

Digital Holographic Microscopy Principles Techniques And Applications Springer Series In Optical Sciences

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[Analog and Digital Holography with MATLAB](#) - Georges T. Nehmetallah 2015

Holography is the only truly three-dimensional imaging method available, and MATLAB has become the programming language of choice for engineering and physics students. Whereas most books solely address the theory behind these 3D imaging techniques, this monograph concentrates on the exact code needed to perform complex mathematical and physical operations.

A Practical Guide to Optical Microscopy - John Girkin 2019-06-14
Choice Recommended Title, March 2020 Optical microscopy is used in a vast range of applications ranging from materials engineering to in vivo observations and clinical diagnosis, and thanks to the latest advances in technology, there has been a rapid growth in the number of methods available. This book is aimed at providing users with a practical guide to help them select, and then use, the most suitable method for their application. It explores the principles behind the different forms of optical microscopy, without the use of complex maths, to provide an understanding to help the reader utilise a specific method and then interpret the results. Detailed physics is provided in boxed sections, which can be bypassed by the non-specialist. It is an invaluable tool for use within research groups and laboratories in the life and physical sciences, acting as a first source for practical information to guide less experienced users (or those new to a particular methodology) on the range of techniques available. Features: The first book to cover all current optical microscopy methods for practical applications Written to be understood by a non-optical expert with inserts to provide the physical science background Brings together conventional widefield and confocal microscopy, with advanced non-linear and super resolution methods, in one book To learn more about the author please visit here.

[Springer Series in Light Scattering](#) - Alexander Kokhanovsky 2019-06-29
This book describes recent advances in radiative transfer, atmospheric remote sensing, polarization optics of random media, and light scattering. It is a valuable resource for anyone involved in light scattering research. Providing numerous step-by-step tutorials, it allows readers to quickly learn about various aspects of theoretical and experimental light scattering media optics. The book features among others a chapter on aerosol remote sensing that helps readers to define and solve various aerosol remote sensing problems.

[Optical Holography](#) - P. Hariharan 1996-07-13

This 1996 book is an expanded edition of one of the best known introductions to optical holography.

Biomedical Optical Phase Microscopy and Nanoscopy - Natan T. Shaked 2012-11-05

Written by leading optical phase microscopy experts, this book is a comprehensive reference to phase microscopy and nanoscopy techniques for biomedical applications, including differential interference contrast (DIC) microscopy, phase contrast microscopy, digital holographic microscopy, optical coherence tomography, tomographic phase microscopy, spectral-domain phase detection, and nanoparticle usage for phase nanoscopy The Editors show biomedical and optical engineers how to use phase microscopy for visualizing unstained specimens, and support the theoretical coverage with applied content and examples on designing systems and interpreting results in bio- and nanoscience applications. Provides a comprehensive overview of the principles and techniques of optical phase microscopy and nanoscopy with biomedical applications. Tips/advice on building systems and working with advanced imaging biomedical techniques, including interpretation of phase images, and techniques for quantitative analysis based on phase microscopy. Interdisciplinary approach that combines optical engineering,

nanotechnology, biology and medical aspects of this topic. Each chapter includes practical implementations and worked examples.

Holographic Materials and Optical Systems - Izabela Naydenova 2017-03-22

Holographic Materials and Optical Systems covers recent research achievements in the areas of volume holographic optical elements and systems, development of functionalized holographic recording materials, and applications in holographic imaging and metrology. Designs of single and multiplexed volume holographic optical elements for laser beam shaping, combining, and redirection are covered, and their properties are studied theoretically and experimentally. The high impact of holography in imaging and metrology is demonstrated by applications spreading from thickness and surface measurements, through antenna metrology and analyzing high-density gradients in fluid mechanics to characterization of live objects in clinical diagnostics. Novel functionalized materials used in dynamic or permanent holographic recording cover photopolymers, photochromics, photo-thermo-refractive glasses, and hybrid organic-inorganic media.

[Digital Holography](#) - Ulf Schnars 2005-12-12

This highly practical and self-contained guidebook explains the principles and major applications of digital hologram recording and numerical reconstruction (Digital Holography). A special chapter is designated to digital holographic interferometry with applications in deformation and shape measurement and refractive index determination. Applications in imaging and microscopy are also described. Special techniques such as digital light-in-flight holography, holographic endoscopy, information encrypting, comparative holography, and related techniques of speckle metrology are also treated

Holography, 3D Imaging and 3D Display - Ting-Chung Poon 2021-02-19

Modern holographic techniques have been successfully applied in many important areas, such as 3-D inspection, 3-D microscopy, metrology, and profilometry, augmented reality, and industrial informatics. This Special Issue covers selected pieces of cutting-edge research works, ranging from low-level acquisition, to high-level analysis, processing, and manipulation of holographic information. The Special Issue also serves as a comprehensive review of existing state-of-the-art techniques in 3-D imaging and 3-D display, as well as broad insights into the future development of these disciplines. The Special Issue contains 25 papers in the field of holography, 3-D imaging, and 3-D display. All the papers underwent substantial peer review under the guidelines of Applied Sciences.

Digital Holographic Microscopy - Myung K. Kim 2011-08-09

Digital holography is an emerging field of new paradigm in general imaging applications. The book presents an introduction to the theoretical and numerical principles and reviews the research and development activities in digital holography, with emphasis on the microscopy techniques and applications. Topics covered include the general theory of diffraction and holography formations, and practical instrumentation and experimentation of digital holography. Various numerical techniques are described that give rise to the unique and versatile capabilities of digital holography. Representative special techniques and applications of digital holography are discussed. The book is intended for researchers interested in developing new techniques and exploring new applications of digital holography.

[Holoscopy](#) - Dierck Hillmann 2014-07-08

Holoscopy is a new tomographic imaging modality that combines techniques of digital holography with Fourier-domain optical coherence tomography (FD-OCT). Dierck Hillmann gives a theoretical introduction

to the mathematics and physics of holoscopy and develops an efficient numerical reconstruction procedure. Compared to FD-OCT, holoscopy provides unique advantages by enabling tomographic imaging without a limited depth of focus, but results in an increased numerical cost for reconstruction. In further chapters, the author introduces techniques for FD-OCT that are relevant to holoscopy as well. He demonstrates and compares numerical reconstruction methods for FD-OCT and shows how motion and dispersion artifacts in FD-OCT can be numerically compensated.

[Optical Microscopic and Spectroscopic Techniques Targeting Biological Applications](#) - Vicente Micó 2021-10-22

A Practical Guide to Optical Microscopy - John Girkin 2019-06-14

Choice Recommended Title, March 2020 Optical microscopy is used in a vast range of applications ranging from materials engineering to in vivo observations and clinical diagnosis, and thanks to the latest advances in technology, there has been a rapid growth in the number of methods available. This book is aimed at providing users with a practical guide to help them select, and then use, the most suitable method for their application. It explores the principles behind the different forms of optical microscopy, without the use of complex maths, to provide an understanding to help the reader utilise a specific method and then interpret the results. Detailed physics is provided in boxed sections, which can be bypassed by the non-specialist. It is an invaluable tool for use within research groups and laboratories in the life and physical sciences, acting as a first source for practical information to guide less experienced users (or those new to a particular methodology) on the range of techniques available. Features: The first book to cover all current optical microscopy methods for practical applications Written to be understood by a non-optical expert with inserts to provide the physical science background Brings together conventional widefield and confocal microscopy, with advanced non-linear and super resolution methods, in one book To learn more about the author please visit here.

Introduction to Experimental Biophysics - Jay L. Nadeau 2017-10-10
Praise for the First Edition "essential reading for any physical scientist who is interested in performing biological research." —Contemporary Physics "an ambitious text.... Each chapter contains protocols and the conceptual reasoning behind them, which is often useful to physicists performing biological experiments for the first time." -Physics Today This fully updated and expanded text is the best starting point for any student or researcher in the physical sciences to gain firm grounding in the techniques employed in molecular biophysics and quantitative biology. It includes brand new chapters on gene expression techniques, advanced techniques in biological light microscopy (super-resolution, two-photon, and fluorescence lifetime imaging), holography, and gold nanoparticles used in medicine. The author shares invaluable practical tips and insider's knowledge to simplify potentially confusing techniques. The reader is guided through easy-to-follow examples carried out from start to finish with practical tips and insider's knowledge. The emphasis is on building comfort with getting hands "wet" with basic methods and finally understanding when and how to apply or adapt them to address different questions. Jay L. Nadeau is a scientific researcher and head of the Biomedical Engineering in Advanced Applications of Quantum, Oscillatory, and Nanotechnological Systems (BEAQONS) lab at Caltech and was previously associate professor of biomedical engineering and physics at McGill University.

Encyclopedia of Biomedical Engineering - 2018-09-01

Encyclopedia of Biomedical Engineering is a unique source for rapidly evolving updates on topics that are at the interface of the biological sciences and engineering. Biomaterials, biomedical devices and techniques play a significant role in improving the quality of health care in the developed world. The book covers an extensive range of topics related to biomedical engineering, including biomaterials, sensors, medical devices, imaging modalities and imaging processing. In addition, applications of biomedical engineering, advances in cardiology, drug delivery, gene therapy, orthopedics, ophthalmology, sensing and tissue engineering are explored. This important reference work serves many groups working at the interface of the biological sciences and engineering, including engineering students, biological science students, clinicians, and industrial researchers. Provides students with a concise description of the technologies at the interface of the biological sciences and engineering Covers all aspects of biomedical engineering, also incorporating perspectives from experts working within the domains of biomedicine, medical engineering, biology, chemistry, physics, electrical engineering, and more Contains reputable, multidisciplinary content

from domain experts Presents a 'one-stop' resource for access to information written by world-leading scholars in the field

Holography: Techniques and Applications - Wynne Davis 2015-02-11

The various techniques and applications of holography are covered in this profound book. It is an elucidative account on the fundamental principles of holography and current innovative advancement in this area. Topics covered in the book include a discussion on the standards of hologram recording, an extensive review of diffraction in volume gratings and holograms, advanced functions of holography in sensors, holographic gratings and white-light viewable holographic stereograms, digital hologram coding and digital holographic microscopy.

[Digital Holography](#) - Pascal Picart 2013-01-24

This book presents a substantial description of the principles and applications of digital holography. The first part of the book deals with mathematical basics and the linear filtering theory necessary to approach the topic. The next part describes the fundamentals of diffraction theory and exhaustively details the numerical computation of diffracted fields using FFT algorithms. A thorough presentation of the principles of holography and digital holography, including digital color holography, is proposed in the third part. A special section is devoted to the algorithms and methods for the numerical reconstruction of holograms. There is also a chapter devoted to digital holographic interferometry with applications in holographic microscopy, quantitative phase contrast imaging, multidimensional deformation investigations, surface shape measurements, fluid mechanics, refractive index investigations, synthetic aperture imaging and information encrypting. Keys so as to understand the differences between digital holography and speckle interferometry and examples of software for hologram reconstructions are also treated in brief. Contents 1. Mathematical Prerequisites. 2. The Scalar Theory of Diffraction. 3. Calculating Diffraction by Fast Fourier Transform. 4. Fundamentals of Holography. 5. Digital Off-Axis Fresnel Holography. 6. Reconstructing Wavefronts Propagated through an Optical System. 7. Digital Holographic Interferometry and Its Applications. Appendix. Examples of Digital Hologram Reconstruction Programs

Digital Holographic Microscopy - Myung K. Kim 2011-08-09

Digital holography is an emerging field of new paradigm in general imaging applications. The book presents an introduction to the theoretical and numerical principles and reviews the research and development activities in digital holography, with emphasis on the microscopy techniques and applications. Topics covered include the general theory of diffraction and holography formations, and practical instrumentation and experimentation of digital holography. Various numerical techniques are described that give rise to the unique and versatile capabilities of digital holography. Representative special techniques and applications of digital holography are discussed. The book is intended for researchers interested in developing new techniques and exploring new applications of digital holography.

Optical Measurement of Surface Topography - Richard Leach 2011-03-31

The measurement and characterisation of surface topography is crucial to modern manufacturing industry. The control of areal surface structure allows a manufacturer to radically alter the functionality of a part. Examples include structuring to effect fluidics, optics, tribology, aerodynamics and biology. To control such manufacturing methods requires measurement strategies. There is now a large range of new optical techniques on the market, or being developed in academia, that can measure areal surface topography. Each method has its strong points and limitations. The book starts with introductory chapters on optical instruments, their common language, generic features and limitations, and their calibration. Each type of modern optical instrument is described (in a common format) by an expert in the field. The book is intended for both industrial and academic scientists and engineers, and will be useful for undergraduate and postgraduate studies.

Introduction to Modern Digital Holography - Ting-Chung Poon 2014-01-23

Get up to speed with digital holography with this concise and straightforward introduction to modern techniques and conventions. Building up from the basic principles of optics, this book describes key techniques in digital holography, such as phase-shifting holography, low-coherence holography, diffraction tomographic holography and optical scanning holography, discussing their practical applications, and accompanied by all the theory necessary to understand the underlying principles at work. A further chapter covers advanced techniques for producing computer-generated holograms. Extensive Matlab code is

integrated with the text throughout and available for download online, illustrating both theoretical results and practical considerations such as aliasing, zero padding and sampling. Accompanied by end-of-chapter problems and an online solutions manual for instructors, this is an indispensable resource for students, researchers and engineers in the fields of optical image processing and digital holography.

[Digital Holographic Methods](#) - Stephan Stuerwald 2018-10-12

This book presents not only the simultaneous combination of optical methods based on holographic principles for marker-free imaging, real-time trapping, identification and tracking of micro objects, but also the application of substantial low coherent light sources and non-diffractive beams. It first provides an overview of digital holographic microscopy (DHM) and holographic optical tweezers as well as non-diffracting beam types for minimal-invasive, real-time and marker-free imaging as well as manipulation of micro and nano objects. It then investigates the design concepts for the optical layout of holographic optical tweezers (HOTs) and their optimization using optical simulations and experimental methods. In a further part, the book characterizes the corresponding system modules that allow the addition of HOTs to commercial microscopes with regard to stability and diffraction efficiency. Further, based on experiments and microfluidic applications, it demonstrates the functionality of the combined setup, and discusses several types of non-diffracting beams and their application in optical manipulation. The book shows that holographic optical tweezers, including several non-diffracting beam types like Mathieu beams, combined parabolic and Airy beams, not only open up the possibility of generating efficient multiple dynamic traps for micro and nano particles with forces in the piconewton and nanonewton range, but also the opportunity to exert optical torque with special beams like Bessel beams, which can facilitate the movement and rotation of particles by generating microfluidic flows. The last part discusses the potential use of a slightly modified DHM-HOT-system to explore the functionality of direct laser writing based on a two-photon absorption process in a negative photoresist with a continuous wave laser

Digital Holography and Wavefront Sensing - Ulf Schnars 2014-09-19

This highly practical and self-contained guidebook explains the principles and major applications of digital hologram recording and numerical reconstruction (Digital Holography). A special chapter is designated to digital holographic interferometry with applications in deformation and shape measurement and refractive index determination. Applications in imaging and microscopy are also described. Special techniques such as digital light-in-flight holography, holographic endoscopy, information encrypting, comparative holography, and related techniques of speckle metrology are also treated

Computational Optical Phase Imaging - Cheng Liu 2022-04-11

In this book, computational optical phase imaging techniques are presented along with Matlab codes that allow the reader to run their own simulations and gain a thorough understanding of the current state-of-the-art. The book focuses on modern applications of computational optical phase imaging in engineering measurements and biomedical imaging. Additionally, it discusses the future of computational optical phase imaging, especially in terms of system miniaturization and deep learning-based phase retrieval.

[Digital Holography: Techniques and Applications](#) - Liangcai Cao 2022-11-16

[Cell Volume Regulation](#) - 2018-09-20

Cell Volume Regulation and Fluid Secretion, Volume 81, the latest release in the Current Topics in Membranes series highlights new advances in the field, with this new volume presenting interesting chapters on General principles of cell volume regulation, Cell volume maintenance: water and salt homeostasis, The search for ubiquitous cell volume sensor: the role of plasma membrane and cytoplasmic hydrogel, More than membranes, Cellular and membrane biomechanics of CVR response, Molecular identities of volume-regulatory anion channels, Molecular biology and physiology of volume-regulated anion channel (VRAC), the Role of WNKs in the modulation of intracellular chloride, amongst other topics. Provides the authority and expertise of leading contributors from an international board of authors Presents the latest release in the Current Topics in Membranes series Includes the latest information on Cell Volume Regulation

[Label-Free Super-Resolution Microscopy](#) - Vasily Astratov 2019-08-31

This book presents the advances in super-resolution microscopy in physics and biomedical optics for nanoscale imaging. In the last decade, super-resolved fluorescence imaging has opened new horizons in

improving the resolution of optical microscopes far beyond the classical diffraction limit, leading to the Nobel Prize in Chemistry in 2014. This book represents the first comprehensive review of a different type of super-resolved microscopy, which does not rely on using fluorescent markers. Such label-free super-resolution microscopy enables potentially even broader applications in life sciences and nanoscale imaging, but is much more challenging and it is based on different physical concepts and approaches. A unique feature of this book is that it combines insights into mechanisms of label-free super-resolution with a vast range of applications from fast imaging of living cells to inorganic nanostructures. This book can be used by researchers in biological and medical physics. Due to its logically organizational structure, it can be also used as a teaching tool in graduate and upper-division undergraduate-level courses devoted to super-resolved microscopy, nanoscale imaging, microscopy instrumentation, and biomedical imaging.

Micro- and Nanophotonic Technologies - Patrick Meyrueis 2017-03-20

Edited and authored by leading experts from top institutions in Europe, the US and Asia, this comprehensive overview of micro- and nanophotonics covers the physical and chemical fundamentals, while clearly focusing on the technologies and applications in industrial R&D. As such, the book reports on the four main areas of telecommunications and display technologies; light conversion and energy generation; light-based fabrication of materials; and micro- and nanophotonic devices in metrology and control.

[Second Harmonic Generation Imaging](#) - Francesco S. Pavone 2013-06-18

Second-harmonic generation (SHG) microscopy has shown great promise for imaging live cells and tissues, with applications in basic science, medical research, and tissue engineering. Second Harmonic Generation Imaging offers a complete guide to this optical modality, from basic principles, instrumentation, methods, and image analysis to biomedical applications. The book features contributions by experts in second-harmonic imaging, including many pioneering researchers in the field. Written for researchers at all levels, it takes an in-depth look at the current state of the art and possibilities of SHG microscopy. Organized into three sections, the book: Provides an introduction to the physics of the process, step-by-step instructions on how to build an SHG microscope, and comparisons with related imaging techniques Gives an overview of the capabilities of SHG microscopy for imaging tissues and cells—including cell membranes, muscle, collagen in tissues, and microtubules in live cells—by summarizing experimental and analytical methods Highlights representative biomedical and medical applications in imaging cancer, fibroses, autoimmune diseases, connective tissue disorders, eye pathologies, and cardiovascular disease Historically, clinical imaging at the cellular and tissue level has been performed by pathologists on ex vivo biopsies removed by the surgeon. While histology remains the "gold standard" for pathologists, its interpretation remains highly subjective. Much of SHG research has focused on developing more quantitative, objective metrics. A tutorial for newcomers and an up-to-date review for experts, this book explores how SHG may be used to more precisely image a wide range of pathological conditions and diseases.

[Augmented Reality and Its Application](#) - Dragan Cvetković 2022-03-16

Augmented Reality (AR) is a discipline that includes the interactive experience of a real-world environment, in which real-world objects and elements are enhanced using computer perceptual information. It has many potential applications in education, medicine, and engineering, among other fields. This book explores these potential uses, presenting case studies and investigations of AR for vocational training, emergency response, interior design, architecture, and much more.

Advances in Optics, Vol. 3 - Sergey Yurish 2018-04-26

Advances in Optics: Reviews Book Series is a comprehensive study of the field of optics, which provides readers with the most up-to-date coverage of optics, photonics and lasers with a good balance of practical and theoretical aspects. Directed towards both physicists and engineers this Book Series is also suitable for audiences focusing on applications of optics. The Vol.3 is devoted to various topics of applied optics and contains 17 chapters written by 49 experts in the field from 14 countries: Australia, China, India, Israel, Italy, Japan, Malaysia, Mexico, The Netherlands, Poland, Taiwan, UK, USA, Vietnam A clear comprehensive presentation makes these books work well as both a teaching resources and a reference books. The book is intended for researchers and scientists in physics and optics, in academia and industry, as well as postgraduate students.

[Holography](#) - Fouad Sabry 2022-02-21

What Is Holography Holography is a technique that enables a wavefront to be recorded and later re-constructed. Holography is best known as a method of generating three-dimensional images, but it also has a wide range of other applications. In principle, it is possible to make a hologram for any type of wave. How You Will Benefit (I) Insights, and validations about the following topics: Chapter 1: Holography Chapter 2: Diffraction Chapter 3: Microscopy Chapter 4: Interferometry Chapter 5: Photorefractive effect Chapter 6: Particle image velocimetry Chapter 7: Holographic data storage Chapter 8: Interference lithography Chapter 9: Rainbow hologram Chapter 10: Holographic interferometry Chapter 11: Digital holography Chapter 12: Computer-generated holography Chapter 13: Volume hologram Chapter 14: Holographic display Chapter 15: Electronic speckle pattern interferometry Chapter 16: Speckle (interference) Chapter 17: Digital holographic microscopy Chapter 18: Holographic optical element Chapter 19: Common-path interferometer Chapter 20: Physics of optical holography Chapter 21: Time-domain holography (II) Answering the public top questions about holography. (III) Real world examples for the usage of holography in many fields. (IV) 17 appendices to explain, briefly, 266 emerging technologies in each industry to have 360-degree full understanding of holography' technologies. Who This Book Is For Professionals, undergraduate and graduate students, enthusiasts, hobbyists, and those who want to go beyond basic knowledge or information for any kind of holography. Biomedical Optical Phase Microscopy and Nanoscopy - Natan T. Shaked 2012-12-31

Written by leading optical phase microscopy experts, this book is a comprehensive reference to phase microscopy and nanoscopy techniques for biomedical applications, including differential interference contrast (DIC) microscopy, phase contrast microscopy, digital holographic microscopy, optical coherence tomography, tomographic phase microscopy, spectral-domain phase detection, and nanoparticle usage for phase nanoscopy The Editors show biomedical and optical engineers how to use phase microscopy for visualizing unstained specimens, and support the theoretical coverage with applied content and examples on designing systems and interpreting results in bio- and nanoscience applications. Provides a comprehensive overview of the principles and techniques of optical phase microscopy and nanoscopy with biomedical applications. Tips/advice on building systems and working with advanced imaging biomedical techniques, including interpretation of phase images, and techniques for quantitative analysis based on phase microscopy. Interdisciplinary approach that combines optical engineering, nanotechnology, biology and medical aspects of this topic. Each chapter includes practical implementations and worked examples.

Holography - Emilia Mihaylova 2013-05-29

Holography - Basic Principles and Contemporary Applications is a collection of fifteen chapters, describing the basic principles of holography and some recent innovative developments in the field. The book is divided into three sections. The first, Understanding Holography, presents the principles of hologram recording illustrated with practical examples. A comprehensive review of diffraction in volume gratings and holograms is also presented. The second section, Contemporary Holographic Applications, is concerned with advanced applications of holography including sensors, holographic gratings, white-light viewable holographic stereograms. The third section of the book Digital Holography is devoted to digital hologram coding and digital holographic microscopy.

Optical Holography - P. Hariharan 1984

This book presents a self-contained treatment of the principles, techniques and applications of optical holography, with particular emphasis on recent developments. The first part deals with the theory of holographic imaging, the characteristics of the reconstructed image and the different types of holograms. The next section covers the practical aspects of holography - optical systems, light sources and recording media - as well as the production of holograms for display, colour holography and computer-generated holograms. Finally, there is a detailed description of the most important applications of holography. These include particle-size analysis, high-resolution imaging, holographic optical elements and information storage and processing, as well as holographic interferometry and its use in stress analysis, vibration studies and contouring.

Digital Holography and Three-Dimensional Display - Ting-Chung Poon 2006-09-01

Digital holography and its application to 3-D display is one of the formidable problems of evolving areas of high technology to receive great attention in recent years. This book offers a collection of key

chapters that covers digital holography and 3-D display techniques to provide the state-of-the-art developments in these important areas. The book contains research material as well as reviews, new ideas and fresh insights.

Progress in Optomechatronics - Indrani Bhattacharya 2020-09-21

This book presents peer-reviewed articles from the 20th International Symposium on Optomechatronic Technologies (ISOT 2019), held in Goa, India. The symposium brought together students, researchers, professionals, and academicians in the field of optomechatronics and related areas on a common platform conducive to academic interaction with business professionals.

Contemporary Holography - C. S. Narayanamurthy 2022

Conventional holography -- Conoscopic holography -- Computer generated holography -- Photorefractive dynamic holography -- Digital holography -- Unconventional holography.

Optical Metrology with Interferometry - Dahi Ghareab Abdelsalam Ibrahim 2019-07-31

The accurate measurements of surface topography are becoming important to many applications in both engineering and science. Optical interferometry is considered a preferable technique for featuring accurate 3D surface profiling since it is non-contacting, non-destructive and highly accurate. In combination with computers and other electronic devices, optical interferometry has become faster, more reliable, more convenient and more robust. There is now a wealth of new optical interferometry techniques on the market, or being developed in academia, that can measure surface topography with high precision. Each method has both its strong points and its limitations. This book explains in detail the basics of optical interferometry, their common language, generic features and limitations, and their simulation and uncertainties. Moreover, it provides an introduction to new frontiers in optical interferometry, including terahertz technology and optical frequency combs.

Introduction to Modern Digital Holography - Ting-Chung Poon 2014-01-23

Building up from the basic principles of optics, this straightforward introduction to digital holography, aimed at graduate students, engineers and researchers, describes modern techniques and applications, plus all the necessary underlying theory. Supporting Matlab code is available for download online, and homework problems are accompanied by an instructor solution manual.

Advancement of Optical Methods & Digital Image Correlation in Experimental Mechanics, Volume 3 - Luciano Lamberti 2018-10-11

Advancement of Optical Methods & Digital Image Correlation in Experimental Mechanics, Volume 3 of the Proceedings of the 2018 SEM Annual Conference & Exposition on Experimental and Applied Mechanics, the third volume of eight from the Conference, brings together contributions to this important area of research and engineering. The collection presents early findings and case studies on a wide range of optical methods ranging from traditional photoelasticity and interferometry to more recent DIC and DVC techniques, and includes papers in the following general technical research areas: New Developments in Optical Methods & Fringe Pattern Analysis; DIC Applications for Challenging Environments; Optical Methods in SEM: History & Perspective; Mechanical Characterization of Materials & Structures with Optical Methods; Bioengineering.

Principles of Light Microscopy: From Basic to Advanced -

Volodymyr Nechyporuk-Zloy 2022-11-29

This textbook is an excellent guide to microscopy for students and scientists, who use microscopy as one of their primary research and analysis tool in the laboratory. The book covers key microscopy principles and explains the various techniques such as epifluorescence microscopy, confocal/live cell imaging, SIM/light sheet microscopy, and many more. Easy-to-understand protocols provide helpful guidance for practical implementation in various commercially available imaging systems. The reader is introduced to histology and further be guided through advanced image acquisition, classification and analysis. The book is written by experienced imaging specialists from the UK, other EU countries, the US and Asia, and is based on advanced training courses for master students and PhD students. Readers are not expected to be familiar with imaging and microscopy technologies, but are introduced to the subject step by step. This textbook is indented for biomedical and medical students, as well as scientists and postdocs who want to acquire a thorough knowledge of microscopy, or gain a comprehensive overview of modern microscopy techniques used in various research laboratories and imaging facilities. Chapter 4 is available open access under a

