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 Advanced Digital Imaging Laboratory Using MATLAB®
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 Advances in Signal Transforms
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 How to Shape Light with Spatial Light Modulators
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 Optical Scanning Holography with MATLAB®
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 Springer Handbook of Microscopy
 Theoretical Foundations of Digital Imaging Using MATLAB®

Hologram Matlab Code

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Holographic Recording Materials John Wiley & Sons

"This is an unusual book. It is a book of exercises, exercises in digital imaging engineering, one of the most important and rapidly developing branches of modern information technology. Studying digital imaging engineering, mastering this profession and working in the area is not possible without obtaining practical skills based on fundamental knowledge in the subject. The current book is aimed at providing technical support for this. It contains exercises on all major topics of digital imaging for students, researchers in experimental sciences and, generally, all practitioners in imaging engineering."--
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Advanced Digital Imaging Laboratory Using MATLAB® CRC Press

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.

Zebra Stripes BoD - Books on Demand
 Digital signal transforms are of a fundamental value in digital signal and image processing. Their role is manifold. Transforms selected appropriately enable substantial compressing signals and images for storage and transmission. No signal recovery, image reconstruction and restoration task can be efficiently solved without using digital signal transforms.

Transforms are successfully used for logic design and digital data encryption. Fast transforms are the main tools for acceleration of computations in digital signal and image processing. The volume collects in one book most recent developments in the theory and practice of the design and usage of transforms in digital signal and image processing. It emerged from the series of reports published by Tampere International Centre for Signal Processing, Tampere University of Technology. For the volume, all contributions are appropriately updated to represent the state of the art in the field and to cover the most recent developments in different aspects of the theory and applications of transforms. The book consists of two parts that represent two major directions in the field: development of new transforms and development of transform based signal

and image processing algorithms. The first part contains four chapters devoted to recent advances in transforms for image compression and switching and logic design and to new fast transforms for digital holography and tomography. In the second part, advanced transform based signal and image algorithms are considered: signal and image local adaptive restoration methods and two complementing families of signal and image re-sampling algorithms, fast transform based discrete sinc-interpolation and spline theory based ones.

Advances in Signal Transforms

Cambridge University Press

Optical Scanning Holography is an exciting new field with many potential novel applications. This book contains tutorials, research materials, as well as new ideas and insights that will be useful for those working in the field of optics and holography. The book has been written by one of the leading researchers in the field. It covers the basic principles of the topic which will make the book relevant for years to come.

Handbook of Holographic Interferometry

Springer

With the ubiquitous use of digital imaging, a new profession has emerged: imaging engineering. Designed for newcomers to imaging science and engineering, *Theoretical Foundations of Digital Imaging Using MATLAB®* treats the theory of digital imaging as a specific branch of science. It covers the subject in its entirety, from image formation to image perfecting. Based on the author's 50 years of working and teaching in the field, the text first addresses the problem of converting images into digital signals that can be stored, transmitted, and processed on digital computers. It then explains how to adequately represent image transformations on computers. After presenting several examples of computational imaging, including numerical reconstruction of holograms and virtual image formation through computer-generated display holograms, the author introduces methods for image perfect resampling and building continuous image models. He also examines the fundamental problem of the optimal estimation of image parameters, such as how to localize targets in images. The book concludes with a comprehensive discussion of linear and nonlinear filtering methods for image perfecting and enhancement. Helping you master digital imaging, this book presents a unified theoretical basis for understanding and designing methods of imaging and image processing. To facilitate a deeper

understanding of the major results, it offers a number of exercises supported by MATLAB programs, with the code available at www.crcpress.com.

Theory and Applications Cambridge University Press

A Valuable Reference for Understanding Basic Optical Principles Need a crash course in optics? If you are a non-specialist with little or no knowledge of optical components, systems, or hardware, who suddenly finds it necessary to work with optics in your given field, then *Optics Essentials: An Interdisciplinary Guide* is the book for you. Aimed at engineers and other interdisciplinary professionals tackling optics-related challenges, this text provides a basic overview of optical principles, concepts, and applications as well as worked examples throughout. It enables readers to gain a basic understanding of optics and sense of optical phenomena, without having to commit to extended periods of study. Contains MATLAB® Simulations and Suggested Experiments The book provides MATLAB simulations to help the reader visualize concepts, includes simple experiments using everyday materials that are readily available to solidify optical principles, and provides worked examples throughout. It contains a set of suggested experiments in each chapter designed to help the reader understand and visualize the basic principles. While this book assumes that the reader has a basic background in mathematics, it does not burden or overwhelm them with complex information or heavy mathematical equations. In addition, while it also briefly discusses advanced topics, readers are directed to the appropriate texts for more detailed study. Comprised of 11 chapters, this illuminating text: Describes light sources, such as lasers, light-emitting diodes, and thermal sources Compares various light sources, and photometric and radiometric parameters Discusses light detection, including various detector types, such as photon detectors and thermal detectors, and other topics re *Computational Optical Phase Imaging* Springer

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. The text and the included CD-ROM spare students and researchers from

the tedium of programming complex equations so that they can focus on their experiments instead. Topics include a brief introduction to the history, types, and materials of holography; the basic principles of analog and digital holography; a detailed explanation of famous fringe-deciphering techniques for holographic interferometry; holographic and non-holographic 3D display technologies; and cutting-edge concepts such as compressive, coherence, nonlinear, and polarization holography.

Numerical Simulation of Optical Wave Propagation with Examples in MATLAB

Elsevier

This invaluable second edition provides more in-depth discussions and examples in various chapters. Based largely on the authors' own in-class lectures as well as research in the area, the comprehensive textbook serves two purposes. The first introduces some traditional topics such as matrix formalism of geometrical optics, wave propagation and diffraction, and some fundamental background on Fourier optics. The second presents the essentials of acousto-optics and electro-optics, and provides the students with experience in modeling the theory and applications using a commonly used software tool MATLAB®. Request Inspection Copy *Biomedical Image Processing* Cambridge University Press

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 pico and nano newton 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

Computer Vision - ECCV 2016 MDPI

This book features reviews by leading experts on the methods and applications of modern forms of microscopy. The recent awards of Nobel Prizes awarded for super-resolution optical microscopy and cryo-electron microscopy have demonstrated the rich scientific opportunities for research in novel microscopies. Earlier Nobel Prizes for electron microscopy (the instrument itself and applications to biology), scanning probe microscopy and holography are a reminder of the central role of microscopy in modern science, from the study of nanostructures in materials science, physics and chemistry to structural biology. Separate chapters are devoted to confocal, fluorescent and related novel optical microscopies, coherent diffractive imaging, scanning probe microscopy, transmission electron microscopy in all its modes from aberration corrected and analytical to in-situ and time-resolved, low energy electron microscopy, photoelectron microscopy, cryo-electron microscopy in biology, and also ion microscopy. In addition to serving as an essential reference for researchers and teachers in the fields such as materials science, condensed matter physics, solid-state chemistry, structural biology and the molecular sciences generally, the Springer Handbook of Microscopy is a unified, coherent and pedagogically attractive text for advanced students who need an authoritative yet accessible guide to the science and practice of microscopy.

How to Shape Light with Spatial Light Modulators John Wiley & Sons

An excellent introduction to holography for students and researchers in science and engineering.

14th European Conference, Amsterdam, The Netherlands, October 11-14, 2016, Proceedings, Part IV Springer Science & Business Media

Like virtual reality, augmented reality is

becoming an emerging platform in new application areas for museums, edutainment, home entertainment, research, industry, and the art communities using novel approaches which have taken augmented reality beyond traditional eye-worn or hand-held displays. In this book, the authors discuss spatial augmented r

7th International Conference on the Development of Biomedical Engineering in Vietnam (BME7) Cambridge University Press

Structuring light is a ubiquitous laboratory tool, and computer-controlled devices such as spatial light modulators (SLMs) can reshape an input beam into almost any desired output beam. This Spotlight ranges the basic principles of these devices to some of the most advanced techniques in beam shaping. Many examples have been included to make this guide more comprehensive and help those shaping beams with a SLM for the first time. The provided examples are based in MATLAB, but they can be easily adapted to other programming languages. Readers need only an undergraduate level of mathematics and a basic knowledge of programming.

Computer-Generated Phase-Only Holograms for 3D Displays CRC Press

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 *Optical Cryptosystems* University of Chicago Press

This book on the laboratory teaching of optics is based on the author's experience during many years in several universities and colleges. It describes basic experiments in optics that are suitable for student laboratories at undergraduate and graduate levels and do not require specialized equipment or measurement techniques.

With Matlab Society of Photo Optical The term "photomechanics" describes a suite of experimental techniques which use optics (photo) for studying problems in mechanics. The field has been in existence for some time, but has always lagged behind other experimental and numerical techniques. The main reason for this is that the interpretation of data, which whilst providing whole-field visualization, is not in a form readily amenable to the end-user. Digital image processing has become common within the photomechanics community. However, one approach does not fit all, and subtle variations in technique and method have been developed by different groups working on specific applications. This primer enables the user to get started with their experimental analysis quickly. It is based on the universally popular MATLAB® software, which includes dedicated and optimized functions for a variety of image processing tasks. These can readily scripted, along with the necessary mathematical expressions, for particular experimental techniques. The book provides an introduction to some of the optical techniques, and then introduces MATLAB® routines specific to the image processing in experimental mechanics. There are also case studies on particular techniques. As part of the book, a collection of M-files is provided on CD-ROM, which also contains example images and test code. This provides a starting point for the user, who can then easily add or edit statements or function for their own images. MATLAB® is a registered trademark of The MathWorks, Inc. For product information, visit <http://www.mathworks.com>

Translational Health Science and Technology for Developing Countries Springer

This book describes algorithms and hardware implementations of computer

holography, especially in terms of fast calculation. It summarizes the basics of holography and computer holography and describes how conventional diffraction calculations play a central role. Numerical implementations by actual codes will also be discussed. This book will explain new fast diffraction calculations, such as scaled scalar diffraction. Computer Holography will also explain acceleration algorithms for computer-generated hologram (CGH) generation and digital holography with 3D objects composed of point clouds, using look-up table- (LUT) based algorithms, and a wave front recording plane. 3D objects composed of polygons using tilted plane diffraction, expressed by multi-view images and RGB-D images, will be explained in this book. Digital holography, including inline, off-axis, Gabor digital holography, and phase shift digital holography, will also be explored. This book introduces applications of computer holography, including phase retrieval algorithm, holographic memory, holographic projection, and deep learning in computer holography, while explaining hardware implementations for computer holography. Recently, several parallel processors have been released (for example, multi-core CPU, GPU, Xeon Phi, and FPGA). Readers will learn how to apply algorithms to these processors. Features

- Provides an introduction of the basics of holography and computer holography
- Summarizes the latest advancements in computer-generated holograms
- Showcases the latest researchers of digital holography
- Discusses fast CGH algorithms

and diffraction calculations, and their actual codes Includes hardware implementation for computer holography, and its actual codes and quasi-codes

Theory, Algorithms, and Software SPIE-International Society for Optical Engineering

The book presents a collection of MATLAB-based chapters of various engineering background. Instead of giving exhausting amount of technical details, authors were rather advised to explain relations of their problems to actual MATLAB concepts. So, whenever possible, download links to functioning MATLAB codes were added and a potential reader can do own testing. Authors are typically scientists with interests in modeling in MATLAB. Chapters include image and signal processing, mechanics and dynamics, models and data identification in biology, fuzzy logic, discrete event systems and data acquisition systems.

Introduction to Modern Digital Holography
BoD – Books on Demand

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.

Optical and Digital Methods CRC Press

The eight-volume set comprising LNCS volumes 9905-9912 constitutes the refereed proceedings of the 14th European Conference on Computer Vision, ECCV 2016, held in Amsterdam, The Netherlands, in October 2016. The 415 revised papers presented were carefully reviewed and selected from 1480 submissions. The papers cover all aspects of computer vision and pattern recognition such as 3D computer vision; computational photography, sensing and display; face and gesture; low-level vision and image processing; motion and tracking; optimization methods; physicsbased vision, photometry and shape-from-X; recognition: detection, categorization, indexing, matching; segmentation, grouping and shape representation; statistical methods and learning; video: events, activities and surveillance; applications. They are organized in topical sections on detection, recognition and retrieval; scene understanding; optimization; image and video processing; learning; action activity and tracking; 3D; and 9 poster sessions.