



# Methods For Computer Design Of Diffractive Optical Elements

**H. P. Herzig**



## **Methods For Computer Design Of Diffractive Optical Elements:**

*Methods for Computer Design of Diffractive Optical Elements* Soifer, 2002-03-01      **Methods for Computer Design of Diffractive Optical Elements** Victor A. Soifer, 2002 The first inclusive book on the cutting edge field of modern optics and its applications For the first time all the major aspects of designing planar DOEs are covered in one book comprised of original methods developed by experts at the Russian Academy of Sciences Image Processing Systems Institute The breadth of *Methods for Computer Design of Diffractive Optical Elements* covers DOE production beginning from the design techniques and the software to the fabrication technology experimental studies and testing of DOEs including all major DOE application fields and DOE types The contributors also detail the three key approaches to designing phase DOEs a geometric optics ray tracing method the scalar diffraction Kirchhoff method and the rigorous design based on electromagnetic theory *Methods for Computer Design of Diffractive Optical Elements* is an estimable reference for experts in the aerospace industry research and development institutes the automobile industry as well as students and university professors      **Interactive Methods For Diffractive Optical Elements Computation** Victor A. Soifer, V Kotlar, L. Doskolovich, 1997-05-08 This high level monograph for the optics research market explores a large number of novel interactive methods and algorithms for calculating the transmission function of phase diffractive optical elements The text includes accounts of well established methods and algorithms for calculating DOEs but its major contribution is to include current methods and examine the theoretical and practical aspects of synthesising optical components All the methods discussed in this book have been verified by their numerical simulation A fast fourier transform algorithm presents computational basis of all the methods considered A portion of the algorithms have received a comparative study in terms of their suitability for solving the same problem For a number of the interactive algorithms a rigorous proof to their convergence is given      **Computer Design of Diffractive Optics** V A Soifer, 2012-11-19 Diffractive optics involves the manipulation of light using diffractive optical elements DOEs DOEs are being widely applied in such areas as telecommunications electronics laser technologies and biomedical engineering Computer design of diffractive optics provides an authoritative guide to the principles and applications of computer designed diffractive optics The theoretical aspects underpinning diffractive optics are initially explored including the main equations in diffraction theory and diffractive optical transformations Application of electromagnetic field theory for calculating diffractive gratings and related methods in micro optics are discussed as is analysis of transverse modes of laser radiation and the formation of self replicating multimode laser beams Key applications of DOEs reviewed include geometrical optics approximation scalar approximation and optical manipulation of micro objects with additional consideration of multi order DOEs and synthesis of DOEs on polycrystalline diamond films With its distinguished editor and respected team of expert contributors *Computer design of diffractive optics* is a comprehensive reference tool for professionals and academics working in the field of optical engineering and photonics Explores the

theoretical aspects underpinning diffractive optics Discusses key applications of diffractive optical elements A comprehensive reference for professionals and academics in optical engineering and photonics      **Microoptics** Karl-Heinz Brenner, Jürgen Jahns, 2013-03-20 Microoptics is still an emerging field with a huge potential for a large number of applications This monograph brings together the most recent developments in order to give a broad overview      Diffractive Nanophotonics Victor A Soifer, 2016-04-19 Diffractive Nanophotonics demonstrates the utility of the well established methods of diffractive computer optics in solving nanophotonics tasks It is concerned with peculiar properties of laser light diffraction by microoptics elements with nanoscale features and light confinement in subwavelength space regions Written by recognized experts in t      Diffractive Optics and Nanophotonics V. A. Soifer, 2017-09-01 Diffractive Optics and Nanophotonics is devoted to achievements in diffractive optics focusing on the creation of new nanophotonic components and devices as well as instrumentation and available information technology The author describes methods of calculation of diffractive optical elements to solve actual problems of nanophotonics Coverage includes mathematical methods for calculation of diffraction gratings calculation of modes of inhomogeneous waveguides integral methods of calculation of electromagnetic field near the focus and methods of calculation of diffractive optical elements generating vortex laser beams      **Compendium On Electromagnetic Analysis - From Electrostatics To Photonics: Fundamentals And Applications For Physicists And Engineers (In 5 Volumes)** , 2020-06-15 The five volume set may serve as a comprehensive reference on electromagnetic analysis and its applications at all frequencies from static fields to optics and photonics The material includes micro and nanomagnetism the new generation of electric machines renewable energy hybrid vehicles low noise motors antennas and microwave devices plasmonics metamaterials lasers and more Written at a level accessible to both graduate students and engineers Electromagnetic Analysis is a comprehensive reference covering methods and applications at all frequencies from statics to optical Each volume contains pedagogical tutorial material of high archival value as well as chapters on state of the art developments      Handbook of Laser Technology and Applications (Three- Volume Set) Colin Webb, Julian D. C. Jones, 2003-12-01 The invention of the laser was one of the towering achievements of the twentieth century At the opening of the twenty first century we are witnessing the burgeoning of the myriad technical innovations to which that invention has led The Handbook of Laser Technology and Applications is a practical and long lasting reference source for scientists a

**Handbook of Optical Interconnects** Shigeru Kawai, 2018-10-03 As we reach the data transmission limits of copper wire and communications experts seek to bring the speed of long haul fiber optics networks closer to access points optical interconnects promise to provide efficient high speed data transmission for the next generation of networks and systems They offer higher bit rates virtually no crosstalk lower demands on power requirements and thermal management and the possibility of two dimensional channel arrays for chip to chip communication The Handbook of Optical Interconnects introduces the systems and devices that will bring the speed and quality of optical transmission closer to the circuit board

Contributed by active experts most from leading technology companies in the US and Japan this outstanding handbook details various low cost and small size configurations illustrates the discussion with more than 300 figures and offers a look at the applications and future of this exciting and rapidly growing field The book includes a detailed introduction to vertical cavity surface emitting lasers VCSELs the use of optical interconnects in metropolitan local area and access networks through FTTP FTTH and Jisso technologies which are critical for developing low cost small size modules Driving down the size and cost of optical interconnects is vital for integrating these technologies into the network and onto microprocessors and the Handbook of Optical Interconnects provides the knowledge and tools necessary to accomplish these goals

*Diffraction Optics and Optical Microsystems* S. Martellucci, Arthur N. Chester, 2013-06-29 Proceedings of the 20th Course of the International School of Quantum Electronics held in Erice Italy November 14 24 1996 'Advances in Optics: Reviews', Vol. 4 Sergey Yurish, 2019-07-18 The fourth volume of this popular Book Series is devoted to optics lasers and optical sensors and written by 29 authors from academia and industry from 10 countries Brazil China France Germany Greece Israel Russia Serbia USA and Vietnam This book ensures that the readers will stay at the cutting edge of the field and get the right and effective start point and road map for the further researches and developments By this way they will be able to save more time for productive research activity and eliminate routine work *Micro-Optics* H. P. Herzig, 1997-04-26 This text examines the technology behind the plethora of modern industrial and domestic technologies which incorporate micro optics eg CDs cameras automated manufacturing systems mobile communications etc It includes a simple but comprehensive introduction to micro optical developments design and an overview of fabrication and replication technology The theoretical practical and industrial developments in micro scale optoelectronics continue apace in the late 1990s In this book a distinguished group of physicists and engineers describe the current state of research and applications in micro optics It provides the theoretical background and an overview of current technology with several chapters taking a deeper look at specific recent applications and future trends The book concentrates on diffractive and refractive micro optical elements such as lenses fan out gratings optimized phase elements and polarisers Sections are included on the simulation and optimization of design for micro optics and subsequently the efficient transformation from design to real optical elements using techniques such as e beam writing laser beam writing lithography etching and thin film deposition **Diffractive Optics** Donald C. O'Shea, 2004 This book provides the reader with the broad range of materials that were discussed in a series of short courses presented at Georgia Tech on the design fabrication and testing of diffractive optical elements DOEs Although there are not long derivations or detailed methods for specific engineering calculations the reader should be familiar and comfortable with basic computational techniques This text is not a cookbook for producing DOEs but it should provide readers with sufficient information to assess whether this technology would benefit their work and to understand the requirements for using the concepts and techniques presented by the authors Handbook of Laser Technology and

Applications Colin Webb, Julian D.C. Jones, 2020-09-29 The invention of the laser was one of the towering achievements of the twentieth century At the opening of the twenty first century we are witnessing the burgeoning of the myriad technical innovations to which that invention has led The Handbook of Laser Technology and Applications is a practical and long lasting reference source for scientists and engineers who work with lasers The Handbook provides a comprehensive guide to the current status of lasers and laser systems it is accessible to science or engineering graduates needing no more than standard undergraduate knowledge of optics Whilst being a self contained reference work the Handbook provides extensive references to contemporary work and is a basis for studying the professional journal literature on the subject It covers applications through detailed case studies and is therefore well suited to readers who wish to use it to solve specific problems of their own The first of the three volumes comprises an introduction to the basic scientific principles of lasers laser beams and non linear optics The second volume describes the mechanisms and operating characteristics of specific types of laser including crystalline solid state lasers semiconductor diode lasers fibre lasers gas lasers chemical lasers dye lasers and many others as well as detailing the optical and electronic components which tailor the laser s performance and beam delivery systems The third volume is devoted to case studies of applications in a wide range of subjects including materials processing optical measurement techniques medicine telecommunications data storage spectroscopy earth sciences and astronomy and plasma fusion research This vast compendium of knowledge on laser science and technology is the work of over 130 international experts many of whom are recognised as the world leaders in their respective fields Whether the reader is engaged in the science technology industrial or medical applications of lasers or is researching the subject as a manager or investor in technical enterprises they cannot fail to be informed and enlightened by the wide range of information the Handbook supplies

*Laser Beam Shaping* ,2001      **Cavity Quantum Electrodynamics** Sergio M. Dutra, 2005-05-27 What happens to light when it is trapped in a box Cavity Quantum Electrodynamics addresses a fascinating question in physics what happens to light and in particular to its interaction with matter when it is trapped inside a box With the aid of a model building approach readers discover the answer to this question and come to appreciate its important applications in computing cryptography quantum teleportation and optoelectronics Instead of taking a traditional approach that requires readers to first master a series of seemingly unconnected mathematical techniques this book engages the readers interest and imagination by going straight to the point introducing the mathematics along the way as needed Appendices are provided for the additional mathematical theory Researchers scientists and students of modern physics can refer to Cavity Quantum Electrodynamics and examine the field thoroughly Several key topics covered that readers cannot find in any other quantum optics book include Introduction to the problem of the vacuum catastrophe and the cosmological constant Detailed up to date account of cavity QED lasers and thresholdless lasing Examination of cavities with movable walls First principles discussion about cavity QED in open cavities Pedagogical account of microscopic quantization in dielectrics

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**Practical Holography**  
 Graham Saxby, Stanislovas Zacharovas, 2015-09-22 Continuing in the steps of its predecessors, the fourth edition of Practical Holography provides the most comprehensive and up-to-date resource available. Focused on practical techniques in holography at all levels, it avoids any unnecessary mathematical theory. Features of the Fourth Edition: Highlights new information on color holograms, sensitive m  
*Vortex Laser Beams* Victor V. Kotlyar, Alexey A. Kovalev, Alexey P. Porfirev, 2018-09-03 This book deals with the theoretical bases of the modern optics division concerned with coherent light fields with singularities characterized by phase uncertainty. Singular light fields include laser vortex beams or beams that carry orbital angular momentum. Laser vortex beams that have been introduced in optics in recent years are discussed in detail. Among them of special notice are families of asymmetric laser vortex beams that while being devoid of radial symmetry remain unchanged upon propagation. What makes the laser vortex beams especially interesting is the ability to preserve their structure while propagating in a scattering medium or through a turbulent atmosphere. The orbital angular momentum is an extra degree of freedom of laser vortices because beams with different topological charge can be utilized as independent channels for data transmission in wireless communications. Laser vortex beams are generated from conventional Gaussian beams using liquid crystal light modulators which are now readily available at any optical laboratory. Provide a framework for the comparative analysis of the efficiency of different vortex beams for micromanipulation. Includes detailed illustrations enabling the vortex structure to be easily understood even by non-experts. Presents detailed descriptions of more than a dozen most popular types of vortex laser beams. Explores how optical vortices have been used in many practical applications including conventional and quantum wireless communications, micromanipulation, optical measurements with super-resolution, spiral interferometry, microscopy, and atom cooling. Presents in a systematic and detailed form many analytical and numerical results for the propagation of vortex optical beams, chiefly in the linear propagation regime.

*Long-Wavelength Infrared Semiconductor Lasers* Hong K. Choi, 2004-03-18 Long wavelength Infrared Semiconductor Lasers provides a comprehensive review of the current status of semiconductor coherent sources emitting in the mid to far infrared spectrum and their applications. It includes three topics not covered in any previous book: far infrared emission from photo mixers as well as from hot hole lasers and InP based lasers emitting beyond two micrometers. Semiconductor lasers emitting at more than two micrometers have many applications such as in trace gas analysis, environmental monitoring, and industrial process

control Because of very rapid progress in recent years until this book no comprehensive information beyond scattered journal articles is available at present



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