



Art And Science Of Optical Design

Philip C. D. Hobbs



Art And Science Of Optical Design:

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 optimization 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

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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

Intermediate Optical Design Michael J. Kidger, 2004 This second volume based on Michael Kidger's popular short courses and workshops is aimed at readers already familiar with the concepts presented in Fundamental Optical Design SPIE Press Vol PM92 It begins with a sweeping discussion of optimization that is written with the user in mind and continues with a unique look at the role of higher order aberrations The book's key feature is its astounding presentation of a wide range of practical design examples covering such

problems as secondary spectrum correction high numerical aperture designs lasers zoom lenses tilted or decentered optical systems and price and performance requirements Each scenario is accompanied by an in depth discussion that goes well beyond the ray aberration plot including useful insights into an optical designer s thought processes Handbook of Laser Technology and Applications: Principles Colin E. Webb, Julian D. C. Jones, 2004 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 Modern Information Systems Christos Kalloniatis, 2012-06-13 The development of modern information systems is a demanding task New technologies and tools are designed implemented and presented in the market on a daily bases User needs change dramatically fast and the IT industry copes to reach the level of efficiency and adaptability for its systems in order to be competitive and up to date Thus the realization of modern information systems with great characteristics and functionalities implemented for specific areas of interest is a fact of our modern and demanding digital society and this is the main scope of this book Therefore this book aims to present a number of innovative and recently developed information systems It is titled Modern Information Systems and includes 8 chapters This book may assist researchers on studying the innovative functions of modern systems in various areas like health telematics knowledge management etc It can also assist young students in capturing the new research tendencies of the information systems development **Modular Optical Design** O.N. Stavroudis, 2013-04-17 Images are ubiquitous Their formation is one of natures universalities Water droplets in suspension act in concert to produce rainbows A partially filled wine glass can be made to form the image of a chandelier at aboring dinner party The bottom of a water glass too can be made to produce an optical image wildly distorted perhaps but nevertheless recognizable as an optical image Primitive folklore abounds with images Perseus used his highly polished shield as a rear view mirror to lop off Medusa s head without turning hirnself into stone Narcissus displaying incredibly poor taste fell in love with his own reflection in a pool of water causing poor Echo to pine away to a me re echo and providing yet another term for the psychoanalytic lexicon Strepsiades according to Aristophanes proposed using a burning stone to melt a summons off the bailiff s wax tablet And the castaways in Jules Vernes MYsterious Is nd made a burning glass by freezing water in a watch crystal Everyone from the Baron M nchhausen to Tom Swift has gotten into the optics act with incredible but eminently useful optical devices Indeed Mother Nature herself has had a hand in evolving image making de vices Any reasonably symmetrie glob of transparent material such as an ag gregate of cells is capable of forming an image It is not difficult to imag ine the specialization of such an aggregate into a blastula like structure with an anterior window and light sensitive neurons at its posterior region *Opto-Mechanical Systems Design, Two Volume Set* Paul Yoder, Daniel Vukobratovich, 2018-12-14 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 The 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 The second volume Design and Analysis of Large Mirrors and Structures concentrates on the design and mounting of significantly larger optics and their structures including a new and important topic detailed consideration of factors affecting large mirror performance The book details how to design and fabricate very large single substrate segmented and lightweight mirrors describes mountings for large mirrors with their optical axes in vertical horizontal and variable orientations indicates how metal and composite mirrors differ from ones made of glass explains key design aspects of optical instrument structural design and takes a look at an emerging technology the evolution and applications of silicon and silicon carbide in mirrors and other types of components for optical applications

Introduction to the Optical Transfer Function Charles Sumner Williams, Orville A. Becklund, 2002 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 *Optical Engineering*, 2000 [Building Electro-Optical Systems](#) Philip C. D. Hobbs, 2022-01-26 Building Electro Optical Systems In the newly revised third edition of Building Electro Optical Systems Making It All Work renowned Dr Philip C D Hobbs delivers a birds eye view of all the topics you ll need to understand for successful optical instrument design and construction The author draws on his own work as an applied physicist and consultant with over a decade of experience in designing and constructing electro optical systems from beginning to end The book s topics are chosen to allow readers in a variety of disciplines and fields to quickly and confidently decide whether a given device or technique is appropriate for their needs Using accessible prose and intuitive organization Building Electro Optical Systems remains one of the most practical and

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Genetic Programming Maarten Keijzer, Andrea Tettamanzi, Pierre Collet, Jano van Hemert, Marco Tomassini, 2005-03-10 In this volume we present the contributions for the 18th European Conference on Genetic Programming EuroGP 2005 The conference took place from 30 March to 1 April in Lausanne Switzerland EuroGP is a well established conference and the only one exclusively devoted to genetic programming All previous proceedings were published by Springer in the LNCS series From the outset EuroGP has been co located with the EvoWorkshops focusing on applications of evolutionary computation Since 2004 EvoCOP the conference on evolutionary combinatorial optimization has also been co

located with EuroGP making this year's combined events one of the largest dedicated to evolutionary computation in Europe

Genetic programming GP is evolutionary computation that solves complex problems or tasks by evolving and adapting a population of computer programs using Darwinian evolution and Mendelian genetics as its sources of inspiration Some of the 34 papers included in these proceedings address foundational and theoretical issues and there is also a wide variety of papers dealing with different application areas such as computer science engineering language processing biology and computational design demonstrating that GP is a powerful and practical problem solving paradigm

Optical Fabrication, Metrology, and Material Advancements for Telescopes Eli Atad-Ettinger, Philippe Dierckx, 2004 Proceedings of SPIE present the original research papers presented at SPIE conferences and other high quality conferences in the broad ranging fields of optics and photonics These books provide prompt access to the latest innovations in research and technology in their respective fields Proceedings of SPIE are among the most cited references in patent literature

Optics in Astronomy J. V. Wall, 1993-07-15 Ground based optical astronomy is undergoing a renaissance inspired by recent technological advances This book collects contributions from expert international designers and observers which show the fundamental role of innovative optical design in modern astrophysics and cosmological research The papers are based on those presented at a conference held at the Royal Greenwich Observatory Cambridge in September 1991 in celebration of Professor C G Wynne New and future telescopes instruments spectrographs and detector systems are described in the context of the research problems at which they are targeted This book is an essential reference for both state of the art instrumentation and future design

Handbook of Optical Fibers and Cables, Second Edition Murata, 1996-06-25 This work covers the history of optical communications fibres and fiber cables and compares optical fibres with other transmission media It also discusses optical fibre materials reliability and manufacture illustrates the design construction and properties of recent cables used for optical fibre describes fibre splicing and presents automated fibre splicing machines and more

Entropy and Information Optics Francis T.S. Yu, 2000-03-17 Identifies the relationship between entropy and information optics as the impetus for the research and development of high speed high data rate and high capacity communication systems Examines computing pattern recognition and wavelet transformation

Handbook of Nonlinear Optics Richard L. Sutherland, 2003-04-22 Examining classic theories experimental methods and practical formulas for exploration of the core topics in nonlinear optics the second edition of this acclaimed text was extensively revised to reflect recent advances in the analysis and modification of material properties for application in frequency conversion optical switching and limiting multiphoton absorption and electro optic effects Handbook of Nonlinear Optics Second Edition contains additional chapters on ultrafast characterization techniques laser flash photolysis and the electro optic effect as well as expanded coverage of nonlinear optics in fibers and pulsed two beam coupling

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