Laser Beam Mode Selection By Computer Generated Holograms 1st Edition

Invented more than a hundred years ago by Alexander Graham Bell, the technology of free-space optical communications, or lasercom, has finally reached the level of maturity required to meet a growing demand for operational multi-giga-bit-per-second data rate systems communicating to and from aircrafts and satellites. Putting the emphasis on near-earth links, including air, LEO, MEO, and GEO orbits, Near-Earth Laser Communications presents a summary of important free-space laser communication subsystem challenges and discusses potential ways to overcome them. This comprehensive reference provides up-to-date information on component and subsystem technologies, fundamental limitations, and approaches to reach those limits. It covers basic concepts and state-of-the-art technologies, emphasizing device technology, implementation techniques, and system trades. The authors discuss hardware technologies and their applications, and also explore ongoing research activities and those planned for the near future. The analytical aspects of laser communication have been covered to a great extent in several books. However, a detailed approach to system design and development, including trades on subsystem choices and implications of the hardware selection for satellite and aircraft telecommunications, is missing. Highlighting key design variations and critical differences between them, this book distills decades' worth of experience into a practical resource on hardware technologies.

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.

Starting from the concepts of classical optics, Optics, Light and Lasers introduces in detail the phenomena of linear and nonlinear light matter interaction, the properties of modern laser sources, and the concepts of quantum optics. Several examples taken from the scope of modern research are provided to emphasize the relevance of optics in current developments within science and technology. The text has been written for newcomers to the topic and benefits from the author's ability to explain difficult sequences and effects in a straightforward and easily comprehensible way. To this second, completely updated and enlarged edition, new chapters on quantum optics, quantum information, matter waves, photonic fibres and materials have been added, as well as more than 100 problems on laser physics and applied optics.

Laser Beam Mode Selection by Computer Generated HologramsCRC Press

Lasers
Principles of Laser Materials Processing
Laser Beam Shaping

17th IFIP TC 13 International Conference, Paphos, Cyprus, September 2–6, 2019, Proceedings, Part IV

This book is motivated by the very favorable reception given to the previous editions as well as by the considerable range of new developments in the laser field since the publication of the third edition in 1989. These new developments include, among others, quantum-well and muitiple-quantum-welliasers, diode-pumped solid-state lasers, new concepts for both stable and unstable resonators, femtosecond lasers, ultra-high-brightness lasers, etc. This edition thus represents a radically revised version of the preceding edition, amounting essentially to a new book in its own right. However, the basic aim has remained the same, namely to provide a broad and unified description of laser behavior at the simplest level which is compatible with a correct physical understanding. The book is therefore intended as a textbook for a senior-level or first-year graduate course and/or as a reference book. The most relevant additions or changes to this edition can be summarized as follows: 1. A much-more detailed description of Amplified Spontaneous Emission has been given (Chapter 2) and a novel simplified treatment of this phenomenon, both for homogeneous and inhomogeneous lines, has been introduced (Appendix C). 2. A major fraction of a new chapter (Chapter 3) is dedicated to the interaction of radiation with semiconductor media, either in a bulk form or in a quantum-confined structure (quantum-well, quantum-wire and quantum dot). 3.
In 1975 the Marcel Grossmann Meetings were established by Remo Ruffini and Abdus Salam to provide a forum for discussion of recent advances in gravitation, general relativity, and relativistic field theories. In these meetings, which are held once every three years, every aspect of research is emphasized - mathematical foundations, physical predictions, and numerical and experimental investigations. The major objective of these meetings is to facilitate exchange among scientists, so as to deepen our understanding of the structure of space-time and to review the status of both the ground-based and the space-

based experiments aimed at testing the theory of gravitation.The Marcel Grossmann Meetings have grown under the guidance of an International Organizing Committee and a large International Coordinating Committee. The first two meetings, MG1 and MG2, were held in Trieste (1975, 1979). A most memorable MG3 (1982) was held in Shanghai and represented the first truly international scientific meeting in China after the so-called Cultural Revolution. Three years later MG4 was held in Rome (1985). It was at MG4 that ';astroparticle physics'; was born.MGIXMM was organized by the International Organizing Committee composed of D Blair, Y Choquet-Bruhat, D Christodoulou, T Damour, J Ehlers, F Everitt, Fang Li Zhi, S Hawking, Y Ne'eman, R Ruffini (chair), H Sato, R Sunyaev, and S Weinberg. Essential to the organization was an International Coordinating Committee of 135 members from scientific institutions of 54 countries. MGIXMM was attended by 997 scientists of 69 nationalities. It took place on 2-8 July 2000 at the University of Rome, Italy. The scientific programs included 60 plenary and review talks, as well as talks in 88 parallel sessions. The three volumes of the proceedings of MGIXMM present a rather authoritative view of relativistic astrophysics, which is becoming one of the priorities in scientific endeavour. The papers appearing in these volumes cover all aspects of gravitation, from mathematical issues to recent observations and experiments. Their intention is to give a complete picture of our current understanding of gravitational theory at the turn of the millennium.The Marcel Grossmann Individual Awards for this meeting were presented to Cecille and Bryce DeWitt, Riccardo Giacconi and Roger Penrose, while the Institutional Award went to the Solvay Institute, accepted on behalf of the Institute by Jacques Solvay and Ilya Prigogine. The acceptance speeches are also included in the proceedings.

The first decade of solid-state Iaser technology has seen the development of an enormous number of lasing materials and a !arge variety of interesting design concepts. However, in recent years the technology has matured to a point where solid-state Iasers have reached a plateau in their development. To a major extent, the growth in importance of solid-state Iasers for industrial and military applications and as a general research tool is due to the improvement in reliability and maintainability of these systems. The

practical advances of these devices had several major consequences: A wealth of applications for solid-state Iasers has emerged in materials processing, holography, rangefinding, target illumination and designation, satellite and lunar ranging, thermonuclear fusion, plasma experiments, and in general for scientific work requiring high power densities. Emphasis has shifted from research and innovation to cost reduction and system improve ment. As a result, a standardization of the system designs occurred. This book, written from an industrial vantage-point, provides a detailed discussion of solid-state Iasers, their characteristics, design and construction, and practical problems. The title Solid-State Laser Engineering is chosen so as to convey the emphasis which is placed on engineering and practical considerations.

The four-volume set LNCS 11746-11749 constitutes the proceedings of the 17th IFIP TC 13 International Conference on Human-Computer Interaction, INTERACT 2019, held in Paphos, Cyprus, in September 2019. The total of 111 full papers presented together with 55 short papers and 48 other papers in these books was carefully reviewed and selected from 385 submissions. The contributions are organized in topical sections named: Part I: accessibility design principles; assistive technology for cognition and neurodevelopment disorders; assistive technology for mobility and rehabilitation; assistive technology for visually impaired; co-design and design methods; crowdsourcing and collaborative work; cyber security and e-voting systems; design methods; design principles for safety/critical systems. Part II: e-commerce; education and HCI curriculum I; education and HCI curriculum II; eye-gaze interaction; games and gamification; human-robot interaction and 3D interaction; information visualization; information visualization and augmented reality; interaction design for culture and development I. Part III: interaction design for culture and development II; interaction design for culture and development III; interaction in public spaces; interaction techniques for writing and drawing; methods for user studies; mobile HCI; personalization and recommender systems; pointing, touch, gesture and speech-based interaction techniques; social networks and social media interaction. Part IV: user modelling and user studies; user experience; users' emotions, feelings and perception; virtual and augmented reality I; virtual and

augmented reality II; wearable and tangible interaction; courses; demonstrations and installations; industry case studies; interactive posters; panels; workshops. The chapter 'Experiencing Materialized Reading: Individuals' Encounters with Books' is open access under a CC BY 4.0 license at link.springer.com. The chapter 'What Is Beautiful Continues to Be Good: People Images and Algorithmic Inferences on Physical Attractiveness' is open access under a CC BY 4.0 license at link.springer.com.

Mode Selection and Enhancement with a Ruby Laser

Handbook of the Eurolaser Academy

Patents

Laser Beam Shaping Applications

Handbook of Laser Technology and Applications

The practice of shaping the irradiance profile of laser beams goes back more than three decades, and the applications of beam shaping are as diverse as they are numerous. However, until Dickey and Holswade's groundbreaking and highly popular Laser Beam Shaping: Theory and Techniques was published, there was no single, detailed treatment available on the underlying theory and basic techniques of beam shaping. Building on the foundations of this previous work, these esteemed editors have teamed with recognized expert David L. Shealy to produce the first in-depth account of beam shaping applications and design. Laser Beam Shaping Applications details the important features of beam shaping and exposes the subtleties of the theory and techniques that are best demonstrated through proven applications. In chapters contributed by prominent, active leaders in their respective specialties, the book discusses applications in lithography, laser printing, optical data storage, stable isotope separation, adaptive mirrors, and spatially dispersive lasers. The contributors share major insights, knowledge, and experience, reveal the advantages of the technologies, and include extensive references to the literature. The book concludes with a summary of beam shaping theory and techniques as well as the history of the field. Providing practical expertise, Laser Beam Shaping Applications is an extremely helpful guide to improving current laser processes, optimizing application-specific technologies, and advancing future development in the field.

This series, established in 1965, is concerned with recent developments in the general area of atomic, molecular, and optical physics. The field is in a state of rapid growth, as new experimental and theoretical techniques are used on many old and new problems. Topics covered also include related applied areas, such as atmospheric science, astrophysics, surface physics, and laser physics. Articles are written by distinguished experts who are active in their research fields. The articles contain both

relevant review material as well as detailed descriptions of important recent developments.
This volume presents six review articles devoted to various topics of current interest both in classical and in quantum optics. The first article, by S. Ya. Kilin, entitled "Quanta and Information", is concerned with a multidisciplinary subject which involves optics, information theory, programming and discrete mathematics. The second article, "Optical Solitons in Periodic Media with Resonant and Off-Resonant Nonlinearities", by G. Kurizki, A.E. Kozhekin, T. Optatrny and B. Malomed, reviews the properties of optical solitons in periodic nonlinear media. The article which follows deals with an effect and its inverse which is a manifestation of hindrance and enhancement, respectively, of the evolution of a quantum system by an external agent, such as a detection apparatus. The fourth article discusses the current status of a relatively new branch of physical optics, sometimes called singular optics. The next two articles respectively present a review of advances in two-photon interferometry and their relation to investigations of the foundations of quantum theory and an examination of transverse mode shaping and selection in laser resonators.
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
Lasers; Selected Reprints with Editorial Comment
Introduction to Optical Engineering
Lasers and Masers
Handbook of Laser Technology and Applications (Three- Volume Set)
Selected Topics on Optical Fiber Technology

The angular distribution of the laser output from a ruby rod is determined by the characteristics of the standing-wave pattern inducing the emission. If the angular spread of the pattern is limited by an aperture in an external optical system through which the standing wave must pass, the stimulated emission will be limited to the same angular spread. In addition, the suppression of the standing wave pattern in offaxis directions will increase the intensity of the laser beam along the axis, since that part of the stimulated emission which normally would have gone into the off-axis modes will be channeled into the axial modes. (Author).

This book presents a comprehensive account of the recent advances and research in optical fiber technology. It covers a broad spectrum of topics in special areas of optical fiber technology. The book highlights the development of fiber lasers, optical fiber applications in medical, imaging, spectroscopy and measurement, new optical fibers and sensors. This is an essential reference for researchers working in optical fiber researches and for industrial users who need to be aware of

current developments in fiber lasers, sensors and other optical fiber applications.

Coverage of the most recent advancements and applications in laser materials processing This book provides state-of-the-art coverage of the field of laser materials processing, from fundamentals to applications to the latest research topics. The content is divided into three succinct parts: Principles of laser engineering-an introduction to the basic concepts and characteristics of lasers, design of their components, and beam delivery Engineering background&-a review of engineering concepts needed to analyze different processes: thermal analysis and fluid flow; solidification of molten metal; and residual stresses that evolve during processes Laser materials processing-a rigorous and detailed treatment of laser materials processing and its principle applications, including laser cutting and drilling, welding, surface modification, laser forming, and rapid prototyping Each chapter includes an outline, summary, and example sets to help readers reinforce their understanding of the material. This book is designed to prepare graduate students who will be entering industry; researchers interested in initiating a research program; and practicing engineers who need to stay abreast of the latest developments in this rapidly evolving field.

This comprehensive handbook gives a fully updated guide to lasers and laser technologies, including the complete range of their technical applications. The first volume outlines the fundamental components of lasers, their properties, and working principles. Key Features: • Offers a complete update of the original, bestselling work, including many brand-new chapters. • Deepens the introduction to fundamentals, from laser design and fabrication to host matrices for solid-state lasers, energy level diagrams, hosting materials, dopant energy levels, and lasers based on nonlinear effects. • Covers new laser types, including quantum cascade lasers, silicon-based lasers, titanium sapphire lasers, terahertz lasers, bismuth-doped fiber lasers, and diode-pumped alkali lasers. • Discusses the latest applications, e.g., lasers in microscopy, high-speed imaging, attosecond metrology, 3D printing, optical atomic clocks, time-resolved spectroscopy, polarization and profile measurements, pulse measurements, and laser-induced fluorescence detection. • Adds new sections on laser materials processing, laser spectroscopy, lasers in imaging, lasers in environmental sciences, and lasers in communications. This handbook is the ideal companion for scientists, engineers, and students working with lasers, including those in optics, electrical engineering, physics, chemistry, biomedicine, and other relevant areas.

Tailored Light 1

Volume 2: Laser Design and Laser Systems

Laser Technology, Second Edition

Lasers in Biology and Medicine

Chapter 10. Spatial Multiplexing Using Multiple-Input Multiple-Output Signal Processing

This introduction to Atomic and Molecular Physics explains how our present model of atoms and molecules has been developed during the last two centuries by many experimental discoveries and from the theoretical side by the introduction of quantum physics to the adequate description of micro-particles. It illustrates the wave model of particles by many examples and shows the limits of classical description. The interaction of electromagnetic radiation with atoms and molecules and its potential for spectroscopy is outlined in more detail and in particular lasers as modern spectroscopic tools are discussed more thoroughly. Many examples and problems with solutions should induce the reader to an intense active cooperation.

An introductory text on laser physics features an emphasis on basic laser principles and theory, without requiring a quantum mechanical background.

The European Community regards training as a priority area and has therefore developed a series of programmes in the field of vocational training. This book is the result of a pilot project selected under two of these Community Action Programmes. It was initially selected under the COMETT programme, concerned with the development of continuing vocational training in the European Community. Moreover, it was one of the few selected projects to receive further funding under a second selection in the context of the LEONARDO DA VINCI Action Programme for the implementation of a European Community Vocational Training policy. It is with great pleasure that I present the outcome of this project which embodies one of the fundamental objectives of the LEONARDO DA VINCI Programme - training for new technologies in SMEs, which make a significant contribution to economic development in Europe. - K DRAXLER, Director Directorate General XXII European Commission

The Laser world consists basically of two areas, which are necessary and in many cases also sufficient for effective innovation: The right laser for the right application. For the individual application that means the determination of optimized process parameters in terms of laser power, peak power/ intensity, focus geometry and dimension, pulse length, pulse repetition rate and wavelength to name only the six most important ones. Once these parameters are identified, the corresponding Laser has to be selected on the basis of commercial availability. Obviously there is no such thing than "One Laser for all". The situation is rather comparable with electrical power, were depending on the demand of the application in terms of voltage, current and time corresponding power supplies need to be tailored, however, with the difference that in the case of the Laser the variety of parameters is even higher, thus the technology is more complex but on the other hand much more flexible in terms optimizing the source to the application. As a consequence it is suggested to generate two volumes on Lasers and Applications named "Tailored Light".

Volume 1: Principles

Advances in Atomic, Molecular, and Optical Physics

Fundamentals and Applications

Efficient material laser beam ablation with a picosecond laser

Progress in Optics

Ultra-short pulse laser processing of ultra-hard materials requires an accurate and agile experimental and analytical investigation to determine an efficient choice of parameters and settings to optimize ablation. Therefore, this work presents a quality-oriented experimental approach and an analytical approach for the modeling and validation of multi-pulse picosecond laser beam ablation on cemented tungsten carbide. This work starts with a review of literature and state-of-the-art theories of four relevant areas for this research: picosecond lasers, laser beam ablation process, cemented tungsten carbide (WC) and quality-oriented tools. Subsequently, a concept for an efficient material laser beam ablation with a picosecond laser was introduced. Furthermore, two approaches for the investigation are presented from an experimental and analytical perspective, respectively. The first approach introduced a methodology for the identification of influential parameters. It executes a quality-oriented methodology based on the SWOT analysis, cause-and-effect diagram and the variable search methodology. The conclusion of the methodology gave the interaction of pulse repetition rate and scanner speed in the form of pulse overlap and track overlap PO/TO as the most influential parameter in the maximization of the ablation rate. The second most influential factors resulted laser beam power and burst-mode. The second approach, description of the model, executes a theoretical analysis of the picosecond laser beam ablation of cemented WC by the application of the Beer-Lambert law and multi-pulse ablation modeling. The unavailable material properties were obtained by experimental investigations, like in the cases of the incubation factor and the reflectivity factor. Threshold fluence for cemented WC was determined by the application of the heat transfer theory and input power intensity was adapted to a Gaussian beam profile. At the end of the approach, power density visualizations of a picosecond laser pulse under the five available pulse repetition rates were modeled and validated. The findings from the adaptation of the Beer-Lambert law acted as basis for development of the multi-pulse laser ablation model for both single-pulse mode and burst-mode, respectively. Based on the definition of the number of pulses N irradiating the same area, the corresponding threshold fluence for N, the input fluence and incubation factor, ablation depth was modeled and experimentally validated. Finally, results and conclusions of both approaches were discussed and a framework for an efficient laser beam ablation was presented. Recommendations for further actions on research and industry were introduced at the end of the work.

Ever since their invention in 1960, lasers have assumed tremendous importance in the fields of science, engineering and technology because of their use both in basic research and in various technological applications. Lasers: Theory and Applications 2nd Edition will provide a coherent presentation of the basic physics behind the working of the laser along with some of their most important applications. Numerical examples are scattered throughout the book for helping the student gain a better appreciation of the concepts and problems at the end of each chapter and provides the student a

better understanding of the basics and help in applying the concepts to practical situations. This book serves as a text in a course on lasers and their applications for students majoring in various disciplines such as Physics, Chemistry and Electrical Engineering.

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.

Proceedings of the NATO Advanced Study Institute, San Miniato, Italy, September 2-13, 1985

Principles of Lasers

Volume 1

The Practical Approach to Modern Aspects of Photonics and Laser Physics

Solid-State Laser Engineering

Optical Fiber Telecommunications VIB

As different laser technologies continue to make it possible to change laser parameters and improve beam quality and

performance, a multidisciplinary theoretical knowledge and grasp of cutting-edge technological developments also become increasingly important. The revised and updated Laser Technology, Second Edition reviews the principles and basic physical laws of lasers needed to learn from past developments and solve the many technical problems arising in this challenging field. The first edition of Laser Technology was classified by the Chinese National Education Committee as a "national-level key textbook." This updated second edition logically presents the various types of laser technology currently available and discusses the transmission of information using optical waves with modulating technology. It assesses how to enhance beam energy or power through Q switching, mode-locking, and amplification, and it illustrates how mode selection and frequency stabilizing technology can improve light beam directionality or monochromaticity. The text also covers nonlinear optical techniques for obtaining new frequencies and light waves. Features Self-Contained, Independent Chapters for Flexible Use The author presents the fundamentals of physical effects in technical devices and implementation methods to create a clear and systematic understanding of the physical processes of different laser technologies. Technical improvements to enhance laser performance in different applications have given rise to new physical phenomena. These have resulted in a series of new laser branches and fields of applied technologies, such as laser physics, nonlinear optics, laser spectroscopy, laser medicine, and information optoelectronic technology. This book analyzes this growth, stressing basic principles but also including key technical methods and examples where needed to properly combine practical and theoretical coverage of this distinct area.

Laser Beam Mode Selection by Computer Generated Holograms brings attention to a new class of optical elements called modans, with applications in laser and fiber optics. Separation of the transverse modes by modans is discussed in close analogy to well-known effects of color separation by diffraction gratings. The book describes the basic questions of digital holography in the recording of complex wavefronts on phase-only media, binary coding cells, multilevel computer-generated holograms, quantization and sampling, image reconstruction, and computer generation of multifocal and multibeam holograms. This collective effort summarizes 12 years of scientific activities in the development of diffractive optical elements and provides considerable material never before published. An interesting appendix dedicates itself to mathematical proof of optimal properties of orthogonal base-functions and eigenfunctions.

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
A detailed introduction to modern optical engineering.
Laser Beam Mode Selection by Computer Generated Holograms
A Practical Guide to Handling Laser Diode Beams
Theory and Techniques, Second Edition
Official Gazette of the United States Patent and Trademark Office
Computer Design of Diffractive Optics

At the beginning of an exciting new era in optical communications, we review fundamentals as well as practical experimental aspects of MIMO-SDM: we discuss the importance of selectively addressing all modes of a coupled-mode SDM channel at transmitter and receiver in order to achieve reliable capacity gains and show that reasonable levels of mode-dependent loss (MDL) are acceptable without much loss of channel capacity. We then introduce MIMO-DSP techniques as an extension of familiar algorithms used in polarization-division multiplexed (PDM) digital coherent receivers and discuss their functionality and scalability. Finally, we review the design of mode multiplexers (MMUXs) that allow for the mapping of the individual transmission signals onto an orthogonal basis of waveguide mode, and discuss their performance in experimental demonstrations.

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 this field, the book covers in detail a wide variety of advanced methods for the rigorous simulation of light diffraction. The authors apply their expertise to addressing cutting-edge problems in nanophotonics. Chapters consider the basic equations of diffractive nanophotonics and related transformations and numerical methods for solving diffraction problems under strict electromagnetic theory. They examine the diffraction of light on two-dimensional microscopic objects of arbitrary shape and present a numerical method for solving the problem of diffraction on periodic diffractive micro- and nanostructures. This method is used in modern trends in nanophotonics, such as plasmonics, metamaterials, and nanometrology. The book describes the simulation of electromagnetic waves in nanophotonic devices and discusses two methods of calculating the spatial modes of microstructured photonic crystal fibres—a relatively new class of optical fibres with the properties of photonic crystals. The book explains the theory of paraxial and non-paraxial laser beams with axial symmetry and an orbital angular momentum—called vortex beams—which are used for optical trapping and rotating micro- and nanoparticles in a ring in the cross-sectional plane of the beam. The final chapter discusses methods for calculating the force and torque exerted by the electromagnetic field focused onto the microparticle of arbitrary form, whose dimensions are comparable with the wavelength of light.

Laser Beam Shaping: Theory and Techniques addresses the theory and practice of every important technique for lossless beam shaping. Complete with experimental results as well as guidance on when beam shaping is practical and when each technique is appropriate, the Second Edition is updated to reflect significant developments in the field. This authoritative

text: Features new chapters on axicon light ring generation systems, laser-beam-splitting (fan-out) gratings, vortex beams, and microlens diffusers Describes the latest advances in beam profile measurement technology and laser beam shaping using diffractive diffusers Contains new material on wavelength dependence, channel integrators, geometrical optics, and optical software Laser Beam Shaping: Theory and Techniques, Second Edition not only provides a working understanding of the fundamentals, but also offers insight into the potential application of laser-beam-profile shaping in laser system design. This book offers the reader a practical guide to the control and characterization of laser diode beams. Laser diodes are the most widely used lasers, accounting for 50% of the global laser market. Correct handling of laser diode beams is the key to the successful use of laser diodes, and this requires an in-depth understanding of their unique properties. Following a short introduction to the working principles of laser diodes, the book describes the basics of laser diode beams and beam propagation, including Zemax modeling of a Gaussian beam propagating through a lens. The core of the book is concerned with laser diode beam manipulations: collimating and focusing, circularization and astigmatism correction, coupling into a single mode optical fiber, diffractive optics and beam shaping, and manipulation of multi transverse mode beams. The final chapter of the book covers beam characterization methods, describing the measurement of spatial and spectral properties, including wavelength and linewidth measurement techniques. The book is a significantly revised and expanded version of the title Laser Diode Beam Basics, Manipulations and Characterizations by the same author. New topics introduced in this volume include: laser diode types and working principles, non-paraxial Gaussian beam, Zemax modeling, numerical analysis of a laser diode beam, spectral property characterization methods, and power and energy characterization techniques. The book approaches the subject in a practical way with mathematical content kept to the minimum level required, making the book a convenient reference for laser diode users.

Optics, Light and Lasers

Ninth Marcel Grossmann Meeting, The: On Recent Developments In Theoretical And Experimental General Relativity, Gravitation & Relativistic Field Theories (In 3 Volumes) - Procs Of The Mgix Mm Meeting

An Introduction to Atomic-, Molecular- and Quantum Physics

Laser Configurations for Transverse Mode Selection and Coherent Beam Combining

Lasers and Masers: a Continuing Bibliography

This volume contains the lectures and seminars presented at the NATO Advanced Study Institute on Lasers in Biology and Medicine organized by the International School of Quantum Electronics at the Villa Le Pianore, Camaiore, Italy, August 19-31, 1979. Most laser applications in biology and medicine are highly interdisciplinary in nature, drawing from and pertaining to such diverse fields as the physical sciences ((bio)physics, (bio)chemi stry) , engineering, the biological sciences (cellular research, photobiology) and finally theoretical and clinical medicine. Indeed the group of participants of the summer school did reflect this diversity both in background and interest. The presentations con tained in this volume mainly fall into two categories: tutorial lectures on the most important general subjects, intended to lay a common base for all participants,

and a number of more advanced con tributions, serving the purpose of exemplifying selected but typical applications in their current state of development. Intense inter communication, lively discussion, and here and there even future cooperation were the general aims more than a detailed in-depth discussion of one or the other aspect of this large field. In this sense it is the hope of the organizing committee that, despite the inevitable limitations, a broad and reasonably representative cov erage of the field has been achieved and that this volume may be a valuable aid for newcomers to get a good start into this complex subject area for some years to corne.

Near-Earth Laser Communications

Atoms, Molecules and Photons

Lasers: Principles and Operations (Volume One)

Iteractive Methods For Diffractive Optical Elements Computation

High Power Lasers for Production