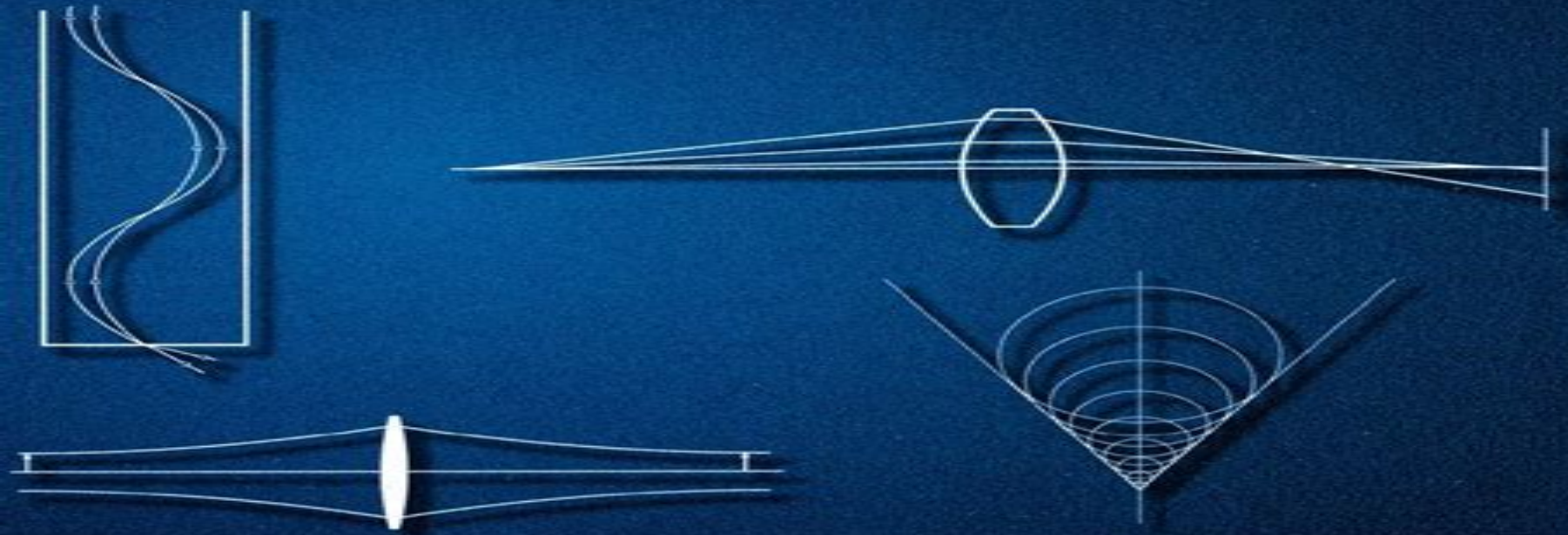


Geometrical Optics and Optical Design

Pantazis Mouroulis
John Macdonald



Geometrical Optics And Optical Design

Psang Dain Lin



Geometrical Optics And Optical Design:

Geometrical Optics and Optical Design Pantazis Mouroulis, John Macdonald, 1997 Geometrical Optics and Optical Design is an up to date introductory treatment of geometrical optics which is intended to lead students toward the modern practices of computer aided optical design The principles of Gaussian optics and first order layout and design are emphasized based on the tracing of two paraxial rays and the associated optical invariant The radiometry of lens systems is seen to rest on the same concepts Third order aberration theory is developed in detail Complete examples of third order design are provided together with software tools that allow students to follow the examples in detail or to develop other examples independently Several problems at the end of each chapter allow students to practice and extend the concepts taught **Fundamental**

Optical Design Michael J. Kidger, 2002 This book provides all the essential and best elements of Kidger's many courses taught worldwide on lens and optical design It is written in a direct style that is compact logical and to the point a tutorial in the best sense of the word I read my copy late last year and read it straight through cover to cover In fact I read it no less than three times Its elegant expositions valuable insights and up front espousal of pre design theory make it an outstanding work It's in the same league with Conrady and Kingslake Warren Smith **Geometrical Optics and Optical Design**

Fletcher Donaldson Cruickshank, G. A. Hills, 1960 *Handbook of Optical Design* Daniel Malacara-Hernández, Zacarías Malacara-Hernández, 2017-12-19 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 **A Course in Lens Design** Chris

Velzel,2014-03-28 A Course in Lens Design is an instruction in the design of image forming optical systems It teaches how a satisfactory design can be obtained in a straightforward way Theory is limited to a minimum and used to support the practical design work The book introduces geometrical optics optical instruments and aberrations It gives a description of the process of lens design and of the strategies used in this process Half of its content is devoted to the design of sixteen types of lenses described in detail from beginning to end This book is different from most other books on lens design because it stresses the importance of the initial phases of the design process paraxial lay out and thin lens pre design The argument for this change of accent is that in these phases much information can be obtained about the properties of the lens to be designed This information can be used in later phases of the design This makes A Course in Lens Design a useful self study book and a suitable basis for an introductory course in lens design The mathematics mainly used is college algebra in a few sections calculus is applied The book could be used by students of engineering and technical physics and by engineers and scientists

Handbook of Lens Design Daniel Malacara,Zacarias Malacara,1994-07-07 This practical reference text provides comprehensive coverage of geometrical optics from basic principles to the most advanced topics and presents its applications in the design optimization and evaluation of lenses and optical instruments Introduces a new approach to the derivation of primary aberration coefficients

Aberrations of Optical Systems W.T Welford,2017-11-22 Although the subject of optical design as a branch of applied physics is over one hundred years old the use of aberration theory has changed considerably Aberrations of Optical Systems covers elementary optics and aberration theory of various optical systems including the use of nonaxially symmetric systems and diffractive optical elements in complex designs such as head up displays and the increasing use of scanning systems with laser illumination The book provides the complete range of mathematical tools formulae and derivations needed for understanding the process of optical design and for planning optical design programs While the treatment is mainly based on geometrical optics some excursions into physical optics are made particularly in connection with the problems of optical tolerances

Handbook of Optical Design Daniel Malacara-Hernández,Zacarías Malacara-Hernández,2003-09-21 Infused with more than 500 tables and figures this reference clearly illustrates the intricacies of optical system design and evaluation and considers key aspects of component selection optimization and integration for the development of effective optical apparatus The book provides a much needed update on the vanguard in the field with vivid e

New Computation Methods for Geometrical Optics Psang Dain Lin,2013-10-01 This book employs homogeneous coordinate notation to compute the first and second order derivative matrices of various optical quantities It will be one of the important mathematical tools for automatic optical design The traditional geometrical optics is based on raytracing only It is very difficult if possible to compute the first and second order derivatives of a ray and optical path length with respect to system variables since they are recursive functions Consequently current commercial software packages use a finite difference approximation methodology to estimate these derivatives for use in optical design

and analysis Furthermore previous publications of geometrical optics use vector notation which is comparatively awkward for computations for non axially symmetrical systems

Introduction to Geometrical Optics Milton Katz, 2002 This book is the culmination of twenty five years of teaching Geometrical Optics The volume is organised such that the single spherical refracting surface is the basic optical element Spherical mirrors are treated as special cases of refraction with the same applicable equations Thin lens equations follow as combinations of spherical refracting surfaces while the cardinal points of the thick lens make it equivalent to a thin lens Ultimately one set of vergence equations are applicable to all these elements The chapters are devoted to in depth treatments of stops pupils and ports magnifiers microscopes telescopes and camera lenses ophthalmic instruments resolving power and MTF trigonometric ray tracing and chromatic and monochromatic aberrations There are over 100 worked examples 400 homework problems and 400 illustrations First published in 1994 by Penumbra Publishing Co

New Computation Methods for Geometrical Optics P.D. Lin, 2013-11-27 This book employs homogeneous coordinate notation to compute the first and second order derivative matrices of various optical quantities It will be one of the important mathematical tools for automatic optical design The traditional geometrical optics is based on raytracing only It is very difficult if possible to compute the first and second order derivatives of a ray and optical path length with respect to system variables since they are recursive functions Consequently current commercial software packages use a finite difference approximation methodology to estimate these derivatives for use in optical design and analysis Furthermore previous publications of geometrical optics use vector notation which is comparatively awkward for computations for non axially symmetrical systems

Geometric Optics Antonio Romano, 2009-10-10 This book unique in the literature provides readers with the mathematical background needed to design many of the optical combinations that are used in astronomical telescopes and cameras The results presented in the work were obtained by using a different approach to third order aberration theory as well as the extensive use of the software package Mathematica Replete with workout examples and exercises Geometric Optics is an excellent reference for advanced graduate students researchers and practitioners in applied mathematics engineering astronomy and astronomical optics The work may be used as a supplementary textbook for graduate level courses in astronomical optics optical design optical engineering programming with Mathematica or geometric optics

The Art and Science of Optical Design Robert R. Shannon, 1997-06-13 The Art and Science of Optical Design is a comprehensive introduction to lens design covering the fundamental physical principles and key engineering issues Several practical examples of modern computer aided lens design are worked out in detail from start to finish The basic theory and results of optics are presented early on in the book along with a discussion of optical materials Aberrations and their correction and image analysis are then covered in great detail Subsequent chapters deal with design optimisation and tolerance analysis Several design examples are then given beginning with basic lens design forms and progressing to advanced systems such as gradient index and diffractive optical components In covering all aspects of

optical design including the use of modern lens design software this book will be invaluable to students of optical engineering as well as to anyone engaged in optical design at any stage

Introduction to Lens Design José Sasián, 2019-09-26 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

Fundamentals and Basic Optical Instruments Daniel Malacara Hernández, 2017-11-22 Fundamentals and Basic Optical Instruments includes thirteen chapters providing an introductory guide to the basics of optical engineering instrumentation and design Topics include basic geometric optics basic wave optics and basic photon and quantum optics Paraxial ray tracing aberrations and optical design and prisms and refractive optical components are included Polarization and polarizing optical devices are covered as well as optical instruments such as telescopes microscopes and spectrometers

New Methods in Geometrical Optics Charles Sheldon Hastings, 1927

Lens Design Fundamentals Rudolf Kingslake, R. Barry Johnson, 2009-11-20 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 **Optical Design**

Using Excel Hiroshi Nakajima, 2015-07-02 A practical introductory guide to optical design covering geometrical optics simple wave optics and diffraction using Excel software explains practical calculation methods for designing optical systems with fully worked out examples and avoiding complex mathematical methods includes practical calculations for ray tracing laser beam Gaussian beam focusing and diffraction calculations the ray tracing and the diffraction calculations are done by using the VBA program which Excel provides as a supporting tool describes basic optical theory and application methods and provides readers with calculation methods for designing laser optical systems with numerous practical calculation examples After finishing the book even inexperienced readers should have the ability to design laser optical systems covers large areas of geometrical optics and diffraction theory providing a good overview and reference for beginners or non specialist engineers accompanied by a website including password protected electronic files [A Course in Lens Design](#) Christian

Velzel, 2014-04-02 A Course in Lens Design is an instruction in the design of image forming optical systems It teaches how a satisfactory design can be obtained in a straightforward way Theory is limited to a minimum and used to support the practical design work The book introduces geometrical optics optical instruments and aberrations It gives a description of the process of lens design and of the strategies used in this process Half of its content is devoted to the design of sixteen types of lenses described in detail from beginning to end This book is different from most other books on lens design because it stresses the importance of the initial phases of the design process paraxial layout and thin lens pre design The argument for this change of accent is that in these phases much information can be obtained about the properties of the lens to be designed This information can be used in later phases of the design This makes A Course in Lens Design a useful self study book and a suitable basis for an introductory course in lens design The mathematics mainly used is college algebra in a few sections calculus is applied The book could be used by students of engineering and technical physics and by engineers and scientists **Fundamentals of Photonics** Bahaa E. A. Saleh, Malvin Carl Teich, 2020-03-04 Fundamentals of Photonics A

complete thoroughly updated full color third edition Fundamentals of Photonics Third Edition is a self contained and up to date introductory level textbook that thoroughly surveys this rapidly expanding area of engineering and applied physics Featuring a blend of theory and applications coverage includes detailed accounts of the primary theories of light including ray optics wave optics electromagnetic optics and photon optics as well as the interaction of light and matter Presented at increasing levels of complexity preliminary sections build toward more advanced topics such as Fourier optics and holography photonic crystal optics guided wave and fiber optics LEDs and lasers acousto optic and electro optic devices nonlinear optical devices ultrafast optics optical interconnects and switches and optical fiber communications The third edition features an entirely new chapter on the optics of metals and plasmonic devices Each chapter contains highlighted equations exercises problems summaries and selected reading lists Examples of real systems are included to emphasize the concepts governing applications of current interest Each of the twenty four chapters of the second edition has been thoroughly updated

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