Applied Optics And Optical Design Part Two Dover Books On Physics

Handbook of Optical Design, Third Edition covers the fundamental principles of geometric optics and their application to lens design in one volume. It incorporates classic aspects of lens design along with important modern methods, tools, and instruments, including contemporary astronomical telescopes, Gaussian beams, and computer lens design. Written by respected researchers, the book has been extensively classroom-tested and developed in their lens design courses. This well-illustrated handbook clearly and concisely explains the intricacies of optical system design and evaluation. It also discusses component selection, optimization, and integration for the development of effective optical apparatus. The authors analyze the performance of a wide range of optical materials, components, and systems, from simple magnifiers to complex lenses used in photography, ophthalmology, telescopes, microscopes, and projection systems. Throughout, the book includes a wealth of design examples, illustrations, and equations, most of which are derived from basic principles. Appendices supply additional background information. What's New in This Edition Improved figures, including 32 now in color Updates throughout, reflecting advances in the field New material on Buchdahl high-order aberrations Expanded and improved coverage of the calculation of wavefront aberrations based on optical path An updated list of optical materials in the appendix A clearer, more detailed description of primary aberrations References to important new publications Optical system design examples updated to include newly available glasses 25 new design examples This comprehensive book combines basic theory and practical details for the design of optical systems. It is an invaluable reference for optical students as well as scientists and engineers working with optical instrumentation. Miniaturization and mass replications have begun to lead the optical industry in the transition from traditional analog to novel digital optics. As digital optics enter the realm of mainstream technology through the worldwide sale of consumer electronic devices, this timely book aims to present the topic of digital optics in a unified way. Ranging from micro-optics to nanophotonics, and design to fabrication through to integration in final products, it reviews the various physical implementations of digital optics in either micro-refractives, waveguide (planar lightwave chips), diffractive and hybrid optics or sub-wavelength structures (resonant gratings, surface plasmons, photonic crystals and metamaterials). Finally, it presents a comprehensive list of industrial and commercial applications that are taking advantage of the unique properties of digital optics. Applied Digital Optics is aimed primarily at optical engineers and product development and technical marketing managers; it is also of interest to graduate-level photonics students and micro-optic foundries. Helps optical engineers review and choose the appropriate software tools to design, model and generate fabrication files. Gives product managers access to an exhaustive list of applications available in today's market for integrating such digital optics, as well as where the next potential application of digital optics might be. Provides a broad view for technical marketing managers in all aspects of digital optics, and how such optics can be classified. Explains the numerical implementation of optical design and modelling techniques. Enables micro-optics foundries to integrate the latest fabrication and replication techniques, and accordingly fine tune their own fabrication processes. The Latest Advances in Optical Engineering and Lens Technology Long-established as the definitive optics text and reference, Modern Optical Engineering has been completely revised and updated to equip you with all the latest optical and lens advances. The Fourth Edition now contains cutting-edge information on optical engineering theory, design, and practice, including new chapters on ray tracing, optical system design, and third-order aberration theory. Written by the renowned optical scientist Warren J. Smith, this state-of-the-art guide provides unsurpassed coverage of image formation, basic optical devices, image evaluation, fabrication and testing methods, and more. Comprehensive and up-to-date, Modern Optical Engineering features: The latest information on optical engineering theory, design, and practice Over 150 detailed illustrations New to this edition: new coverage of ray tracing, optical system design, and third-order aberration theory; new lens designs; new optical design software; and new problems and exercises Inside This Updated Optical Engineering Classic • Image formation • Aberrations • Prisms and mirrors • The eye • Stops and apertures • Optical materials • Interference coatings • Radiometry and photometry • Basic optical devices • Optical systems • Ray tracing • Third-order aberration theory • Image evaluation • Design of optical systems • 44 lens designs • Optics fabrication and testing Thoroughly revised and expanded to reflect the substantial changes in the field since its publication in 1978 Strong emphasis on how to effectively use software design packages, indispensable to today's lens designer Many new lens design problems and examples – ranging from simple lenses to complex zoom lenses and mirror systems – give insight for both the newcomer and specialist in the field Rudolf Kingslake is regarded as the American father of lens design; his book, not revised since its publication in 1978, is viewed as a classic in the field. Naturally, the area has developed considerably since the book was published, the most obvious changes being the availability of powerful lens design software packages, theoretical advances, and new surface fabrication technologies. This book provides the skills and knowledge to move into the exciting world of contemporary lens design and develop practical lenses needed for the great variety of 21st-century applications. Continuing to focus on fundamental methods and procedures of lens design, this revision by R. Barry Johnson of a classic modernizes symbology and nomenclature, improves conceptual clarity, broadens the study of aberrations, enhances discussion of multi-mirror systems, adds tilted and decentered systems with eccentric pupils, explores use of aberrations in the optimization process, enlarges field flattener concepts, expands discussion of image analysis, includes many new exemplary examples to illustrate concepts, and much more. Optical engineers working in lens design will find this book an invaluable guide to lens design in traditional and emerging areas of application; it is also suited to advanced undergraduate or graduate course in lens design principles and as a self-learning tutorial and reference for the practitioner. Rudolf Kingslake (1903-2003) was a founding faculty member of the Institute of Optics at The University of Rochester (1929) and remained teaching until 1983. Concurrently, in 1937 he

became head of the lens design department at Eastman Kodak until his retirement in 1969. Dr. Kingslake published numerous papers, books, and was awarded many patents. He was a Fellow of SPIE and OSA, and an OSA President (1947-48). He was awarded the Progress Medal from SMPTE (1978), the Frederic Ives Medal (1973), and the Gold Medal of SPIE (1980). R. Barry Johnson has been involved for over 40 years in lens design, optical systems design, and electro-optical systems engineering. He has been a faculty member at three academic institutions engaged in optics education and research, co-founder of the Center for Applied Optics at the University of Alabama in Huntsville, employed by a number of companies, and provided consulting services. Dr. Johnson is an SPIE Fellow and Life Member, OSA Fellow, and an SPIE President (1987). He published numerous papers and has been awarded many patents. Dr. Johnson was founder and Chairman of the SPIE Lens Design Working Group (1988-2002), is an active Program Committee member of the International Optical Design Conference, and perennial co-chair of the annual SPIE Current Developments in Lens Design and Optical Engineering Conference. Thoroughly revised and expanded to reflect the substantial changes in the field since its publication in 1978 Strong emphasis on how to effectively use software design packages, indispensable to today's lens designer Many new lens design problems and examples – ranging from simple lenses to complex zoom lenses and mirror systems – give insight for both the newcomer and specialist in the field Gets you quickly up to speed with the theoretical and practical aspects of free space optical systems engineering design and analysis One of today's fastest growing system design and analysis disciplines is free space optical systems engineering for communications and remote sensing applications. It is concerned with creating a light signal with certain characteristics, how this signal is affected and changed by the medium it traverses, how these effects can be mitigated both pre- and post-detection, and if after detection, it can be differentiated from noise under a certain standard, e.g., receiver operating characteristic. Free space optical systems engineering is a complex process to design against and analyze. While there are several good introductory texts devoted to key aspects of optics—such as lens design, lasers, detectors, fiber and free space, optical communications, and remote sensing—until now, there were none offering comprehensive coverage of the basics needed for optical systems engineering. If you're an upper-division undergraduate, or first-year graduate student, looking to acquire a practical understanding of electro-optical engineering basics, this book is intended for you. Topics and tools are covered that will prepare you for graduate research and engineering in either an academic or commercial environment. If you are an engineer or scientist considering making the move into the opportunity rich field of optics, this all-in-one guide brings you up to speed with everything you need to know to hit the ground running, leveraging your experience and expertise acquired previously in alternate fields. Following an overview of the mathematical fundamentals, this book provides a concise, yet thorough coverage of, among other crucial topics: Maxwell Equations, Geometrical Optics, Fourier Optics, Partial Coherence theory Linear algebra, Basic probability theory, Statistics, Detection and Estimation theory, Replacement Model detection theory, LADAR/LIDAR detection theory, optical communications theory Critical aspects of atmospheric propagation in real environments, including commonly used models for characterizing beam, and spherical and plane wave propagation through free space, turbulent and particulate channels Lasers, blackbodies/graybodies sources and photodetectors (e.g., PIN, ADP, PMT) and their inherent internal noise sources The book provides clear, detailed discussions of the basics for free space optical systems design and analysis, along with a wealth of worked examples and practice problems—found throughout the book and on a companion website. Their intent is to help you test and hone your skill set and assess your comprehension of this important area. Free Space Optical Systems Engineering is an indispensable introduction for students and professionals alike.

Applied Optics and Optical Engineering, Volume VIII covers topics on photographic lenses; lens mounting and centering; and aspheric surfaces. The book also presents automated lens design; radiometry; and the calculation of image quality. Topics on circuits for detectors of visible radiation, as well as arrays and charge-coupled devices are also encompassed. Practicing optical engineers will find the book invaluable.

Appendices in part 2

A textbook for elementary optical design that treats lasers, modulators, and scanners as part of the design process. Moves from the simplest concepts in optics to a basic understanding of ray tracing in optical systems, the components of those systems, and the process by which a design is produced. Features numerous problems, examples, and figures.

This tribute volume honors two icons in the world of applied optics: Robert (Bob) Shannon and Roland Shack. The result of an August 2004 tribute conference held at the SPIE Optical Science and Technology meeting, the volume contains both technical and nontechnical papers by the honorees' former students and colleagues at the University of Arizona's Optical Sciences Center (OSC). The papers divulge the origin and development of such technologies as the Multiple Mirror Telescope (MMT) and the Shack-Hartmann Wavefront Sensor, as well as shed light on the formative years of the OSC. In addition to the original material, the volume contains a collection of previously published milestone papers authored by Bob Shannon, Roland Shack, or their former students.

Classic detailed treatment for practical designer. Fundamental concepts, systematic study and design of all types of optical systems. Reader can then design simpler optical systems without aid. Part Two of Two.

From basic terms and concepts to advanced optimization techniques-a complete, practical introduction to modern geometrical optics Most books on geometrical optics present only matrix methods. Modern Geometrical Optics, although it covers matrix methods, emphasizes y-nu ray tracing methods, which are used most commonly by optical engineers and are easier to adapt to third-order optics and y-??? diagrams. Moving by logical degrees from fundamental principles to advanced optical analysis and design methods, this book bridges the gap between the optical theory taught in introductory physics texts and advanced books on lens design. Providing the background material needed to understand advanced material, it covers important topics such as field of view, stops, pupils and windows, exact ray tracing, image quality, and optimization of the image. Important features of Modern Geometrical Optics include: * Examples of all important techniques presented * Extensive problem sets in each chapter * Optical

analysis and design software * Chapters covering y-??? diagrams, optimization, and lens design This book is both a primer for professionals called upon to design optical systems and an ideal text for courses in modern geometrical optics. Companion Software Special lens design and analysis software capable of solving all problems presented in the book is available via Wiley's FTP site. This software also serves as an introduction to the use of commercial lens design software. Appendix C is a user's manual for the software.

Applied Optics and Optical Engineering, Volume VI is an 11-chapter text that covers the principles and design of some optical devices and systems. The first three chapters deal with the principles, mode of operation, and application of several types of lasers, such as solid-state, gas, and semiconductor diode lasers. These topics are followed by the presentation of the physics and engineering of acousto-optic systems and coherent light valves. A chapter provides the fundamental considerations of the principles of scanning devices and systems, including the light beam, the scanning motions and patterns, and optical, mechanical, and electronic engineering considerations. The discussion then shifts to the potential applications of coherent optical processing techniques in mapping and the infrared detectors to the optical engineer. The remaining chapters examine the principles and applications of optical holography, image intensifiers, and fiber optics. This book is of great benefit to applied scientists and engineers who are interested in the conceptualization and design of new instruments and systems of coherent optics.

Applied Optics and Optical Engineering, Volume VII discusses the developments and improvements in some areas of applied optics. This book contains eight chapters that tackle the concepts, techniques, and process vital to optical engineering design. This book deals first with the luminous properties and spectral radiance of incoherent light sources, followed by an overview of plastic optical components. The subsequent chapters describe the refractive and reflective characteristics of various optical materials, such as optical glass, crystals, and vitreous silica glass. These topics are followed by a discussion on the macro- and micro-image properties and signal-to-noise transfer during photographic recording, which are crucial to the proper utilization of photographic materials in optical applications. This volume further provides the tools required for the analysis of the propagation of laser beams. A chapter explores the scalar and vector scattering theories for light scattering calculation of correlated surface microirregularities. The final chapter emphasizes the significant role of adaptive optical techniques for wave-front correction and removal of deleterious phase perturbations. This book will be greatly appreciated by applied scientists and optical engineers.

This work covers spatial frequency, spread function, wave aberration, and transfer function - and how these concepts are related in an optical system, how they are measured and calculated, and how they may be useful.

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