

PROCEEDINGS OF SPIE

Optomechanics and Optical Alignment

Keith B. Doyle
Jonathan D. Ellis
José M. Sasián
Richard N. Youngworth
Editors

1–5 August 2021
San Diego, California, United States

Sponsored by and Published by
SPIE

Volume 11816

Proceedings of SPIE 0277-786X, V. 11816

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 *Optomechanics and Optical Alignment*, edited by Keith B. Doyle, Jonathan D. Ellis, José M. Sasián, Richard N. Youngworth, Proc. of SPIE 11816, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510644700

ISBN: 9781510644717 (electronic)

Published by

SPIE

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

Telephone +1 360 676 3290 (Pacific Time)

SPIE.org

Copyright © 2021 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**

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

ALIGNMENT AND ENGINEERING APPLICATIONS

- 11816 02 **Quad target method: optical simulation to model the step height and projected fringe frequency** [11816-7]
- 11816 03 **Practical considerations for using grating produced Bessel beams for alignment purposes** [11816-8]
- 11816 04 **A picometer-class displacement metrology system using photonic integrated circuit** [11816-10]
- 11816 05 **Combining visible shadowgraph imaging with x-ray imaging for dynamic shock experiments** [11816-9]
- 11816 06 **Integrated optics chip automated fabrication at Honeywell** [11816-11]

ALIGNMENT FOR AEROSPACE AND REFLECTIVE OPTICS

- 11816 07 **Ultrafast laser strain generation for nanometer-precision alignment of optical components** [11816-2]
- 11816 08 **TMA optical alignment using code V automatic design, code V alignment optimization, and Zernike sensitivity analysis** [11816-3]
- 11816 0A **Rate of change of curvature as metric for optical fabrication difficulty in precision aspheres** [11816-6]
- 11816 0B **Automated reflective optical system alignment: analysis and experiments** [11816-5]

OPTOMECHANICAL DESIGN AND MECHANISMS

- 11816 0C **Lessons learned while (maybe) educating optomechanical engineers** [11816-14]
- 11816 0D **Torque it up: a low-cost approximate method to prevent lateral load slip in mechanical hardware fasteners by determination of preload** [11816-15]
- 11816 0E **Demonstration of a modular, scalable, laser communication terminal for human spaceflight missions** [11816-16]
- 11816 0F **Advancements in optomechanical resonators for novel inertial sensors** [11816-22]

11816 0I **Towards magnetically actuated 3D-printed micro-optical elements** [11816-21]

OPTOMECHANICAL ANALYSIS

11816 0J **Freeform surfaces in STOP analysis** [11816-17]

11816 0L **Optimum mount location for lightweight mirrors in a gravitational environment with optical axis horizontal** [11816-19]

11816 0M **Transient thermal design for athermal bond-line estimates** [11816-20]

POSTER SESSION

11816 0O **Modeling the PSF of misaligned wide-field telescopes through an integrated modeling approach** [11816-26]