

PROCEEDINGS OF SPIE

# ***Optical Modeling and Performance Predictions X***

**Mark A. Kahan  
Marie B. Levine-West  
Catherine D. Merrill**  
*Editors*

**22–23 August 2018  
San Diego, California, United States**

*Sponsored and Published by*  
SPIE

**Volume 10743**

Proceedings of SPIE 0277-786X, V. 10743

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 *Optical Modeling and Performance Predictions X*, edited by Mark A. Kahan, Marie B. Levine-West, Catherine D. Merrill, Proceedings of SPIE Vol. 10743 (SPIE, Bellingham, WA, 2018) Seven-digit Article CID Number.

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510620575

ISBN: 9781510620582 (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](http://SPIE.org)

Copyright © 2018, 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](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. The CCC fee code is 0277-786X/18/\$18.00.

Printed in the United States of America

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

**SPIE. DIGITAL LIBRARY**

[SPIDigitalLibrary.org](http://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

vii	<i>Authors</i>
ix	<i>Conference Committee</i>
xi	<i>Introduction</i>

---

## **SESSION 1 STRAY LIGHT, PROPAGATION, PHASE EFFECTS, AND POLARIZATION**

---

10743 02	<b>Simple but accurate variance reduction techniques for Monte Carlo ray tracing of stray light from optical surface scatter</b> [10743-1]
10743 03	<b>Bidirectional reflectance measurement of black absorber layers for use in optical instrument design</b> [10743-2]
10743 04	<b>Integration of optomechanical system models with DIRSIG</b> [10743-3]
10743 05	<b>Optimization of aspheric geometric-phase lenses for improved field-of-view</b> [10743-4]
10743 06	<b>Optical propagation through multilayered anisotropic media</b> [10743-5]
10743 07	<b>Polarization ray tracing and polarization aberration compensation in reflective astronomical telescopes</b> [10743-6]
10743 08	<b>Using lightfields to simulate the performance of optical systems</b> [10743-7]

---

## **SESSION 2 MATERIALS AND STOP I**

---

10743 0A	<b>Optothermal stability of large ULE and Zerodur mirrors</b> [10743-9]
10743 0B	<b>Influence of core and hexapod geometry, and local reinforcement on the performance of ultra lightweight ULE mirror</b> [10743-10]

---

## **SESSION 3 MATERIALS AND STOP II**

---

10743 0D	<b>Projection x-ray microscopy beamline mirror cooling and optomechanical analysis</b> [10743-12]
----------	---

10743 OE **Beamed-energy propulsion: optical phase noise in 1064nm fiber amplifiers** [10743-13]

---

**SESSION 4 OPTICAL SYSTEMS**

---

10743 OG **HabEx Telescope WFE stability specification derived from coronagraph starlight leakage** [10743-15]

10743 OH **Performance modelling of the fine lateral and longitudinal sensor (FLLS) for ESA's PROBA-3 mission** [10743-16]

10743 OI **Optical design of dual-mode seeker for long-wave infrared and mid-wave infrared seeker in missile application** [10743-18]

10743 OJ **Weighted raised cosine waveform with reduced peak to average power ratio for optical transmission** [10743-19]

---

**SESSION 5 EVOLVING COMPONENTS AND DEVICES**

---

10743 OM **On-chip photonic filter design via objective-first algorithm** [10743-22]

10743 OO **Effects of a random process variation on the transfer characteristics of a fundamental photonic integrated circuit component** [10743-25]

---

**POSTER SESSION**

---

10743 OQ **Analysis and performance of non-circular polynomials in the wavefront modelling** [10743-26]

10743 OR **Birefringence test for basic load case** [10743-27]

10743 OT **Defocused optical system for analyzing dust defects in imaging capturing module** [10743-29]

10743 OU **Research progress of laser Doppler vibrometry technology and its application** [10743-30]

10743 OV **Experimental validation of a 2D approximation method for investigating photonic components: case study refractive index sensor** [10743-31]

10743 OX **Analysis of optical schemes of HMD systems for the possibility of their using in binocular or biocular displays in the aircraft industry** [10743-33]

- 10743 0Y **Passive target tracking method based on vision information feedback** [10743-34]
- 10743 0Z **Laser proximity sensor effects in missile application** [10743-35]
- 10743 10 **Spatial and spectral sampling analysis of the spectral imaging system based on the light-field architecture** [10743-37]