

PROCEEDINGS OF SPIE

AOPC 2020: Telescopes, Space Optics, and Instrumentation

Suijian Xue
Ziyang Zhang
Editors

30 November – 2 December 2020
Beijing, China

Sponsored by
Chinese Society for Optical Engineering (CSOE) (China)

Technical Sponsor
SPIE

Organized by
Chinese Society for Optical Engineering (CSOE) (China) • Academy of Opto-Electronics of Electronics Technology of China (China) • Science and Technology on Low-light-level Night Vision Laboratory (China) • Science and Technology on Electro-Optical Information Security Control (China)

Published by
SPIE

Volume 11570

Proceedings of SPIE 0277-786X, V. 11570

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.

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 *AOPC 2020: Telescopes, Space Optics, and Instrumentation*, edited by Suijian Xue, Ziyang Zhang, Proceedings of SPIE Vol. 11570 (SPIE, Bellingham, WA, 2020) Seven-digit Article CID Number.

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510639614

ISBN: 9781510639621 (electronic)

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 © 2020, 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 \$21.00 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/20/\$21.00.

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

Paper Numbering: *Proceedings of SPIE* follow an e-First publication model. A unique citation identifier (CID) number is assigned to each article 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

TELESCOPES, SPACE OPTICS, AND INSTRUMENTATION

- 11570 02 **Design and improvement of a type of filter wheel in remote sensing** [11570-1]
- 11570 03 **Analysis of influence of anomaly zone in south Atlantic on star sensors** [11570-2]
- 11570 04 **Optical design of space debris detection system with wide field of view** [11570-4]
- 11570 05 **Digital TDI star camera calibration based on real space** [11570-5]
- 11570 06 **Stray light suppression of common aperture optical antenna for laser communication system** [11570-6]
- 11570 07 **Design and splicing of autocollimation target for space camera** [11570-7]
- 11570 08 **Research on safety self-perceptual optical payload of space vehicle** [11570-8]
- 11570 09 **Design of ropes driven sunshade deployment mechanism** [11570-9]
- 11570 0A **Application of reverse optimization method in computer-aided alignment** [11570-10]
- 11570 0B **Outgassing test of contamination sensitive unit for space optical instruments** [11570-11]
- 11570 0C **Automatic on-orbit adjusting TDI stages of intelligent space camera based on sun zenith angles** [11570-12]
- 11570 0D **A multi-channel joint restoration algorithm based on imaging Shack-Hartmann wave-front sensor** [11570-13]
- 11570 0E **A star map identification algorithm based on radial and cyclic features** [11570-14]
- 11570 0F **Research on influencing factors of natural frequency of shafting** [11570-15]
- 11570 0G **Imaging system based on CMOS for distributed reconfigurable remote sensing satellite system** [11570-17]
- 11570 0H **Design of a compact freeform optical system via the surface contribution analysis method** [11570-18]
- 11570 0I **Influence of structure defects of microchannel-plate-based x-ray optics on imaging performance** [11570-19]

- 11570 OJ **A novel quality inspection method for components with small diameter and deep aperture** [11570-20]
- 11570 OK **Research on focal length measurement of telephoto lens based on Polaris observation** [11570-21]
- 11570 OL **Research on sky light simulation method on the surface of Mars** [11570-22]
- 11570 OM **Polarization aberrations in an unobscured off-axis astronomical telescope and their effects on PSF ellipticity** [11570-23]
- 11570 ON **Research on collaborative design of space remote sensor based on Teamcenter** [11570-24]
- 11570 OO **Optical design of miniature projection lighting system** [11570-28]
- 11570 OP **Moving ships target detection algorithms for GAOFEN-4 sequence images** [11570-33]
- 11570 OQ **Design of flexure support for high-precision base plates on hard x-ray imager** [11570-34]
- 11570 OR **Alignment for active secondary mirror of space telescope using model-based wavefront sensorless adaptive optics** [11570-37]
- 11570 OS **Optimized design for the supporting structure of a large aperture mirror** [11570-39]
- 11570 OT **Topology optimization design of large aperture mirror for the VT system of SVOM** [11570-40]
- 11570 OU **Compact catadioptric optical system with long focal length large relative aperture and large field of view** [11570-45]
- 11570 OV **The athermalization design of an airborne all-day star sensor optical system** [11570-46]
- 11570 OW **A sparse aperture imaging system with optimal rotating pupil** [11570-47]
- 11570 OX **Design and test of flexible support structure for large aperture lightweight mirror** [11570-49]
- 11570 OY **Micro-vibration test and analysis of refrigeration for visible and infrared integrated space camera** [11570-57]
- 11570 OZ **Optical design method of three-mirror anastigmatic (TMA) telescopes with curved image surface for astronomy applications** [11570-58]