

# PROCEEDINGS OF SPIE

## *Optical Design and Engineering VII*

**Laurent Mazuray**

**Rolf Wartmann**

**Andrew P. Wood**

*Editors*

**14–17 May 2018**

**Frankfurt, Germany**

*Sponsored by*

SPIE

*Cosponsored by*

OPTATEC (Germany)

*Published by*

SPIE

**Volume 10690**

Proceedings of SPIE 0277-786X, V. 10690

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

Optical Design and Engineering VII, edited by Laurent Mazuray, Rolf Wartmann,  
Andrew P. Wood, Proc. of SPIE Vol. 10690, 1069001 · © 2018 SPIE  
CCC code: 0277-786X/18/\$18 · doi: 10.1117/12.2503816

Proc. of SPIE Vol. 10690 1069001-1

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 [SPIEDigitalLibrary.org](http://SPIEDigitalLibrary.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 Design and Engineering VII*, edited by Laurent Mazuray, Rolf Wartmann, Andrew P. Wood, Proceedings of SPIE Vol. 10690 (SPIE, Bellingham, WA, 2018) Seven-digit Article CID Number.

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510619173

ISBN: 9781510619180 (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 © 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.



---

**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

ix	Authors
xiii	Conference Committee

---

## DESIGN METHODS I

- |          |   |
|----------|---|
| 10690 06 | <b>Image simulation using decomposition of the point spread function (Invited Paper)</b> [10690-1]    |
| 10690 07 | <b>Practical use of saddle-point construction in lens design</b> [10690-2]                            |
| 10690 08 | <b>Alternative approach to find start points for polychromatic correction</b> [10690-4]               |
| 10690 09 | <b>Stray light simulation and control in imaging systems including diffraction elements</b> [10690-5] |

---

## DESIGN METHODS II

- |          |  |
|----------|--|
| 10690 0C | <b>Use of advanced sensitivity approach to novel optical compensation methods</b> [10690-8]  |
| 10690 0D | <b>Simulation of straight and bent self-written waveguides in photopolymer mixture using phenomenological and diffusion models</b> [10690-9] |

---

## DESIGN METHODS III

- |          |  |
|----------|--|
| 10690 0F | <b>Phase space aberrations in general imaging systems</b> [10690-11]                               |
| 10690 0G | <b>Modeling and experimental validation of highly astigmatic laser beams</b> [10690-13]            |
| 10690 0I | <b>Hybrid ray tracing method for photorealistic image synthesis in head-up displays</b> [10690-14] |

---

## DESIGN METHODS IV

- |          |  |
|----------|--|
| 10690 0J | <b>Induced 3<sup>rd</sup> order spherochromatism</b> [10690-15]  |
| 10690 0K | <b>Finding the optimal starting configuration in optical design, when image plane location is a design parameter, using a diapoint-based error function</b> [10690-16] |

10690 0L **Effects of striae inside optical glasses on optical systems** [10690-17]

10690 0M **Investigation of striae tolerance in optical system** [10690-3]

---

#### DESIGN SOLUTIONS I

---

10690 0N **Study of infrared optical payloads to be integrated in a nanosat (Invited Paper)** [10690-18]

10690 0O **Double-folded catadioptric lens for smartphone portraiture photography** [10690-19]

10690 0P **Optical design of a hyperspectral drone advanced camera for soil monitoring using an electro-optical liquid crystal technology** [10690-20]

---

#### DESIGN SOLUTIONS II

---

10690 0R **Integrating a compact multichannel cryogenic infrared camera in an operational detector dewar cooler assembly (Invited Paper)** [10690-22]

10690 0S **System design of large optical communication antennas** [10690-23]

10690 0T **Potential performance loss and compensation techniques of a lens under ionizing radiations** [10690-24]

10690 0U **Diffractive optical elements for generation and transformation of structured laser beams** [10690-25]

---

#### DESIGN SOLUTIONS III

---

10690 0X **Two iris imaging over an extended depth of field with a mobile phone camera** [10690-28]

10690 0Y **Optical design of ZEISS ForTune photo mask tuning system: how to generate diffraction-limited laser foci in thick specimens** [10690-29]

10690 0Z **Design of TMC wavefront coding system based on user defined surface mask plate** [10690-30]

10690 10 **1 × 8 green light intensity splitter based on gallium-nitride slot waveguide in MMI structure** [10690-31]

10690 11 **Optical design of the post focal relay of MAORY** [10690-51]

---

## DESIGN SOLUTIONS IV

---

- 10690 12 **Design, manufacturing, and opto-mechanical considerations for multimodal micro-endoscope featuring optical coherence microscopy, multiphoton microscopy, and visible navigation** [10690-32]
- 10690 13 **Design of a dual wavelength digital holographic imaging system for the examination of layered structures** [10690-33]
- 10690 14 **Modeling of hybrid polymer optical systems** [10690-34]

---

## FREEFORMS I

---

- 10690 15 **The method of confocal mirror design (Invited Paper)** [10690-35]
- 10690 16 **Micro objectives with extremely large field of view** [10690-36]
- 10690 17 **Ready to use a multi-focal system based on Alvarez lenses** [10690-37]
- 10690 18 **Aberration fields of anamorphic systems** [10690-38]

---

## FREEFORMS II

---

- 10690 1A **Application of particle swarm optimization to the automatic design of optical systems (Invited Paper)** [10690-39]
- 10690 1B **Design for manufacture of a varifocal rotation optics** [10690-40]
- 10690 1C **Zernike surface contributions as an assisting tool for designing freeform optical systems** [10690-41]

---

## FREEFORMS III

---

- 10690 1D **Three-mirror freeform imagers** [10690-43]
- 10690 1G **Investigation of optimization strategy and freeform location on multi-surface systems** [10690-44]
- 10690 1H **Spectrographs with holographic gratings on freeform surfaces: design approach and application for the LUVOIR mission** [10690-45]

---

## SPACE APPLICATIONS I

---

- 10690 1I    **Optical and mechanical designs of the multi-band SWIR receiver for the Lunar Flashlight CubeSat mission [10690-46]**
- 10690 1J    **Sentinel-5 short-wave infrared spectrometer optical design [10690-47]**
- 10690 1L    **The optical design of the MAJIS instrument on board of the JUICE mission [10690-49]**

---

## POSTER SESSION

---

- 10690 1Q    **Radiation-resistant television system for articulated manipulator arm [10690-56]**
- 10690 1R    **Optoelectronic methods and tools for pipeline's internal surface diagnosis [10690-57]**
- 10690 1S    **Design and analysis of a simple augmented reality optical system with AMOLED microdisplay [10690-58]**
- 10690 1T    **An optical system for a selective laser melting technology [10690-59]**
- 10690 1U    **Temperature and coupling field analysis of ring resonator [10690-60]**
- 10690 1V    **Design of the augmented reality system with the smartphone as a source of image [10690-61]**
- 10690 1W    **Afocal compensators of optical systems aberrations [10690-62]**
- 10690 1X    **Optical design of a reflective omnidirectional optical system to be used simultaneously in visible and LWIR wavelength range [10690-63]**
- 10690 1Y    **Analysis and composing principles for HMD optics based on FLCOS and AMOLED [10690-64]**
- 10690 1Z    **Research methods for comparison of reconstructed by a hologram projector Fresnel images [10690-65]**
- 10690 20    **Design of the HMD systems based on AMOLED display with curved combiner [10690-66]**
- 10690 21    **Optical design and unification of optical systems of objectives for microscopes [10690-67]**
- 10690 24    **Parametric model of an optical system consisting of two and three reflecting surfaces and its analysis [10690-70]**
- 10690 25    **Advanced optical designs of curved detectors-based two-mirrors unobsured telescopes [10690-71]**
- 10690 27    **Optical design of a holographic head-mounted display with enhanced efficiency [10690-73]**

- 10690 29      **Optical design of imaging spectrometer for atmosphere monitoring from near-Earth orbit** [10690-75]
- 10690 2A      **Point spread function modeling for a free space optical system** [10690-76]
- 10690 2B      **Optimization of the uniformity of brightness distribution of abstract images with a high degree of self-similarity** [10690-77]
- 10690 2C      **MAORY optical design analysis and tolerances** [10690-78]
- 10690 2D      **Simulative experimental research on vibration compensation of satellite platform based on fiber-coupling using FFT-estimated method** [10690-79]
- 10690 2F      **Development of software for production of design documentation for aspherical optical components** [10690-81]
- 10690 2G      **Simulations and experimental control of x-ray deformable mirror** [10690-83]
- 10690 2H      **Use of computer graphics methods for efficient stray light analysis in optical design** [10690-84]
- 10690 2I      **Options of lightweight mirror design and mounting such mirrors in telescope** [10690-85]
- 10690 2K      **The benefits of a vertically integrated optical systems supplier** [10690-87]
- 10690 2L      **A lightweight mirror made of a magnesium alloy for space-borne telescopes and instruments** [10690-88]
- 10690 2O      **Infrared structure light projector design for 3D sensing** [10690-91]
- 10690 2P      **Analysis of Seidel aberration coefficients of thick lens with arbitrary focal length** [10690-92]
- 10690 2Q      **Off-axis surface tolerance analysis: tips and tricks** [10690-93]
- 10690 2R      **Design and analysis of silicon ring resonator for bio-sensing application** [10690-94]
- 10690 2S      **Optical design for the Giant Magellan Telescope Multi-object Astronomical and Cosmological Spectrograph (GMACS): design methodology, issues, and trade-offs** [10690-95]
- 10690 2T      **A modified Gerchberg-Saxton algorithm for design diffractive optical elements generating light distributions with submicron features** [10690-96]
- 10690 2U      **Development of a simple LDV system for tube micro particles flow rate measurement** [10690-98]



# Authors

Numbers in the index correspond to the last two digits of the seven-digit citation identifier (CID) article numbering system used in Proceedings of SPIE. The first five digits reflect the volume number. Base 36 numbering is employed for the last two digits and indicates the order of articles within the volume. Numbers start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B...0Z, followed by 10-1Z, 20-2Z, etc.

- Allanche, T., 0T  
Allioux, Renaud, 0N  
Amoroso, Marilena, 1L  
Ampleeva, Irina, 2B  
An, Da, 2D  
Andreev, Lev, 1W  
Arcidiacono, C., 2C  
Babington, James, 0F  
Baccani, Cristian, 0P  
Bakhordin, Alexey V., 1Y, 20  
Barbero, Sergio, 0K  
Barton, Jennifer K., 12  
Behaghel, Thibault, 25  
Berner, A., 0J  
Bini, A., 1J  
Bociort, Florian, 07  
Bogdanov, Nikolay N., 0I  
Boni, A., 1J  
Boukenter, A., 0T  
Bouret, Jean-Claude R., 1H  
Butova, Darya V., 2I  
Cariou, Nathan, 0N  
Casagli, Nicola, 0P  
Cen, Zhaofeng, 09  
Champagnat, Frédéric, 0R  
Chang, Chih-Sheng, 2O  
Chang, Keng-Ming, 2U  
Chen, Bo, 16  
Chen, Qi, 2G  
Chen, Yen-Nan, 0M  
Chernaya, Anastasiya S., 1R  
Chuhlamov, Anton, 24  
Ciliogi, P., 11, 2C  
Cook, Erika, 2S  
Cortecchia, F., 11, 2C  
Crabtree, Karlton, 1I  
Da Deppo, Vania, 2Q  
Dai, Xuezhi, 1U  
Dainty, Christopher, 0X  
Davies, Tom, 0G  
De Caprio, V., 11  
de la Barrière, Florence, 0R  
de Oliveira, Claudia Mendes, 2S  
DePoy, Darren L., 2S  
De Rosa, A., 11  
Diolaiti, E., 11, 2C  
Dmitriev, Vladimir, 0Y  
Dobrolenskiy, Yury, 29  
Druart, Guillaume, 0N, 0R  
Dziuban, Ilya, 29  
Efros, Aleksandr I., 20  
Ekimenkova, Alisa, 14  
Enya, K., 2L  
Esposito, S., 11, 2C  
Ezhova, Kseniia, 1Z, 24  
Ezhova, Vasilia, 1W  
Fabbri, Anna, 1L  
Faes, Daniel, 2S  
Feautrier, P., 11, 2C  
Fedorenko, Dmitriy, 24  
Fedorova, Anna, 29  
Ferrari, Marc, 1H, 25  
Filacchione, Gianrico, 1L  
Fitzgerald, Niamh M., 0X  
Fleysher, Alexander G., 2I  
Focardi, Mauro, 0P  
Fomchenkov, Sergey A., 0U, 2T  
Fonti, Sergio, 1L  
Frolov, Dmitry N., 21  
Frolov, Vladimir N., 21  
Froning, Cynthia, 2S  
Fuchs, U., 17  
Garshin, Aleksei S., 1Y, 20  
Gärtner, S., 0L  
Gengenbach, Ulrich, 1B  
Gibson, Megan, 1I  
Girard, S., 0T  
Goncharov, Alexander V., 0O, 0X  
Grange, Robert, 1H  
Greggio, D., 11, 2C  
Gross, Herbert, 0J, 0L, 0M, 1C, 1G  
Guérineau, Nicolas, 0R  
Guerri, Irene, 1L  
Guo, Meng, 0Z  
Guo, Xiaohu, 0Z  
Guseva, Alena, 2B  
Guskov, Ilya A., 27  
Hanford, Keith, 0C  
Hartmann, Peter, 0L, 0M  
Hayne, Paul O., 1I  
He, Fengyun, 2A  
Herkommer, Alois M., 16  
Hou, Zhe, 07  
Howard, Joseph M., 1D  
Hsu, Yu-Hsiang, 2U  
Hugot, Emmanuel, 1H, 25  
Ionov, Dmitry, 29  
Iureva, Radda A., 1Q, 1R

- Ivanov, Yuriy, 29  
 Jahn, Wilfried, 25  
 Ji, Tae-Geun, 2S  
 Jo, Jae Heung, 1X  
 Jones, Damein, 2S  
 Ju, Yun Jae, 1X  
 K., Narayan, 2R  
 Kallmann, Ulrich, 0G  
 Kang, Zuming, 0Z  
 Kärcher, Hans J., 0S  
 Kawamura, Y., 2L  
 Khmaladze, Alexander, 13  
 Khonina, Svetlana N., 0U  
 Khoo, Ting Chean, 13  
 Kirino, O., 2L  
 Koneva, Tatiana A., 1V  
 Kong, Lingqin, 0Z  
 Kononov, A. N., 1T  
 Korablev, Oleg, 29  
 Kozhina, Anastasiya D., 2F  
 Kunisch, T., 17  
 Landini, Federico, 0P  
 Lasfargues, Gilles, 0R  
 Lee, Chih-Kung, 2U  
 Lee, Hye-In, 2S  
 Lee, Kyu Hang, 1X  
 Lee, Shu-Sheng, 2U  
 Lefranc, Vincent, 0N  
 Lemaitre, Gerard, 1H  
 Lépine, T., 0T  
 Li, Mengnan, 2D  
 Li, Xiaotong, 09  
 Liu, Chang, 1G  
 Livshits, Irina, 07  
 Lombardo, Simona, 1H, 25  
 Lombini, M., 11, 2C  
 Lu, Guangfeng, 1U  
 Lu, Tielin, 0Z  
 Lyu, Bohan, 2O  
 M., Shwetha, 2R  
 Magli, Serge, 0R  
 Magrin, D., 11, 2C  
 Malka, Dror, 10  
 Maltseva, Nadezhda K., 1R  
 Marshall, Jennifer L., 2S  
 Matveev, Nikolai V., 2B  
 McFarland, John C., 13  
 Menke, Christoph, 1A  
 Mikš, Antonín, 2P  
 Moehl, A., 17  
 Moretti, Sandro, 0P  
 Moser, Daniel, 1B  
 Mugnuolo, Raffaele, 1L  
 Müller, C., 0T  
 Muslimov, Eduard R., 1H, 25, 27  
 Na, Gao, 1U  
 Nakagawa, H., 2L  
 Neiner, Coralie, 1H  
 Nguyen, Duy Hung, 1Z  
 Nikonorov, Oleg, 1Z  
 Noce, Vladimiro, 0P  
 Novák, Jirí, 2P  
 Novák, Pavel, 2P  
 Ochse, Dennis, 18  
 Oleszko, Mateusz, 1C  
 Ouerdane, Y., 0T  
 Paillet, P., 0T  
 Pak, Soojong, 2S  
 Pancrazi, Maurizio, 0P  
 Papa, Jonathan C., 1D  
 Papovich, Casey, 2S  
 Pasqui, C., 1J  
 Patti, M., 11, 2C  
 Pattnaik, Prasant Kumar, 2R  
 Perrault, Philippe, 0N  
 Petzold, U., 0L  
 Peykar Negar, Farroukh, 0S  
 Piccioni, Giuseppe, 1L  
 Plyer, Aurélien, 0R  
 Poberovsky, Anatoly, 29  
 Pokorný, Petr, 2P  
 Porfirev, Alexey P., 0U, 2T  
 Potemin, Igor S., 0I, 2H  
 Prochaska, Travis, 2S  
 Qiao, Yanfeng, 2A  
 Radaelli, E., 11  
 Ragazzoni, R., 11, 2C  
 Rahlves, Maik, 0D  
 Ran, Moshe, 10  
 Raskin, Evgenii O., 1R  
 Reddy, Navya Krishna, 2R  
 Reichel, Steffen, 0L, 0M  
 Reithmeier, Eduard, 0D  
 Ribeiro, Rafael A.S., 2S  
 Riva, M., 11  
 Rolland, Jannick P., 1D  
 Romano, Gabriella, 12  
 Romanova, Galina E., 1S, 1V, 1Y, 20, 2B  
 Romoli, Marco, 0P  
 Rossi, Guglielmo, 0P  
 Roth, Bernhard, 0D  
 Roulet, Melanie, 25  
 Rousset-Rouvière, Laurent, 0N  
 Sa, Renna, 0Z  
 Saggin, Bortolino, 1L  
 Salvatici, Teresa, 0P  
 Sanson, Mark C., 0C  
 Sasián, José, 15  
 Schill, David, 0G  
 Schmidt, Luke M., 2S  
 Schuster, Norbert, 08  
 Schwiegerling, Jim, 06  
 Seesselberg, Markus, 0Y  
 Sellar, R. Glenn, 1I  
 Sharikova, Anna, 13  
 Sheil, Conor J., 0O  
 Shukalov, Anatoly V., 1Y  
 Sidorov, Vitaly I., 1S  
 Sieber, Ingo, 1B  
 Smejkal, Filip, 2P

Smith, Christopher, 1I  
Souza, Aline, 2S  
Staloff, Daniel, 2K  
Starichenkova, Valentina D., 2I  
Stern, Uri, 0Y  
Stiller, Peter, 1B  
Suar, Monali, 0D  
Sun, Xiaoce, 0Z  
Syniavskyi, Ivan, 29  
Taiti, A., 1J, 1L  
Taylor, Keith, 2S  
Thiele, Simon, 16  
Timko, Andrei S., 1Q, 1R  
Timoshchuk, Irina, 24  
Tolstoba, Nadezhda D., 2F, 2I  
Tommasi, Leonardo, 1L  
Tosi, Federico, 1L  
Tsai, Meng-Ko, 2O  
Tsyganok, E. A., 1T  
Vakulov, Pavel S., 2I  
Vasilyev, Vladimir N., 1Y  
Vega, David, 12  
Veremenko, Andrey, 24  
Vinckier, Quentin, 1I  
Vinogradova, Olga A., 2I  
Voloboy, Alexey G., 0I, 2H  
Voznesenskaya, Anna, 14  
Vyazovetskiy, Nikita, 29  
Wang, Chun-Hsiung, 2U  
Wehmeier, Udo, 1I  
Welte, Joachim, 0Y  
Wickenhagen, S., 17  
Wu, Wen-Jong, 2U  
Xie, Chun, 2G  
Xu, Min, 16  
Yamamoto, T., 2L  
Yu, Xudong, 1U  
Zambelli, Massimo, 1L  
Zeng, Fei, 2A  
Zeng, Zhuoying, 2D  
Zhang, Yueqian, 0J, 0M  
Zhang, Zhong, 2G  
Zhao, Ji, 0Z  
Zhao, Nan, 2A  
Zhdanov, Andrey D., 0I, 2H  
Zhdanov, Dmitry D., 0I, 2H  
Zhu, Jingjing, 0Z  
Zhu, Weiwei, 0Z  
Zverev, Victor, 24



# Conference Committee

## Symposium Chair

**Wilhelm Ulrich**, Carl Zeiss AG (Germany)

## Symposium Co-chairs

**Juan Carlos Miñano**, Universidad Politécnica de Madrid (Spain)  
**David M. Williamson**, Nikon Research Corporation of America  
(United States)

## Honorary Symposium Chair

**Tina E. Kidger**, Kidger Optics Associates (United Kingdom)

## Conference Chairs

**Laurent Mazuray**, Airbus Defence and Space (France)  
**Rolf Wartmann**, Carl Zeiss Microscopy (Germany)  
**Andrew P. Wood**, Qioptiq Ltd. (United Kingdom)

## Conference Programme Committee

**Catherine Antier**, Thales Optronique S.A.S. (France)  
**Tobias Bauer**, Leica Microsystems GmbH (Germany)  
**Francoise Cau**, Sagem (France)  
**Andres F. Cifuentes**, ASE Optics Europe (Spain)  
**Andrew J. Court**, TNO (Netherlands)  
**Guillaume Dovillaire**, Imagine Optic SA (France)  
**Michael Duparré**, Friedrich-Schiller-Universität Jena (Germany)  
**Alain Durieux**, Sodern (France)  
**Regis Grasser**, CILAS (France)  
**Herbert Gross**, Friedrich-Schiller-Universität Jena (Germany)  
**Ullrich Krüger**, JENOPTIK Optical Systems GmbH (Germany)  
**Demetrio Labate**, Leonardo (Italy)  
**Paolo Laporta**, Politecnico di Milano (Italy)  
**Thierry Lépine**, Institut d' Optique (France) and Laboratoire Hubert Curien (France)  
**Kevin F. Middleton**, STFC Rutherford Appleton Laboratory  
(United Kingdom)  
**Takao Nakagawa**, Japan Aerospace Exploration Agency (Japan)  
**Iain A. Neil**, ScotOptix (Switzerland)  
**Thomas Nobis**, Carl Zeiss AG (Germany)  
**Jérôme Primot**, ONERA (France)  
**Jeffrey M. Raynor**, STMicroelectronics (R&D) Ltd. (United Kingdom)  
**Jannick P. Rolland**, University of Rochester (United States)  
**Elisabetta Rugi**, RUAG Holding AG (Switzerland)

**Simon Thibault**, Université Laval (Canada)  
**Min Wang**, INO (Canada)  
**Richard N. Youngworth**, Riyo-LLC (United States)  
**María J. Yzuel**, Universitat Autònoma de Barcelona (Spain)

Session Chairs

- 1 Design Methods I  
**Rolf Wartmann**, Carl Zeiss Microscopy GmbH (Germany)
- 2 Design Methods II  
**Alessio Taiti**, Leonardo (Italy)
- 3 Design Methods III  
**Rolf Wartmann**, Carl Zeiss Microscopy GmbH (Germany)
- 4 Design Methods IV  
**Andrew P. Wood**, Excelitas Qioptiq (United Kingdom)
- 5 Design Solutions I  
**Andrew P. Wood**, Excelitas Qioptiq (United Kingdom)
- 6 Design Solutions II  
**Laurent Mazuray**, Airbus Defence and Space (France)
- 7 Design Solutions III  
**Richard N. Youngworth**, Riyo LLC (United States)
- 8 Design Solutions IV  
**Rolf Wartmann**, Carl Zeiss Microscopy GmbH (Germany)
- 9 Freeforms I  
**Thierry Lépine**, Laboratoire Hubert Curien (France)
- 10 Freeforms II  
**Herbert Gross**, Friedrich-Schiller-Universität Jena (Germany)
- 11 Freeforms III  
**Laurent Mazuray**, Airbus Defence and Space (France)
- 12 Space Applications I  
**Laurent Mazuray**, Airbus Defence and Space (France)
- 13 Space Applications II  
**Laurent Mazuray**, Airbus Defence and Space (France)