinese Academy of Engineering (China)
Hu Yang, Co-chair, IOE, CAS (China)
Wei Gao, Co-chair, Tohoku University (Japan)
Huadong Yu, Co-chair, Changchun University of Science and Technology (China)

Secretary General of the Symposium

Li Yang, Committee of Optical Manufacturing Technology, COS (China)

Session Chairs

Session 1-1 Fan Wu
Session 2-1 Qiming Xin
Session 3-1 Shangming Wen
Session 4-1 Tingwen Xin
Session 5-1 Xiao Wang
Session 6-1 Xiangang Luo
Session 1-2 Bin Fan
Session 2-2 Shengyi Li
Session 3-2 Rongzhu Zhang
Session 4-2 Qingliang Zhao
Session 5-2 Yige Qi
Session 6-2 Changtao Wang

Introduction

The 7th International Symposium on Advanced Optical Manufacturing and Testing Technology (AOMATT) was held 26–29 April 2014 at the Harbin International Conference Center, China.

AOMATT 2014 was kicked off with a formal opening ceremony. The ceremony started with the introduction of VIP guests, symposium chairs, conference chairs, and plenary speakers, followed by opening speeches by Prof. Liwei Zhou, AOMATT 2014 Symposium Chairman, Prof. Bin Xu, Vice President of IOE, a sponsor of AOMATT 2014, and Prof. Yingchun Liang, Assistant President of Harbin Institute of Technology, a local co-sponsor of AOMATT 2014. Dr. H. Philip Stahl, 2014 President of SPIE, technical cosponsor of AOMATT 2014, could not attend the symposium this year due to a schedule conflict, but sent his congratulation letter. In his letter, Dr. Stahl gave high marks for AOMATT and stated:

AOMATT is a very successful collaboration between SPIE, the Institute of Optics and Electronics of the Chinese Academy of Sciences, and the Chinese Optical Society. It has become a well-known international symposium on advanced optical manufacturing and testing technologies. The vision of AOMATT is closely aligned with SPIE's mission to promote optics and photonics around the world.

All of the conference sponsors and attendees greatly appreciate SPIE and Dr. Stahl's long-standing support of AOMATT since its inception in 2002.

The plenary sessions started immediately after the conclusion of the opening ceremony. There were a total of nine plenary presentations: Dr. Larry Stepp, Telescope Department Head for the Thirty Meter Telescope (TMT) Project, USA, presented "Manufacturing the Optics for the Thirty Meter Telescope"; Dr. Bernard Delabre, Optical Design Engineer of European Southern Observatory (ESO), Germany, presented "The Progress of the European Extremely Large Telescope"; Dr. Tao Sun, Director of the Centre for Precision Engineering(CPE) of Harbin Institute of Technology, presented "Method and procedure for the highefficiency and ultra-precision diamond turning of large optical mirrors"; Dr. Wei Gao, Professor and Director of Research Center for Precision Nanosystems, Dept. of Nanomechanics of Tohoku University, Japan, presented "Precision nanometrology for fabrication of micro optics"; Dr. Xuejun Zhang, Vice President of Changchun Institute of Optics, Fine Mechanics and Physics (CIOMP), CAS, presented "Advanced manufacturing and testing technologies for multiple mirror space telescopes"; Dr. A.G. Poleshchuk, Head of the Laboratory of Diffractive Optics, and Dr. Victor P. Korolkov, senior scientist of Institute of Automation and Electrometry, Siberian Branch of Russian Academy of Sciences, Novosibirsk, Russia, presented "Diffractive optical elements: fabrication and application"; Dr.

Axel Schindler, Science and Technology Consultant of Leibniz Institute of Surface Modification (IOM), Germany, presented "Advanced ion beam finishing and atmospheric plasma technology for high end optics"; Dr. Harald Giessen, Chair for Ultrafast Nano-Optics in the Department of Physics at the University of Stuttgart, Germany, presented "Complex hybrid plasmonics: new materials and new functionalities"; Dr. Xiangang Luo, Director of State Key Laboratory of Optical Technologies on Nano-Fabrication and Micro-Engineering of Institute of Optics and Electronics, CAS, presented "Manipulating the polarization states of electromagnetic waves using subwavelength structures". More than 600 people attended the opening ceremony and the full-day plenary sessions.

More than 400 oral and poster papers were selected for AOMATT 2014. About 102 oral papers were presented in six parallel conference sessions on 27 April. A special Technical Workshop was held in the morning of 28 April. An all-symposium poster session was held in the afternoon of 28 April. Authors and attendees had active discussions and exchange of ideas throughout the symposium. Many papers presented cutting-edge research and development work in optical design, manufacturing, and testing. The success of AOMATT 2014 continued the tradition of focus and excellence of this biannual international topical symposium in China.

We would like to express our sincere appreciation to COS—The Chinese Optical Society, IOE—Institute of Optics and Electronics, Chinese Academy of Sciences, and to SPIE for sponsoring and supporting AOMATT 2014. We would like to thank all chairs, committee members, authors, and attendee for their contributions to the symposium and sharing their research with colleagues around the world.

The 8th AOMATT is planned for 2016, and we look forward to seeing everyone at AOMATT 2016. Please watch for the Call for Papers and symposium announcements on the SPIE, IOE and COS web sites.

Li Yang Secretary General, AOMATT 2014

AOMATT 2014 SPONSORS

Sponsored by

COS—The Chinese Optical Society



IOE—Institute of Optics and Electronics, Chinese Academy of Sciences



Technical Cosponsor SPIE



Supporting Organizations
Ministry of Science and Technology of China
Chinese Academy of Sciences
National Natural Science Foundation of China

Cooperating Organizations

Harbin Institute of Technology (China) • Harbin Engineering University (China) • National University of Defense Technology (China) • University of Electronic Science and Technology of China • Sichuan University (China) • Sichuan Optical Society • State Key Laboratory of Optical Technologies on Nano-Fabrication and Micro-Engineering, IOE, CAS • Key Laboratory of Adaptive Optics, IOE, CAS • Changchun Institute of Optics, Fine Mechanics and Physics (China) • Beijing Institute of Technology (China) • Changchun University of Science and Technology (China)

Proc. of SPIE Vol. 9282 928201-20