

Optical Design

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Geometrical optics, on which much of optical system design is based, is a venerable branch of physics and mathematics. However, despite the longevity of the discipline, technological advances continue to shape the field of optical system design. The papers in this special section give interesting insights into the past, overviews of how technology has shaped the field in our lifetime, as well as a glimpse into future directions of optical design.

Evidence of the deep roots of geometrical optics is given in the paper by Giuseppe Molesini, where early advances on the understanding of rays are described. The works of luminaries such as Galileo, Kepler, and Descartes figure prominently in this paper. A 20th century luminary in the field of lens design, Rudolph Kingslake, is the subject of another historical paper by R. Barry Johnson. In that paper, Kingslake's early work is described, done before coming to the United States to join the University of Rochester. In that work you can clearly see the portents of what was to become a long and distinguished career.

More recent history is the subject of an interesting paper by Iain Neil, in which he describes how technological advancements have influenced optical design over the past 30 years. One advancement discussed in that paper, namely the increased ability to manufacture and test aspheric surfaces, has enabled the use of aspheric surfaces to improve quality, reduce the number of elements, or both. This trend is

emphasized in the work described in a separate paper by Chris Bigwood and Andrew Wood on two-element lens systems for military applications. These two-element lens systems can be made surprising high performance with reduced weight, cost, and size.

A more recent, forward-looking trend is represented in the paper by Peter Goldstein on freeform Fresnel lenses. Freeform lenses appear set to become more widespread, not only in nonimaging applications, but also for imaging systems. This paper offers an interesting design approach for freeform analogs of the classical Fresnel lens.

Our thanks to the authors who contributed to this special section, as well as the reviewers and the staff at SPIE. We hope that you find the papers as interesting as we have.

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