

O P T I C A L  

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R E S E A R C H  

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A S S O C I A T E S

**Thomas I. Harris**

**Professional Experience**

2008-Present	Founder and Chairman Emeritus, Optical Research Associates
2000-2008	Chairman and Founder, Optical Research Associates
1991-2000	Chairman and Chief Executive Officer, Optical Research Associates
1963-1991	President, Optical Research Associates
1960-1963	Senior Research Mathematician, Bell and Howell Research Center
1959-1960	Chief Optical Designer, Bell and Howell Company
1958-1959	Senior Optical Designer, Bell and Howell Company
1953-1958	Optical Designer, Bell and Howell Company

**Education**

1958	M.S. Degree in Physics and Optics, University of Rochester
1952	B.S. Degree in Physics, University of Wisconsin

Mr. Harris, founder of Optical Research Associates (ORA®) in 1963, has served as the senior officer of the company and specifically as Chairman and Chief Executive Officer until 2008. He has provided expert financial management and corporate development significantly during recent years, guiding ORA to leadership in the optics industry, both as the world's largest independent optical engineering services organization and as the developer of the world's leading optical design software package.

Mr. Harris continues to have a strong interest in technical developments, as a scientist and engineer. His technical achievements in optical systems design include photographic objectives for high acuity applications, fire control, instrumentation and remote TV systems. Other designs have applied to illumination systems (solar simulators, illuminators for lithography, and condensers for projection systems), special systems employing unusual surface shapes, e.g. aspherics in aerial reconnaissance systems, cylindrical surfaces in anamorphic systems, oscillographic recording instruments and prisms. He has addressed design problems associated with UV and IR and systems requiring precision correction of secondary chromatic effects over broad wavelength bands, e.g. long focal length, ultra wide angle and zoom lenses.

For over 35 years he has done research and development in automatic optical design methods leading to optimization techniques currently employed in ORA's CODE V® optical software. His activities have also included development of solids modeling capability, and improvements in structure and documentation for CODE V. He has contributed to global optimization techniques, diffraction based image evaluation programs for both centered and decentered optical systems, tolerancing methods, environmental and narcissus calculations, color graphic displays of aberration and surface maps, superior modeling of partial dispersions of optical glasses, and the numerical analysis embodied in other sections of CODE V. His current contributions are directed toward embedding lens design expertise and advice to the user in the program.

## **Thomas I. Harris (Continued)**

### **Awards/Honors**

- 1998 SPIE's Gold Medal, for lifetime achievement in lens design, and continuous service to optical engineering through SPIE
- 1998 Distinction of Photonics Award, Laurin Publishing
- 1997 Fellow, Optical Society of Southern California
- 1995 Life Member, SPIE
- 1992 SPIE President's Award, for unique and meritorious service of outstanding benefit to the Society
- 1990 Joseph Fraunhofer Award, OSA, for fundamental contributions to development of automated optical design tools
- 1986 Fellow, SPIE
- 1984 Co-Recipient (with D. Gustafson) of SPIE Technology Achievement Award for the Development of the CODE V Optical Software Program
- 1980 Fellow, OSA

### **Patents**

- U.S. 4,249,805 Composite Photography System - Includes optical system that can be used for scanning probes for simulators (co-inventor).
- U.S. 3,059,532 Optical System - Afocal telephoto attachment for 16 mm camera objectives.
- U.S. 3,038,378 Variable Focal Length Objective - Zoom system of high quality featuring an unusually-low variation of distortion (co-inventor).
- U.S. 3,029,699 Wide Angle Lens System - High aperture (f/1.0) and wide angle (140°) lens system for missile scoring applications (co-inventor).
- U.S. 2,962,931 Optical Objective - Remote TV camera lens for military application with requirements for compactness and unusual optical train.
- U.S. 2,956,475 Wide Angle Lens Attachment - Afocal system for either spherical or cylindrical (anamorphic) lenses (co-inventor).

### **Publications/Presentations**

- "A Journey in Optical Design" SPIE Gold Medal Address, Presented at the SPIE Annual Meeting, July, 1998.
- "A Practical Strategy for Global Optimization of Zoom Lenses," (with T. Kuper), Presented at the International Optical Design Conference, Kona, HI, SPIE Proceedings, Vol. 3482, 1998.
- "Developing a Medium Size High Technology Company," Presented at the OSSC, April 3, 1996.
- "How Effective Can Global Optimization Be for Lens Design?" (with T. Kuper), Presented at the OSA Annual Meeting, Portland, OR, 1995.
- "Practical Lens Design Using a Global Method," (with R. Hilbert and T. Kuper) Presented at the Optical Symposium of the Optical Society of Japan, Japan Society of Applied Physics, Tokyo, Japan, June 8, 1993.

## **Thomas I. Harris (Continued)**

“Global Optimization for Lens Design – An Emerging Technology,” (with T. Kuper) Invited Paper, Presented at the International Symposium on Optical Systems Design, Berlin, Germany, 1992.

“Photonics Design: A New Look at Global Optimization for Optical Design,” (with T. Kuper) Photonics Spectra, Vol. 26, 1992, p. 151.

“Overview of CODE V Development,” SPIE Proceedings, Vol. 1354, 1991, p. 104.

Principal author/editor of “CODE V Reference Manual” and “CODE V Prompting Guide,” Optical Research Associates, 1985 to present.

“New Developments in CODE V Optimization,” SPIE Proceedings, Vol. 237, 1980, p.11.

“The Use of Dedicated Computers in Optical Design, CODE V,” Invited Paper, OSA International Lens Design Conference, Haverford, PA, June 1975.

“Optical Design of an Imaging Spectral Radiometer for Earth Resources Applications,” (with F. S. Reynard and H. D. Wolpert), SPIE Proceedings, Vol. 27, 1971, p. 117. F. S. Reynard F. S. Reynard

“Evolution of a Spectroradiometer,” Paper presented at the OSA Lens Design Technical Group, Ottawa, Canada, October 1971.

“Application of Variable Optics to Solar Simulation Systems for Generation of High Intensity Light Beams,” (with M. Wilson), Paper presented at AIAA/ASTM/IES 4th Space Simulation Conference, Los Angeles, CA, September 1969.

“Automatic Design - Facts and Fallacies,” Paper presented at University of Rochester Lens Design Conference, July 1966.

“Modulation Transfer Functions of Unusual Aperture Shapes,” (with D. Gustafson) Paper presented at Washington OSA Meeting, March 1966.

“Conjugate Direction Methods in Automatic Design,” Paper presented at Pittsburgh OSA Meeting, March 1961.

“Scientific Design Procedures Utilizing a Small Computer,” Invited Paper, Armour Research Foundation, Computer Applications Symposium, 1959.

“Use of Aspheric Corrector Plates for Improvement of Simple Lens Systems,” M.S. Thesis, University of Rochester, 1958.

## **Professional Societies**

SPIE - The International Society for Optical Engineering  
1998 - 2002 Chairman, Audit Committee  
1995 Life Member  
1985 - 1995 Treasurer/Governor  
1986 Fellow

OSA - Optical Society of America  
1982 - 1984 Financial and Investment Committee  
1980 Fellow  
1973 - 1975 Chairman, Optical Design Technical Group