Lens Design Fundamentals

Lens Design FundamentalsLens Design FundamentalsLens Design BasicsOptical Design Fundamentals for Infrared SystemsOptical Engineering FundamentalsIntroduction to Lens DesignIntroduction to Radiometry and Photometry, Second EditionInternational Lens Design ConferenceFoundations of Optical System Analysis and DesignOptical DesignLens Design for ImagingModern Lens DesignCurrent Developments in Lens Design and Optical Systems EngineeringModern Classical Optical System DesignOptical Design Methods, Applications, and Large OpticsHandbook of Optics Third Edition, 5 Volume SetOpto-Mechanical Systems Design, Volume 1Proceedings of Technical Papers Presented at the International Lens Design Conference, May 31, 1980-June 4, 1980, Mills College, Oakland, CaliforniaDesign and Engineering of Optical SystemsPractical Optical System Layout: And Use of Stock Lenses Rudolf Kingslake Rudolf Kingslake Christoph Gerhard Max J. Riedl Bruce H. Walker José Sasián William Ross McCluney George N. Lawrence Lakshminarayan Hazra Max J. Riedl Herbert Gross Warren J. Smith Ronian Siew André Masson Optical Society of America Paul Yoder Robert Edward Fischer Joseph J. M. Braat Warren J. Smith

Lens Design Fundamentals Lens Design Fundamentals Lens Design Basics Optical Design Fundamentals for Infrared Systems Optical Engineering Fundamentals Introduction to Lens Design Introduction to Radiometry and Photometry, Second Edition International Lens Design Conference Foundations of Optical System Analysis and Design Optical Design Lens Design for Imaging Modern Lens Design Current Developments in Lens Design and Optical Systems Engineering Modern Classical Optical System Design Optical Design Methods, Applications, and Large Optics Handbook of Optics Third Edition, 5 Volume Set Opto-Mechanical Systems Design, Volume 1 Proceedings of Technical Papers Presented at the International Lens Design Conference, May 31, 1980-June 4, 1980, Mills College, Oakland, California Design and Engineering of Optical Systems Practical Optical System Layout: And Use of Stock Lenses *Rudolf Kingslake Rudolf Kingslake Christoph Gerhard Max J. Riedl Bruce H. Walker José Sasián William Ross McCluney George N. Lawrence Lakshminarayan Hazra Max J. Riedl Herbert Gross Warren J. Smith Ronian Siew André Masson Optical Society of America Paul Yoder Robert Edward Fischer Joseph J. M. Braat Warren J. Smith*

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

a large part of this book is devoted to a study of possible design procedures for various types of lens or mirror systems with fully worked examples of each the reader is urged to follow the logic of these examples and be sure that he understands what is happening noticing particularly how each available degree of freedom is used to control one aberration not every type of lens has been considered of course but the design techniques illustrated here can readily be applied to the design of other more complex systems it is assumed that the reader has access to a small computer to help with the ray tracing otherwise he may find the computations so time consuming that he is liable to lose track of what he is trying to accomplish

this book gives a comprehensive overview on the principles of optical imaging the first seven chapters provide an extensive summary of optical design as well as the mechanisms and interrelations leading to the formation of aberrations and the accompanying decrease in imaging performance aside from the fundamentals of optics and imaging models topics covered include calculations of simple optical components and systems characterisation and quantification of aberrations and defects in optical systems and optimisation of imaging performance the second part focuses on problem based learning via multiple exercises and case examples derived from the first seven chapters it is an ideal guide for optics and photonics students part of iop series in emerging technologies in optics and photonics

the practical popular 1995 tutorial has been thoroughly revised and updated reflecting developments in technology and applications during the past decade new chapters address wave aberrations thermal effects design examples and diamond turning

this text aims to expose students to the science of optics and optical engineering without the complications of advanced physics and mathematical theory

a concise introduction to lens design including the fundamental theory concepts methods and tools used in the field covering all the essential concepts and providing suggestions for further reading at the end of each chapter this book is an essential resource for graduate students working in optics and photonics

this second edition of an artech house classic title describes in detail the relationship between radiometry and photometry it covers information needed to solve problems in radiation transfer and detection detectors measuring instruments and concepts in colorimetry this revised second edition presents an updated treatment of modern radiometry and photometry including brand new sections on applications and developments in light sources and scientific instruments for measuring radiation and light engineers are also provided with an exciting new chapter on the use of computerized optical ray tracing for virtual experiments on optical systems

since the incorporation of scientific approach in tackling problems of optical instrumentation analysis and design of optical systems constitute a core area of optical engineering a large number of software with varying level of scope and applicability is currently available to facilitate the task however possession of an optical design software per se is no guarantee for arriving at correct or optimal solutions the validity and or optimality of the solutions depend to a large extent on proper formulation of the problem which calls for correct application of principles and theories of optical engineering on a different note development of proper experimental setups for investigations in the burgeoning field of optics and photonics calls for a good understanding of these principles and theories with this backdrop in view this book presents a holistic treatment of topics like paraxial analysis aberration theory hamiltonian optics ray optical and wave optical theories of image formation fourier optics structural design lens design

optimization global optimization etc proper stress is given on exposition of the foundations the proposed book is designed to provide adequate material for self learning the subject for practitioners in related fields this book is a handy reference foundations of optical system analysis and synthesis provides a holistic approach to lens system analysis and design with stress on foundations basic knowledge of ray and wave optics for tackling problems of instrumental optics proper explanation of approximations made at different stages sufficient illustrations for facilitation of understanding techniques for reducing the role of heuristics and empiricism in optical lens design a sourcebook on chronological development of related topics across the globe this book is composed as a reference book for graduate students researchers faculty scientists and technologists in r d centres and industry in pursuance of their understanding of related topics and concepts during problem solving in the broad areas of optical electro optical and photonic system analysis and design

this text is written for engineers and scientists who have some experience in the field of optics and want to know more about the details and derivations of equations used in optical design organized by topic the book begins with the fundamental law of geometrical optics snell s law of refraction and states the paraxial ray trace equations then moves on to thin lenses and increasingly more sophisticated components and multi element systems each topic is covered in depth and provides comprehensive information on performance and limitations while the text is based on general optical laws special emphasis has been placed on the two major infrared regions the mid wave mwir and the long wave lwir this is particularly important with regard to diffractive hybrids which have found their place in these long wavelength areas for the correction of chromatic aberrations and athermalization comments relating to single point diamond turning have also been included because this process is predominantly used to produce optical elements for the infrared regions

master the foundational principles that drive successful optical system design in modern imaging applications lens design for imaging volume 1 fundamentals of optical systems by herbert gross delivers a comprehensive discussion of the theoretical foundations of optical systems gross draws on his extensive industrial and academic experience in lens design to close the gap between purely theoretical examinations of lens design and practical application the author provides a systematic and robust methodology for lens design that guides you through the conceptual design analysis and optimization of complex imaging systems across diverse applications in this first volume the basic preconditions to understand optical imaging systems are presented the book covers twelve domains of optical system fundamentals from material properties and geometrical optics to advanced topics like diffraction theory fourier optics and digital image processing each chapter combines rigorous theory with illustrations and hands on examples making complex concepts accessible while maintaining the mathematical depth demanded by professional practice lens design for imaging volume 1 encompasses the necessary knowledge and critical review about optical materials dispersion the geometrical optics approximation ray tracing methodologies component design principles imaging system

theory physical optics effects and modern computational approaches readers will also find comprehensive coverage of optical materials including dispersion models in particular for short pulse systems absorption and thermal properties and specialized materials for uv ir and consumer applications detailed ray tracing methods with complete equation sets for aspherical surfaces gradient media and diffractive elements presentation of physical models for diffraction effects point spread functions and optical transfer functions of optical systems with practical calculation schemes with discussion of approximations and limitations advanced topics including gaussian beam propagation limits of gaussian beam models photometric analysis and phase space representations for system analysis an integrated approach to digital imaging methods covering realistic image simulation enhancement techniques and modern imaging modalities perfect for optical engineers lens designers and advanced students in optics and photonics lens design for imaging volume 1 provides authoritative coverage of optical system fundamentals it contains the systematic knowledge practitioners and students require to tackle complex design challenges

unlike the first edition which was more a collection of lens designs for use in larger projects the 2nd edition of modern lens design is an optical how to delving deep into the mechanics of lens design optics legend warren j smith reveals time tested methods for designing top quality lenses he deals with lens design software primarily oslo by far the current market leaders and provides 7 comprehensive worked examples all new to this edition with this book in hand there s no lens an optical engineer can t design

modern classical optical system design mcosd shares the author s bag of tricks knowledge experience and interpretation of optical design fundamentals to the development of optical systems in a modern fast paced product development context topics include imaging principles elements of lens design illumination modelling analysis tolerancing of optical systems and detection

the most comprehensive and up to date optics resource available prepared under the auspices of the optical society of america the five carefully architected and cross referenced volumes of the handbook of optics third edition contain everything a student scientist or engineer requires to actively work in the field from the design of complex optical systems to world class research and development methods this definitive publication provides unparalleled access to the fundamentals of the discipline and its greatest minds individual chapters are written by the world s most renowned experts who explain illustrate and solve the entire field of optics each volume contains a complete chapter listing for the entire handbook extensive chapter glossaries and a wealth of references this pioneering work offers unprecedented coverage of optics data techniques and applications volume i covers geometrical and physical optics polarized light components and instruments volume ii covers design fabrications testing sources detectors radiometry and photometry volume iii all in full color covers vision and vision optics volume iv covers optical properties of materials nonlinear optics and quantum optics volume v covers

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opto mechanical systems design fourth edition is different in many ways from its three earlier editions coauthor daniel vukobratovich has brought his broad expertise in materials opto mechanical design analysis of optical instruments large mirrors and structures to bear throughout the book jan nijenhuis has contributed a comprehensive new chapter on kinematics and applications of flexures and several other experts in special aspects of opto mechanics have contributed portions of other chapters an expanded feature a total of 110 worked out design examples has been added to several chapters to show how the theory equations and analytical methods can be applied by the reader finally the extended text new illustrations new tables of data and new references have warranted publication of this work in the form of two separate but closely entwined volumes this first volume design and analysis of opto mechanical assemblies addresses topics pertaining primarily to optics smaller than 50 cm aperture it summarizes the opto mechanical design process considers pertinent environmental influences lists and updates key parameters for materials illustrates numerous ways for mounting individual and multiple lenses shows typical ways to design and mount windows and similar components details designs for many types of prisms and techniques for mounting them suggests designs and mounting techniques for small mirrors explains the benefits of kinematic design and uses of flexures describes how to analyze various types of opto mechanical interfaces demonstrates how the strength of glass can be determined and how to estimate stress generated in optics and explains how changing temperature affects opto mechanical assemblies

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