Imaging Optics

Biomedical Optics
Introduction to Aberrations in Optical Imaging Systems
Biomedical Optical Imaging Technologies
Multilayer Uniformity and Performance of Soft-X-Ray Imaging Optics
Imaging Optics for Image Tubes and Television Type Sensors
Optical Compressive Imaging
Diffraction, Fourier Optics and Imaging
IMAGING OPTICS.
Handbook of Digital Imaging
Optical Compressive Imaging
Mathematics and Physics of Emerging Biomedical Imaging
Statistics for Imaging, Optics, and Photonics
Nonimaging Optics in Solar Energy
Nonimaging Optics
Computational Imaging
TPV Optics Studies
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A Large-Format Imaging Optics System for Fast Neutron Radiography
Substrate Recovery of Mo-Si Multilayer Coated Optics
CMOS, Circuit Design, Layout, and Simulation
Biomedical Optical Imaging
Fourier Optics and Computational Imaging
Gradient Index Imaging Optics
Handbook of 3D Machine Vision
Nonimaging Optics
Anterior Segment Optical Coherence Tomography
Adaptive Optics for Biological Imaging
Applied Photographic Optics
Subsea Optics and Imaging
Introduction to Optics and Optical Imaging
The Optical Transfer Function of Imaging Systems
Advances in Optical Imaging for Clinical Medicine
Statistics for Imaging, Optics, and Photonics
The Optical Transfer Function of Imaging Systems
Optical Imaging and Photography
Introduction to Nonimaging Optics
Imaging Optics
Advances in Imaging and Electron Physics
High Resolution Imaging in Microscopy and Ophthalmology

CARNEY KENNEDI

Biomedical Optics MIT Press
The world's insatiable consumption of energy must be met with new technologies that offer alternative, environmentally conscious sources of light and power. The relatively young field of nonimaging optics is an ideal tool for designing optimized solar energy collectors and illumination optics and holds great promise in the development of solid stat
Introduction to Aberrations in Optical Imaging Systems Springer Science & Business Media
This book provides students, teachers, researchers and clinicians with a strong and established source of information on advanced optical technologies that show real promise of being translated to clinical use.
Biomedical Optical Imaging Technologies John Wiley & Sons
This comprehensive and self-contained text for researchers and professionals presents a detailed account of optical imaging from the viewpoint of both ray and wave optics.
Multilayer Uniformity and Performance of Soft-X-Ray Imaging Optics Cambridge University Press
Imaging optics in a soft x-ray projection lithography (SXPL) system must meet stringent requirements to achieve high throughput and diffraction limited performance. Errors in the surface figure must be kept to less than (approximately)1 nm and the rms surface roughness must be less than 0.1 nm. The ML coatings must provide high reflectivity (> 60%) at wavelengths in the vicinity of 13 nm. The reflectivity bandpasses of the optics must be aligned within 0.05 nm. Each coating must be uniform across the surface of the optic to within 0.5%. These specifications challenge the limits of the current capabilities in optics fabrication and ML deposition. Consequently a set of qualified SXPL imaging optics is expected to be expensive, costing in the range of 100--250 k$. If the lifetime of the imaging optics is short, the replacement cost could significantly impact the economic competitiveness of the technology. The most likely failure modes for the imaging optics are mechanisms that degrade the ML coatings, but which leave the substrates intact. A potentially low cost solution for salvaging the imaging optics could be to strip the damaged ML coating to recover the substrate and then deposit a new coating. In this paper the authors report on the use of reactive ion etching (RIE) to remove Mo-Si ML coatings from precision optical substrates. The goal of this work was to characterize the etching process both in the ML film and at the substrate, and to determine the effects of the etching on the surface figure and finish of the substrate.
Imaging Optics for Image Tubes and Television Type Sensors Wiley-IEEE Press
This dedicated overview of optical compressive imaging addresses implementation aspects of the revolutionary theory of compressive sensing (CS) in the field of optical imaging and sensing. It overviews the technological opportunities and challenges involved in optical design and implementation, from basic theory to optical architectures and systems for compressive imaging in various spectral regimes, spectral and

hyperspectral imaging, polarimetric sensing, three-dimensional imaging, super-resolution imaging, lens-free, on-chip microscopy, and phase sensing and retrieval. The reader will gain a complete introduction to theory, experiment, and practical use for reducing hardware, shortening image scanning time, and improving image resolution as well as other performance parameters. Optics practitioners and optical system designers, electrical and optical engineers, mathematicians, and signal processing professionals will all find the book a unique trove of information and practical guidance. Delivers the first book on compressed sensing dealing with system development for a wide variety of optical imaging and sensing applications. Covers the fundamentals of CS theory, including noise and algorithms, as well as basic design approaches for data acquisition in optics. Addresses the challenges of implementing compressed sensing theory in the context of different optical imaging designs, from 3D imaging to tomography and microscopy. Provides an essential resource for the design of new and improved devices with improved image quality and shorter acquisition times. Adrian Stern, PhD, is associate professor and head of the Electro-Optical Engineering Unit at Ben-Gurion University of the Negev, Israel. He is an elected Fellow of SPIE.

Optical Compressive Imaging Routledge

The Optical Transfer Function of Imaging Systems deals extensively with the theoretical concept of the optical transfer function (OTF), its measurement, and application to imaging devices. The OTF is a mathematical entity describing how well the subject is transferred into an image via the lens. The book focuses on the practical aspects of using and measuring the OTF. It presents the background physics necessary to understand and assess the performance of the great proliferation of electro-optical systems, including image intensifiers, video cameras, and thermal imagers. Assuming a senior undergraduate level of optics knowledge, the book is suitable for graduate courses in optics, electro-optics, and photographic science. In addition, it is a practical guide for systems designers who require a means of assessing and specifying the performance of imaging systems. It is also of interest to physicists and engineers working in all areas of imaging.

Diffraction, Fourier Optics and Imaging CRC Press

A comprehensive and up-to-date textbook and reference for computational imaging, which combines vision, graphics, signal processing, and optics. Computational imaging involves the joint design of imaging hardware and computer algorithms to create novel imaging systems with unprecedented capabilities. In recent years such capabilities include cameras that operate at a trillion frames per second, microscopes that can see small viruses long thought to be optically irresolvable, and telescopes that capture images of black holes. This text offers a comprehensive and up-to-date introduction to this rapidly growing field, a convergence of vision, graphics, signal processing, and optics. It can be used as an

instructional resource for computer imaging courses and as a reference for professionals. It covers the fundamentals of the field, current research and applications, and light transport techniques. The text first presents an imaging toolkit, including optics, image sensors, and illumination, and a computational toolkit, introducing modeling, mathematical tools, model-based inversion, data-driven inversion techniques, and hybrid inversion techniques. It then examines different modalities of light, focusing on the plenoptic function, which describes degrees of freedom of a light ray. Finally, the text outlines light transport techniques, describing imaging systems that obtain micron-scale 3D shape or optimize for noise-free imaging, optical computing, and non-line-of-sight imaging. Throughout, it discusses the use of computational imaging methods in a range of application areas, including smart phone photography, autonomous driving, and medical imaging. End-of-chapter exercises help put the material in context.
IMAGING OPTICS. John Wiley & Sons
The Optical Transfer Function of Imaging Systems deals extensively with the theoretical concept of the optical transfer function (OTF), its measurement, and application to imaging devices. The OTF is a mathematical entity describing how well the subject is transferred into an image via the lens. The book focuses on the practical aspects of using and measuring the OTF. It presents the background physics necessary to understand and assess the performance of the great proliferation of electro-optical systems, including image intensifiers, video cameras, and thermal imagers. Assuming a senior undergraduate level of optics knowledge, the book is suitable for graduate courses in optics, electro-optics, and photographic science. In addition, it is a practical guide for systems designers who require a means of assessing and specifying the performance of imaging systems. It is also of interest to physicists and engineers working in all areas of imaging.
Handbook of Digital Imaging CRC Press
This work is concerned with optical imaging – from simple apertures to complex imaging systems. It spans the range all the way from optical physics to technical optics. For microscopists and photographers it conveys a deeper insight into the intricacies of their daily used devices. Physics and engineering students learn to understand different imaging systems and sensors as well as lenses and errors, image amplification and processing. This introduction into the topic is suitable for beginners and experienced people. It is illustrated by many practical examples and may also be used as a work of reference. The book is useful for everyone employing and assessing imaging systems in general. A special focus is given to photo camera systems.
Optical Compressive Imaging John Wiley & Sons
This open access book provides a comprehensive overview of the application of the newest laser and microscope/ophthalmoscope technology in the field of high resolution imaging in microscopy and ophthalmology. Starting by describing High-Resolution 3D Light

Microscopy with STED and RESOLFT, the book goes on to cover retinal and anterior segment imaging and image-guided treatment and also discusses the development of adaptive optics in vision science and ophthalmology. Using an interdisciplinary approach, the reader will learn about the latest developments and most up to date technology in the field and how these translate to a medical setting. High Resolution Imaging in Microscopy and Ophthalmology – New Frontiers in Biomedical Optics has been written by leading experts in the field and offers insights on engineering, biology, and medicine, thus being a valuable addition for scientists, engineers, and clinicians with technical and medical interest who would like to understand the equipment, the applications and the medical/biological background. Lastly, this book is dedicated to the memory of Dr. Gerhard Zinser, co-founder of Heidelberg Engineering GmbH, a scientist, a husband, a brother, a colleague, and a friend.

Mathematics and Physics of Emerging Biomedical Imaging Elsevier

"With a focus on providing a working knowledge of optical systems and their principles of operation, this book employs today's most important methods for optical analysis: geometrical ray optics, raction integral techniques, and the Abbe plane wave spectrum technique. This thoughtfully organized text uses fundamental electromagnetics as its underlying framework, allowing for a comprehensive understanding of both classical and modern optics theory. Understanding the theories presented in this book is an essential step for readers who want to produce effective design using current software. The author has carefully incorporated practical mathematics throughoutfor readers who want to further their analytical understanding of the material. INTRODUCTION TO OPTICS AND OPTICAL IMAGING will be an indispensable guide for advanced undergraduate engineering students, practicing engineers, and optical scientists seeking a comprehensive background in physical optics."

Statistics for Imaging, Optics, and Photonics CRC Press

Publisher Description

Nonimaging Optics in Solar Energy CRC Press

With the ongoing release of 3D movies and the emergence of 3D TVs, 3D imaging technologies have penetrated our daily lives. Yet choosing from the numerous 3D vision methods available can be frustrating for scientists and engineers, especially without a comprehensive resource to consult. Filling this gap, Handbook of 3D Machine Vision: Optical Metrology and Imaging gives an extensive, in-depth look at the most popular 3D imaging techniques. It focuses on noninvasive, noncontact optical methods (optical metrology and imaging). The handbook begins with the well-studied method of stereo vision and explains how random speckle patterns or space-time varying patterns substantially improve the results of stereo vision. It then discusses stereo particle image velocimetry as a major experimental means in fluid dynamics, the robust and easy-to-implement structured-light technique for computer science applications, digital holography for performing micro- to nanoscale

measurements, and grating, interferometry, and fringe projection techniques for precisely measuring dynamically deformable natural objects. The book goes on to describe techniques that do not require triangulation to recover a 3D shape, including time-of-flight techniques and uniaxial 3D shape measurement, as well as 3D measurement techniques that are not restricted to surface capture, such as 3D ultrasound, optical coherence tomography, and 3D endoscopy. The book also explores how novel 3D imaging techniques are being applied in the promising field of biometrics—which may prove essential to security and public safety. Written by key players in the field and inventors of important imaging technologies, this authoritative, state-of-the-art handbook helps you understand the core of 3D imaging technology and choose the proper 3D imaging technique for your needs. For each technique, the book provides its mathematical foundations, summarizes its successful applications, and discusses its limitations.

Nonimaging Optics
Oxford University Press
Selected by the American Library Association's 'Choice' magazine as "best technical book", the first edition of this book soon established itself as the standard reference work on all aspects of photographic lenses and associated optical systems. This is unsurprising, as Sidney Ray provides a complete, comprehensive reference source for anyone wanting information on photographic lenses, from the student to the practitioner or specialist working with visual and digital media worldwide. This third edition has been fully revised and expanded to include the rapid progress in the last decade in optical technology and advances in relevant electronic and digital forms of imaging. Every chapter has been revised and expanded using new figures and photographs as appropriate, as well as extended bibliographies. New chapters include details of filters, measurements from images and the optical systems of digital cameras. Details of electronic and digital imaging have been integrated throughout. More information is given on topics such as aspherics, diffractive optics, ED glasses, image stabilization, optical technology, video projection and new types of lenses. A selection of the contents includes chapters on: optical theory, aberrations, auto focus, lens testing, depth of field, development of photographic lenses, general properties of lenses, wide-angle lenses, telephoto lenses, video lenses, viewfinder systems, camera movements, projection systems and 3-D systems.

Computational Imaging
Focal Press
A comprehensive and practical analysis and overview of the imaging chain through acquisition, processing and display The Handbook of Digital Imaging provides a coherent overview of the imaging science amalgam, focusing on the capture, storage and display of images. The volumes are arranged thematically to provide a seamless analysis of the imaging chain from source (image acquisition) to destination (image print/display). The coverage is planned to have a very practical orientation to provide a comprehensive source of information for practicing

engineers designing and developing modern digital imaging systems. The content will be drawn from all aspects of digital imaging including optics, sensors, quality, control, colour encoding and decoding, compression, projection and display. Contains approximately 50 highly illustrated articles printed in full colour throughout Over 50 Contributors from Europe, US and Asia from academia and industry The 3 volumes are organized thematically for enhanced usability: Volume 1: Image Capture and Storage; Volume 2: Image Display and Reproduction, Hardcopy Technology, Halftoning and Physical Evaluation, Models for Halftone Reproduction; Volume 3: Imaging System Applications, Media Imaging, Remote Imaging, Medical and Forensic Imaging 3 Volumes www.handbookofdigitalimaging.com

TPV Optics Studies

Elsevier

A vivid, hands-on discussion of the statistical methods in imaging, optics, and photonics applications In the field of imaging science, there is a growing need for students and practitioners to be equipped with the necessary knowledge and tools to carry out quantitative analysis of data. Providing a self-contained approach that is not too heavily statistical in nature, Statistics for Imaging, Optics, and Photonics presents necessary analytical techniques in the context of real examples from various areas within the field, including remote sensing, color science, printing, and astronomy. Bridging the gap between imaging, optics, photonics, and statistical data analysis, the author uniquely concentrates on statistical inference, providing a wide range of relevant methods. Brief introductions to key probabilistic terms are provided at the beginning of the book in order to present the notation used, followed by discussions on multivariate techniques such as: Linear regression models, vector and matrix algebra, and random vectors and matrices Multivariate statistical inference, including inferences about both mean vectors and covariance matrices Principal components analysis Canonical correlation analysis Discrimination and classification analysis for two or more populations and spatial smoothing Cluster analysis, including similarity and dissimilarity measures and hierarchical and nonhierarchical clustering methods Intuitive and geometric understanding of concepts is emphasized, and all examples are relatively simple and include background explanations. Computational results and graphs are presented using the freely available R software, and can be replicated by using a variety of software packages. Throughout the book, problem sets and solutions contain partial numerical results, allowing readers to confirm the accuracy of their approach; and a related website features additional resources including the book's datasets and figures. Statistics for Imaging, Optics, and Photonics is an excellent book for courses on multivariate statistics for imaging science, optics, and photonics at the upper-undergraduate and graduate levels. The book also serves as a valuable reference for professionals working in imaging, optics, and photonics who carry out

data analyses in their everyday work.
Fundamentals of Fluorescence Microscopy Springer Science & Business Media
Adaptive Optics for Biological Imaging brings together groundbreaking research on the use of adaptive optics for biological imaging. The book builds on prior work in astronomy and vision science. Featuring contributions by leaders in this emerging field, it takes an interdisciplinary approach that makes the subject accessible to nonspecialists who want to use adaptive optics techniques in their own work in biology and bioengineering. Organized into three parts, the book covers principles, methods, and applications of adaptive optics for biological imaging, providing the reader with the following benefits: Gives a general overview of applied optics, including definitions and vocabulary, to lay a foundation for clearer communication across disciplines Explains what kinds of optical aberrations arise in imaging through various biological tissues, and what technology can be used to correct for these aberrations Explores research done with a variety of biological samples and imaging instruments, including wide-field, confocal, and two-photon microscopes Discusses both indirect wavefront sensing, which uses an iterative approach, and direct wavefront sensing, which uses a parallel approach Since the sample is an integral part of the optical system in biological imaging, the field will benefit from participation by biologists and biomedical researchers with expertise in applied optics. This book helps lower the barriers to entry for these researchers. It also guides readers in selecting the approach that works best for their own applications.
Advanced Optical Imaging Theory CRC Press
This dedicated overview of optical compressive imaging addresses implementation aspects of the revolutionary theory of compressive sensing (CS) in the field of optical imaging and sensing. It overviews the technological opportunities and challenges involved in optical design and implementation, from basic theory to optical architectures and systems for compressive imaging in various spectral regimes, spectral and hyperspectral imaging, polarimetric sensing, three-dimensional imaging, super-resolution imaging, lens-free, on-chip microscopy, and phase sensing and retrieval. The reader will gain a complete introduction to theory, experiment, and practical use for reducing hardware, shortening image scanning time, and improving image resolution as well as other performance parameters. Optics practitioners and optical system designers, electrical and optical engineers, mathematicians, and signal processing professionals will all find the book a unique trove of information and practical guidance. Delivers the first book on compressed sensing dealing with system development for a wide variety of optical imaging and sensing applications. Covers the fundamentals of CS theory, including noise and algorithms, as well as basic design approaches for data acquisition in optics. Addresses the challenges of implementing compressed sensing theory in the context of different optical imaging designs, from 3D

imaging to tomography and microscopy. Provides an essential resource for the design of new and improved devices with improved image quality and shorter acquisition times. Adrian Stern, PhD, is associate professor and head of the Electro-Optical Engineering Unit at Ben-Gurion University of the Negev, Israel. He is an elected Fellow of SPIE.

A Large-Format Imaging Optics System for Fast Neutron Radiography Walter de Gruyter GmbH & Co KG

Fundamental power couplers for superconducting accelerator applications like the ILC are complicated transmission line assemblies that must simultaneously accommodate demanding RF power, cryogenic, and cleanliness constraints. When these couplers are RF conditioned, the observed response is an aggregate of all the parts of the coupler and the specific features that dominate the conditioning response are hard to determine. To better understand and characterize RF conditioning phenomena toward improving performance and reducing conditioning time, a high-power coupler component test stand has been built at SLAC. Operating at 1.3 GHz, this test stand was designed to measure the conditioning behavior of select components of the TTFIII coupler independently, including outer-conductor bellows, tube transitions, copper plating, surface preparations, and cold window geometries and coatings. A description of the test stand, the measurement approach, and a summary of the results obtained so far are presented.

Substrate Recovery of Mo-Si Multilayer Coated Optics Academic Press

This book starts at an introductory level and leads reader to the most advanced topics in fluorescence imaging and super-resolution techniques that have enabled new developments such as nanobioimaging, multiphoton microscopy, nanometrology and nanosensors. The interdisciplinary subject of fluorescence microscopy and imaging requires complete knowledge of imaging optics and molecular physics. So, this book approaches the subject by introducing optical imaging concepts before going in more depth about advanced imaging systems and their applications. Additionally, molecular orbital theory is the important basis to present molecular physics and gain a complete understanding of light-matter interaction at the geometrical focus. The two disciplines have some overlap since light controls the molecular states of molecules and conversely, molecular states control the emitted light. These two mechanisms together determine essential imaging factors such as, molecular cross-section, Stoke shift, emission and absorption spectra, quantum yield, signal-to-noise ratio, Forster resonance energy transfer (FRET), fluorescence recovery after photobleaching (FRAP) and fluorescence lifetime. These factors form the basis of many fluorescence based devices. The book is organized into two parts. The first part deals with basics of imaging optics and its applications. The advanced part takes care of several imaging techniques and related instrumentation that are developed in the last decade pointing towards far-field diffraction unlimited imaging.