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LAMBERT WENDY

Principles of Lasers

Cambridge University Press

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.

Single-mode laser studies
CRC Press
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.
Introduction to Optical Engineering SPIE-International Society for Optical Engineering
Many optical design technical books are available for many years which mainly deal with image optics design based on geometric optics and using sequential raytracing technique. Some books slightly touched laser beam manipulation optics design. On the other hand many books on laser diodes have been published that extensively deal with laser diode physics with little touching on laser diode beam manipulations and characterizations. There are some internet resources dealing with laser diode beams. However, these internet resources have not covered enough materials with enough details on laser diode beam manipulations and characterizations. A technical book concentrated on laser diode beam manipulations and characterizations can fit in to the open and provide useful information to laser diode users. Laser Diode Beam Basics, Manipulations and Characterizations is concentrated on the very practical side of the subject, it only discusses the basic physics and mathematics that are necessary for the readers in order to understand the subject. This book is intended to provide a practical guidance and reference to those scientists and engineers

who are still new to laser diode applications, and to those undergraduate and graduate students who are studying lasers and optics. Readers are expected to be able to fast and easily find the most practical and useful information about laser diodes in this book without the need of searching through a sea of information.

Laser Beam Quality Metrics CRC Press

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.

Lasers and Masers: a Continuing Bibliography John Wiley & Sons

Laser is one of the most applicable sources of energy and it can be used in a large variety of applications such as defense, industries and medicine. The special characteristics of this source of energy make it very interesting for different applications. This book includes an interesting and recent collection of relevant research on the development of high-powered laser systems. It includes topics such as using a variety of methods to generate laser pulses in the femtosecond and attosecond range with different wavelengths. This book includes 10 chapters. This book is a very relevant source for researchers as well as engineers working with high-powered laser systems around the world.

Gas Lasers BoD – Books on Demand

Principles of Laser Materials Processing Authoritative resource providing state-of-the-art coverage in the field of laser materials processing, supported with supplementary learning materials Principles of Laser Materials Processing goes over the most recent advancements and applications in laser materials processing, with the second edition providing a welcome update to the successful first edition through updated content on the important fields within laser materials processing. The text includes solved example problems and problem sets suitable for the readers' further understanding of the

technology explained. Split into three parts, the text first introduces basic concepts of lasers, including the characteristics of lasers and the design of their components, to aid readers in their initial understanding of the technology. The text then reviews the engineering concepts that are needed to analyze the different processes. Finally, it delves into the background of laser materials and provides a state-of-the-art compilation of material in the major application areas, such as laser cutting and drilling, welding, surface modification, and forming, among many others. It also presents information on laser safety to prepare the reader for working in the industry sector and provide practicing engineers the updates needed to work safely and effectively. In Principles of Laser Materials Processing, readers can expect to find specific information on: Laser generation principles, including basic atomic structure, atomic transitions, population distribution, absorption, and spontaneous emission Optical resonators, including standing waves in a rectangular cavity, planar resonators, beam modes, line selection, confocal resonators, and concentric resonators Laser pumping, including optical pumping, arc/flash lamp pumping, energy distribution in the active medium, and electrical pumping Broadening mechanisms, including line-shape functions,

homogeneous broadening such as natural and collision, and inhomogeneous broadening Principles of Laser Materials Processing is highly suitable for senior undergraduate and graduate students studying laser processing, and non-traditional manufacturing processes; it is also aimed at researchers to provide additional information to be used in research projects that are to be undertaken within the technology field.

Computer Design of Diffractive Optics Springer

Optical devices are employed in an ever-increasing range of applications, from simple lenses to complex fibre-optic communication networks. This book provides a detailed introduction to modern optical engineering, covering the fundamental concepts as well as practical techniques and applications. Basic optical principles are presented, particularly reflection, refraction, aberrations, diffraction and interference. Building on this foundation, a wide variety of optical devices and processes are then discussed, including simple optical instruments, photodetectors, spatial light modulators, holography and lasers. Two chapters are devoted to linear system transforms and signal processing, and the book concludes with a chapter on fibre optics. The book contains many worked examples and over 250 problems (solutions manual for instructors available from the

publishers). It will be invaluable to electrical engineering and physics undergraduates taking courses in optical engineering, photonics, and electro-optics.

Progress in Optics John Wiley & Sons

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.

Lasers: Light Amplifiers and Oscillators Springer Science & Business Media 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.

Optics, Light and Lasers CRC Press

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.

Optically Excited Bulk Semiconductor Lasers Springer Science & Business Media

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.

Laser Beam Shaping Applications Springer Science & Business Media

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 Diode Beam Basics, Manipulations and Characterizations Cuvillier Verlag

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

Selected Papers on Laser Design John Wiley & Sons

The book is geared

toward engineers and laser physicists involved in the development of laser-based systems, especially laser systems for directed energy applications. It begins with a review of basic laser properties and moves to definitions and implications of the various standard beam quality metrics such as M2, power in the bucket, brightness, beam parameter product, and Strehl ratio. The practical aspects of beam metrology, which have not been sufficiently addressed in the literature, are amply covered here. For those who are only interested in measuring Gaussian beams from commercial lasers, a reading of Chapter 1, Chapter 2 "What Your Laser Beam Analyzer Manual Didn't Tell You," and the first three sections of Chapter 6 "Cautionary Tales" will be sufficient. For those working in more off-the-map fields such as unique lasers, unstable resonators, multikilowatt lasers, MOPAs, or requirements generation and development, a reading of the entire text is recommended.

Selected Topics on Optical Fiber Technology Springer Nature

The Fritz Haber Symposium on Methods of Laser Spectroscopy was held in Ein Bokek, Israel, on the shores of the Dead Sea, on December 16-20, 1985. The location is the lowest place on earth, 392 meters below sea level. It was hoped that 120 active laser scientists, so lowly trapped in such a place, with the nearest

entertainment 100 km away, will have no choice but to discuss laser spectroscopy. On the average, the Dead Sea area receives 3-4 days of rain each year, and this year these days all occurred during the conference. This did not mean the cancellation of the hikes, although the trip to Massada was conducted in the rain. The unexpected rains also caused flash floods in the area, and Ein Bokek was completely cut-off on Thursday night. The archeologist scheduled to speak after dinner, and the belly dancer scheduled to appear afterwards, (~ould not arrive, resulting in the only serious deviation from the original plan. The scientific program consisted of invited talks and contributed posters. The emphasis in selection of invited speakers and topics was on the methods rather than specific molecular systems, and an attempt was made to allow ample time for discussion after each lecture. The same philosophy guided us in editing this book, and authors were requested to write manuscripts longer than usual for standard conference proceedings.

The Laser Literature BoD – Books on Demand

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.

Human-Computer Interaction – INTERACT 2019 John Wiley & Sons

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.

Efficient material laser beam ablation with a picosecond laser

Springer

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

Lasers and Masers: a Continuing Bibliography Springer

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homogeneous broadening such as natural and collision, and inhomogeneous broadening Principles of Laser Materials Processing is highly suitable for senior undergraduate and graduate students studying laser processing, and non-traditional manufacturing processes; it is also aimed at researchers to provide additional information to be used in research projects that are to be undertaken within the technology field.

Handbook of the Eurolaser Academy CRC Press

This book is the result of more than ten years of research and teaching in the field of quantum electronics. The purpose of the book is to introduce the principles of lasers, starting from elementary notions of quantum mechanics and electromagnetism. Because it is an introductory book, an effort has been made to make it self contained to minimize the need for reference to other works. For the same reason; the references have been limited (whenever possible) either to review papers or to papers of seminal importance. The organization of the book is based on the fact that a laser can be thought of as consisting of three elements: (i) an active material, (ii) a pumping system, and (iii) a suitable resonator. Ac cordingly, after an introductory chapter, the next three chapters deal, respectively, with the interaction of radiation with matter, pumping processes, and the theory of passive optical

resonators.