

PROCEEDINGS OF SPIE

Environmental Effects on Light Propagation and Adaptive Systems V

Karin Stein
Szymon Gladysz
Editors

6 September 2022
Berlin, Germany

Sponsored by
SPIE

Cooperating Organisations
Cranfield University (United Kingdom)
OpTecBB (Germany)
International Society for Photogrammetry and Remote Sensing
European Association of Remote Sensing Companies

Published by
SPIE

Volume 12266

Proceedings of SPIE 0277-786X, V. 12266

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 *Environmental Effects on Light Propagation and Adaptive Systems V*, edited by Karin Stein, Szymon Gladysz, Proc. of SPIE 12266, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510655355

ISBN: 9781510655362 (electronic)

Published by

SPIE

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

Telephone +1 360 676 3290 (Pacific Time)

SPIE.org

Copyright © 2022 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

v *Conference Committee*

SESSION 1 EXPERIMENTAL CHARACTERIZATION OF THE ATMOSPHERE

- 12266 02 **An autonomous and passive daytime air-turbulence monitor for FSOC link optimization (Invited Paper)** [12266-1]
- 12266 03 **Laser propagation measurements over a multi-km path in a maritime environment** [12266-2]

SESSION 2 NEW DEVICES FOR ATMOSPHERIC MEASUREMENTS

- 12266 06 **Anisotropic turbulence identification from classifying extreme morphological changes in targets with deep learning (Invited Paper)** [12266-5]
- 12266 07 **High-speed complex phase retrieval of a Gaussian beam propagating through controlled optical turbulence** [12266-6]
- 12266 08 **Thermal optimization of a laser scanner** [12266-7]
- 12266 09 **Structured light production with the use of polarization interferometer** [12266-8]

SESSION 3 ADAPTIVE OPTICS

- 12266 0A **Effectiveness of adaptive optics for coherent laser communications in atmospheric turbulence** [12266-9]
- 12266 0B **Investigation of advanced control for adaptive optics in free-space optical communication** [12266-10]
- 12266 0C **Fast-steering prism for correction of tip tilt aberrations** [12266-11]
- 12266 0E **Development of a cascaded fine pointing and tracking control loop for quantum key distribution via free-space optical communications** [12266-12]
- 12266 0F **Analysis of power scintillation and fading margin in the LEO-ground downlink with the OSIRISv1 laser terminal on Flying Laptop and the DLR optical ground station Oberpfaffenhofen** [12266-17]

SESSION 4 IMAGING THROUGH THE ATMOSPHERE

12266 0G **An appraisal of suitable evaluation methods for turbulence mitigation algorithms [12266-13]**

12266 0H **The EDA TURBO project: software-based atmospheric turbulence mitigation [12266-14]**

12266 0I **Improving the quality and visibility of objects in images captured in difficult weather conditions [12266-16]**