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John R. Rogers, Ph.D.

Professional Experience

2010-Present	Principal Engineer/Imaging, Synopsys OSG
2005-2010	Principal Engineer/Imaging, Optical Research Associates
2001-2005	Director, Photonic and Imaging Engineering Services, Optical Research Associates
1997-2001	Assistant Director of Optical Engineering Services, Optical Research Associates
1991-1997	Optical Engineer, Leica AG
1989-1991	Head, Optical Design and Metrology, Leica Aarau (formerly Kern and Co. AG)
1988-1989	Optical Designer, Leica AG (formerly Wild Leitz AG)
1984-1988	Assistant Professor, Institute of Optics, University of Rochester
1983-1984	Optical Designer, Kern Co., AG
1978-1983	Research Assistant, University of Arizona
1977-1978	Mathematician, Computer Sciences Corporation
1976-1977	Programmer, David Taylor Naval Ship R & D Center

Education

1983	Ph.D. Degree in Optics, University of Arizona
1981	M.S. Degree in Optics, University of Arizona
1976	B.S. Degree in Mathematics, Virginia Polytechnic Institute

Dr. Rogers is experienced in optical design from the conceptual stage through assembly and alignment. He has designed and toleranced such diverse systems as 3D imaging for clinical dental use, ophthalmic surgical systems, biocular and binocular systems, FLIR systems, head-up and helmet-mounted displays, zoom lenses, diffractive systems, and systems using Gradient Index (GRIN) lenses. He has hands-on experience in the alignment and testing of optical systems.

Dr. Rogers was an early adopter of Nodal Aberration Theory. In 1986 he demonstrated for the first time that a tilted and/or decentered optical system could be arranged to have aberration patterns that mimic those of a rotationally symmetric system.

In the area of non-imaging optics, he has designed and analyzed systems for illumination and fluorescence detection for a space borne application, as well as a collection system for an airborne LIDAR application.

In addition to optical design, he has substantial experience in interferometry, optical testing, as well as optical fabrication. He has hands-on experience with interferometers from the deep UV to the thermal IR, differential interference microscopes, as well as MTF and distortion test equipment. He has designed software for phase shifting interferometers, and has designed systems for optical alignment using optical coherence tomography.

Dr. Rogers has actively researched design techniques for rotationally non-symmetric optical systems, and has taught optical testing, geometrical optics, and lens design at the university level. He has developed algorithms for the reduction of tolerance sensitivity, for athermalization, as well as for the automatic selection of optical glasses.

Patents

US 9,367,648	Specification-guided user interface for optical design systems
US 8,842,272 B2	Apparatus for euv imaging and methods of using same
US 7,360,899 B2	Beamsplitting structures and methods in optical systems
US 7,230,766 B2	Optical Combiner Designs and Head Mounted Displays
US 7,196,849	Apparatus and methods for illuminating optical surfaces
US 6,612,693	Panoramic reverse Galilean telescope optics for an underwater diving mask
US 6,337,765 B1	Stereomicroscope
US 6,297,497	Method and device for determining the direction in which an object is located
US 6,069,733 A	Stereomicroscope
US 6,043,890 A	Arrangement for Determining the Position of a Surgical Microscope
US 5,953,114	Method of determining measurement-point position data and device for measuring the magnification of an optical beam path
US 5, 841,149	Method of Determining the Distance of a Feature of an Object from a Microscope, and a Device for Carrying Out the Method
WO9745700 A1	Optical sensor for tracking an aiming mark
WO9745701 A1	Optical sensor for determining the angle of inclination
WO9745706 A1	Optical sensor for finding the angle of rotation of a rotary axis

Publications

J. R. Rogers, “Lens design through the ages” Plenary paper, SPIE Optical Systems Design, 2021 Proc. SPIE 11871, Optical Design and Engineering VIII; 1187104 (2021) https://doi.org/10.1117/12.2614768

J. R. Rogers, “Surface slope tolerances: the transition from geometric raytracing to scalar wave theory” Invited paper, Proc. SPIE 11813, Tribute to James C. Wyant: The Extraordinaire in Optical Metrology and Optics Education; 118130Q (2021) https://doi.org/10.1117/12.2567548

J. R. Rogers, “Surface slope error tolerances: applicable range of spatial frequencies” Invited paper, International Optical Design Conference - IODC 2021, Proc. SPIE 12078 (2021) https://doi.org/10.1117/12.2603663

B. G. Crowther, J. R. Rogers, J. M. Rodgers, M. Ravine, J. Bell III, J. Laramee, J. N. Maki “Optical design of the Mastcam-Z lenses” International Optical Design Conference - IODC 2021, SPIE Proc. 12078(2021); https://doi.org/10.1117/12.2603621

A. Rakich, J. R. Rogers, “A Maxwellian ‘ideal imager’ optical relay suitable for AO applications. Proc. SPIE 11451, Advances in Optical and Mechanical Technologies for Telescopes and Instrumentation IV;(2020) https://doi.org/10.1117/12.2562136

A. Rakich, J. R. Rogers , “A generalized Offner relay with an accessible pupil” Proc. SPIE. 11451, 114510B (2020) https://doi.org/10.1117/12.2561302

A. Rakich, J. R. Rogers, "Aberration theory-based approaches to optical design," Proc. SPIE 11548, Optical Design and Testing X, 115480M (10 October 2020); https://doi.org/10.1117/12.2573666

J. R. Rogers, A. Rakich, "The importance of Petzval correction in generalized Offner designs," Proc. SPIE 11482, Current Developments in Lens Design and Optical Engineering XXI, 1148207 (21 August 2020);

https://doi.org/10.1117/12.2567569

J. R. Rogers, "Tolerance eigenmodes of optical systems," Proc. SPIE 11488, Optical System Alignment, Tolerancing, and Verification XIII, 114880A (20 August 2020); https://doi.org/10.1117/12.2567176

J. R. Rogers, “An Optically Athermalized Lens Covering a 200ºC Temperature Range” poster paper, ICSO conference, 2018

J. R. Rogers, “Origins and Fundamentals of Nodal Aberration Theory”, International Optical Design Conference, 2017

J. R. Rogers, “Global optimization and desensitization” , Proc. SPIE 9633, Optifab 2015, 96330S (2015)

J. R. Rogers, “Compensator selection considerations for a zoom lens”, Proc. SPIE. 9580, Zoom Lenses V, 958009. (2015)

J. R. Rogers, “Slope Sensitivities for Optical Surfaces” Proc. SPIE. 9582, Optical System Alignment, Tolerancing, and Verification IX, 958206. (2015)

J. R. Rogers, “Optimization of as-built performance”, EOS Annual Meeting (Invited, 2014)

J. R. Rogers, “Passive athermalization: Required accuracy of the thermo-optical coefficients” *Proc. SPIE*. 9293, International Optical Design Conference 2014, 92931A. (2014)

J. R. Rogers, “Secondary color correction and tolerance sensitivity: What can you get away with?” Invited paper, Proc. SPIE 8844, 884404 (2013)

J. R. Rogers, “The importance of induced aberrations in the correction of secondary color”, Adv.Opt.Techn. 2(1), p. 41-51 (2013)

J. R. Rogers, “Modeling homogeneity for elements made of block glass”, EOS OSJ (2012)

J. R. Rogers, “Orthogonal polynomials and tolerancing”, Invited paper, Proc. SPIE 8131, 81310D (2011)

J. R. Rogers, “Homogeneity tolerances for Optical Elements”, Invited paper, SPIE Optifab_TD-0736.pdf (2011)

T. Kuper and J. R. Rogers, "Automatic Determination of Optimal Aspheric Placement," International Optical Design Conference, OSA Technical Digest (CD) (Optical Society of America, 2010), paper IThB3.

J. R. Rogers, “A Comparison of Anamorphic and Keystone-Distorted Surface Types for Aberration Correction," in International Optical Design Conference, OSA Technical Digest (CD) (Optical Society of America, 2010), paper IMC2.

J. R. Rogers, “Aktuelle Entwicklungen in der Optikdesignsoftware,” Invited paper, German Optical Society meeting, Wetzlar, Germany (May 2010).

O. Cakmakci, J.P. Rolland, K.P. Thompson and J. R. Rogers, "Design efficiency of 3188 optical designs," SPIE 7060, 70600S, 2008.

J. R. Rogers, “Slope Tolerances," 2008 Invited Paper, ODF08 Taipei, 2008.

J. R. Rogers, "Three-bar resolution versus MTF: how different can they be anyway?" SPIE 7071(1), (2008).

J. R. Rogers, “Slope error tolerances for optical surfaces,” Invited paper SPIE Technical Digest TD04-04, (2007).

J. R. Rogers, "Using Global Synthesis to Find Tolerance-Insensitive Design Forms," Proc. SPIE 6432, 63420M1- 63420M11 (2006).

J. R. Rogers, "Design of an advanced helmet mounted display (AHMD)," Proc. SPIE 5801 p.304-315, (2005).

J. R. Rogers, "Using Nodal Aberration Theory for Optical Design," in Robert Shannon and Roland Shack, Legends in Applied Optics, J. Harvey and R.B. Hooker, eds., SPIE, Bellingham WA, (2005)

J. R. Rogers, "Techniques for the design of tilted-component systems” presented at ODF Japan, 2002

J. R. Rogers, "How to Talk to an Optical Design Consultant," OSA Annual Meeting, Long Beach, CA, (2001).

J. R. Rogers, "Design of a wide-field, unity magnification dive mask," Proc. SPIE 5962, (2005).

J. R. Rogers, “Neue Entwicklungen und zukunftige Trends in der Optikdesignsoftware,” German Optical Society meeting, Gottingen, (June 2001).

J. R. Rogers, “Techniques and Tools for Obtaining Symmetrical Performance from Tilted-Component Systems,” Optical Engineering 39,7, 1776-1787 (2000).

J. R. Rogers, “Design techniques for systems containing tilted components” SPIE 3737, p. 286 (1999);

M. Gale, M. Rossi, M. Scheidt, L. Stauffer, and J. R. Rogers, “Integrated Micro-Optical Systems Fabricated by Replication Technology,” Presented at IODC Conference, Proc. SPIE 3482, (1998).

M. Hopler and J. R. Rogers, “Interferometric Measurement of Group and Phase Refractive Index,” Applied Optics 30, 7, pp.735-744, (1991).

J. R. Rogers, “Optical Lenses,” in The Handbook of Microwave and Optical Components, K. Chang, ed. Wiley and Sons, Inc., New York (1989).

D. Buralli, G. M. Morris, and J. R. Rogers, “Optical Performance of Holographic Kinoforms,” Applied Optics 28, 5, 976, (1989).

D. Buralli and J. R. Rogers, “Some Fundamental Limitations of Achromatic Holographic Systems,” Journal of the Optical Society of America 6, 1863, (1989).

J. R. Rogers, M. Harrigan and R. Loce, “The Y-Y Diagram for Radial Gradient Systems,” Applied Optics 27, 3, 452, (1988).

M. Harrigan, R. Loce, and J. R. Rogers, “Use of the Y-Y Diagram to GRIN Rod Design,” Applied Optics 27, 3, 459, (1988).

J. R. Rogers and M. Hopler, “Conversion of Group Refractive Index to Phase Refractive Index,” Journal of the Optical Society of America 5, 10, 1595, (1988).

J. R. Rogers and S. Tachihara, “Practical Tilted Mirror Systems,” Proc. SPIE 679, 12, (1986).

J. R. Rogers, “Vector Aberration Theory and the Design of Off-Axis Systems,” Proc. SPIE 554, 76, (1985).

J. R. Rogers, “Aberrations of Optical Systems with Large Tilts and Decentrations,” Proc. SPIE 399, 272, (1983).

J. R. Rogers, “Fringe Shifts in Multiple Beam Fizeau Interferometry,” Journal of the Optical Society of America, 72, 638, (1982).

Awards

SPIE Rudolf and Hilda Kingslake Award in Optical Design (2020)

Professional Societies

Fellow,	SPIE
Member	Optical Society of America
Member	German Society for Applied Optics

Professional Activities

Co-chair, 2017 and 2021 Freeform Conferences
Co-chair, 2014 and 2017 International Optical Design Conference
Reviewer, JOSA A, Optics Express, Optics Letters
Guest Editor, Optical Engineering (2018)
Guest Editor, Advanced Optical Technologies, (2013)
Speaker, Optical Society of Southern California (2016)
Past convener (1992 – 1997), ISO TC172 SC1 WG2