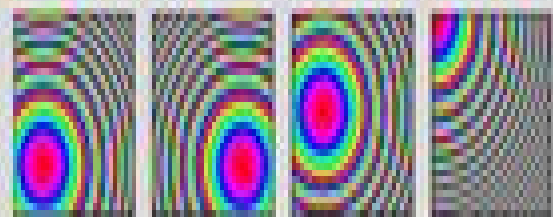


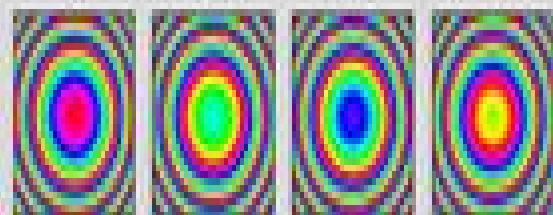
 : Polarization direction

0   $2\pi$   
Phase [rad]

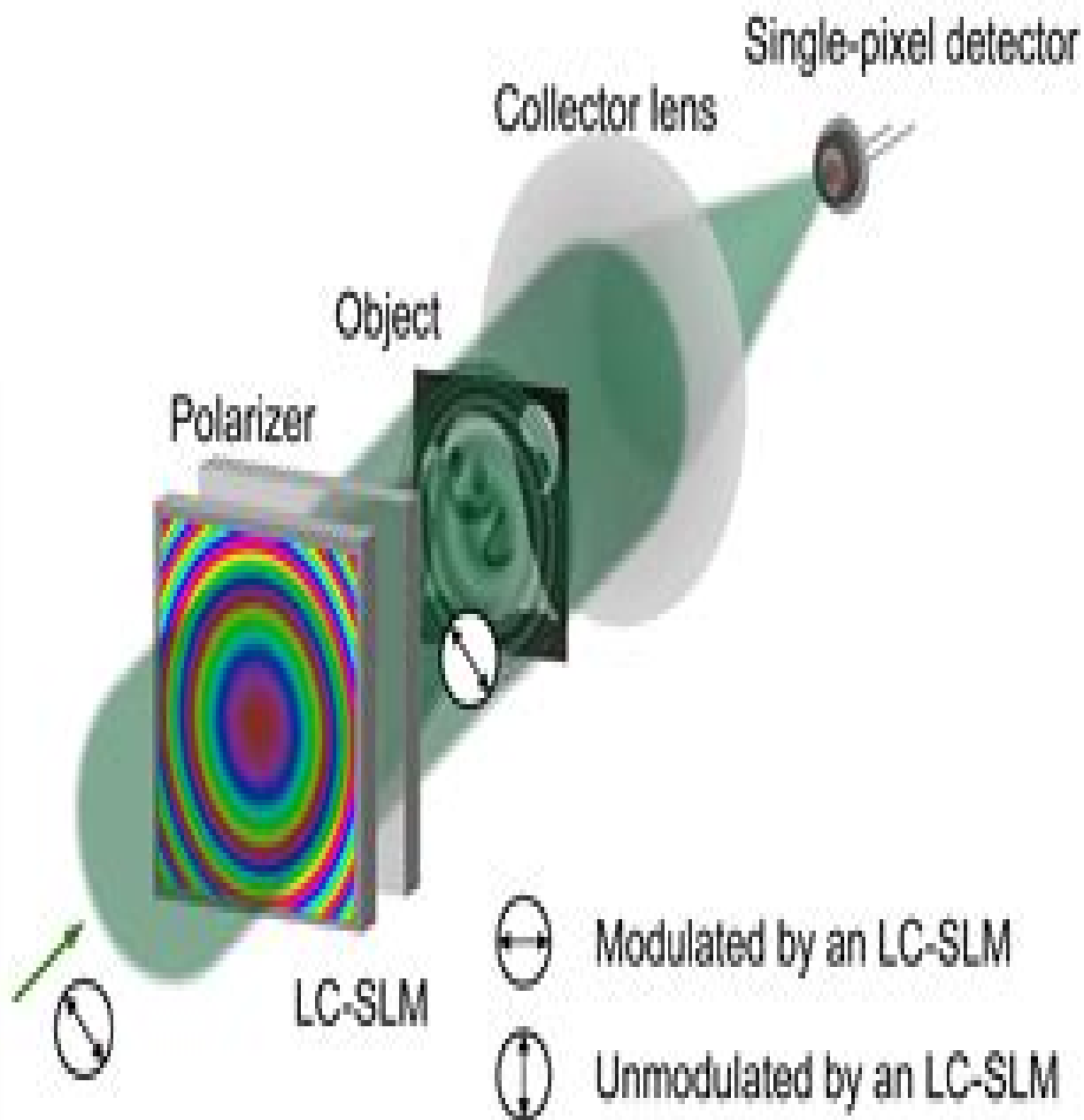


For 2D scanning

0  $\pi/2$   $\pi$   $3\pi/2$



For phase shifting



# Optical Scanning Holography With Matlab

**Ting-Chung Poon, Yaping  
Zhang, Liangcai Cao**



## **Optical Scanning Holography With Matlab Optical Scanning Holography With Matlab:**

**Optical Scanning Holography with MATLAB®** Ting-Chung Poon, 2007-04-10 Optical scanning holography OSH is an emerging area of interest with many potential novel applications such as 3 D pattern recognition 3 D microscopy 3 D cryptography and 3 D optical remote sensing Optical Scanning Holography with MATLAB introduces readers to the latest advances of electronic or digital holography and succinctly covers the necessary mathematical background and wave optics that pertain to Fourier optics and holography The reader is guided through modeling of the theory and applications utilizing MATLAB Optical scanning holography is explained in a manner that enables readers to begin implementing their own setups for novel OSH applications Optical Scanning Holography with MATLAB consists of tutorials with numerous MATLAB examples throughout the text and research material as well as new ideas and insights for graduate students scientists and engineers working in the fields of Fourier optics optical scanning imaging and holography *Introduction to Modern Digital Holography* Ting-Chung Poon, Jung-Ping Liu, 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 Holography, 3D Imaging and 3D Display Ting-Chung Poon, Yaping Zhang, Liangcai Cao, 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 **Modern Information Optics with MATLAB** Yaping Zhang, Ting-Chung Poon, 2023-01-05 An easy to understand course book based on the authentic lectures and detailed research conducted by the authors themselves on information optics holography and MATLAB This book is the first to highlight the incoherent optical system provide up to date novel digital holography techniques and demonstrate MATLAB codes to accomplish tasks such as optical image processing and pattern recognition

This title is a comprehensive introduction to the basics of Fourier optics as well as optical image processing and digital holography A step by step guide which details the vast majority of the derivations without omitting essential steps to facilitate a clear mathematical understanding This book also features exercises at the end of each chapter providing hands on experience and consolidating understanding An ideal companion for graduates and researchers involved in engineering and applied physics as well as interested in the growing field of information optics

**Holographic Imaging Using Aperture Modulation** Abdallah Hamed, 2025-09-29 This book highlights the formation of holographic images using modulated apertures across eleven comprehensive chapters It begins with a summary of basic Fourier transformations used to compute diffraction patterns of well known objects The fundamentals of holography are outlined followed by an investigation of Fourier holographic images obtained using argon plasma This book also explores Fourier holographic images using modulated Hamming apertures and discusses the use of scanning holography with linear and quadratic apertures Advanced topics include the processing and segmentation of cancerous mammographic images using improved Fourier holograms and the detailed study of Fourier holographic imaging of modulated apertures The recognition of colored objects and the computation of the point spread function PSF using operator algebra in Gaussian beam illumination are also covered This book concludes with a discussion on pattern recognition and information processing This book serves as an essential resource for researchers and students interested in the advanced techniques and applications of holographic imaging

Computational Optical Phase Imaging Cheng Liu, Shouyu Wang, Suhas P. Veetil, 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

**Contemporary Optical Image Processing with MATLAB** T.-C. Poon, P.P. Banerjee, 2001-04-18 This book serves two purposes first to introduce readers to the concepts of geometrical optics physical optics and techniques of optical imaging and image processing and secondly to provide them with experience in modeling the theory and applications using the commonly used software tool MATLAB A comprehensively revised version of the authors earlier book Principles of Applied Optics Contemporary Optical Image Processing with MATLAB brings out the systems aspect of optics This includes ray optics Fourier Optics Gaussian beam propagation the split step beam propagation method holography and complex spatial filtering ray theory of holograms optical scanning holography acousto optic image processing edge enhancement and correlation using photorefractive materials holographic phase distortion correction to name a few MATLAB examples are given throughout the text MATLAB is emphasized since it is now a widely accepted software tool very routinely used in signal processing A sizeable portion of this book is based on the authors own in class presentations as well as research in the area

Instructive problems and MATLAB assignments are included at the end of each Chapter to enhance even further the value of this book to its readers MATLAB is a registered trademark of The MathWorks Inc      **Understanding Biophotonics** Kevin Tsia,2016-01-05 Biophotonics involves understanding how light interacts with biological matter from molecules and cells to tissues and even whole organisms Light can be used to probe biomolecular events such as gene expression and protein protein interaction with impressively high sensitivity and specificity The spatial and temporal distribution of biochemic

**Fringe 2009** Wolfgang Osten,Malgorzata Kujawska,2010-04-28 21 years ago it was a joint idea with Hans Rottenkolber to organize a workshop dedicated to the discussion of the latest results in the automatic processing of fringe patterns This idea was promoted by the insight that automatic and high precision phase measurement techniques will play a key role in all future industrial and scientific applications of optical metrology A couple of months later more than 50 specialists from East and West met in East Berlin the capital of the former GDR to spend 3 days with the discussion of new principles of fringe processing In the stimulating atmosphere the idea was born to repeat the workshop and to organize the meeting in an olympic schedule And thus meanwhile 20 years have been passed and we have today Fringe number six However such a workshop takes place in a dynamic environment Therefore the main topics of the previous events were always adapted to the most interesting subjects of the new period In 1993 the workshop took place in Bremen and was dedicated to new principles of optical shape measurement setup calibration phase unwrapping and nondestructive testing while in 1997 new approaches in multi sensor metrology active measurement strategies and hybrid processing technologies played a central role 2001 the first meeting in the 21st century was focused to optical methods for micromasurements hybrid measurement technologies and new sensor solutions for industrial inspection      **Handbook of Research on Big Data Storage and Visualization**

**Techniques** Segall, Richard S.,Cook, Jeffrey S.,2018-01-05 The digital age has presented an exponential growth in the amount of data available to individuals looking to draw conclusions based on given or collected information across industries Challenges associated with the analysis security sharing storage and visualization of large and complex data sets continue to plague data scientists and analysts alike as traditional data processing applications struggle to adequately manage big data The Handbook of Research on Big Data Storage and Visualization Techniques is a critical scholarly resource that explores big data analytics and technologies and their role in developing a broad understanding of issues pertaining to the use of big data in multidisciplinary fields Featuring coverage on a broad range of topics such as architecture patterns programming systems and computational energy this publication is geared towards professionals researchers and students seeking current research and application topics on the subject      **Advances in Imaging and Electron Physics** Peter W. Hawkes,Benjamin Kazan,Tom Mulvey,2003-05-20 Image processing and a major contribution on microscopy dominate the latest volume of these advances This volume looks at theory and its application in a practical sense with a full account of the methods used and realistic detailed application The authors do this by examining the latest developments historic illustrations and

mathematical fundamentals of the exciting developments in imaging and applying them to realistic practical situations Addressing and solving daily issues faced by researchers consultants and engineers working in this field makes this book essential reading Emphasizes broad and in depth article collaborations between world renowned scientists in the field of image and electron physics Emphasises theory and its application in a practical sense Provides the FIRST full statement of a radical new approach to phase calibration and the solution of this important and difficult problem pioneered by A Lannes

**Introduction to Modern Digital Holography** Ting-Chung Poon,2014 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 Ma

**Current Research on Image Processing for 3D Information Displays** Vladimir V. Petrov,2005 Proceedings of SPIE present the original research papers presented at SPIE conferences and other high quality conferences in the broad ranging fields of optics and photonics These books provide prompt access to the latest innovations in research and technology in their respective fields Proceedings of SPIE are among the most cited references in patent literature

**Digital Holography and Three-Dimensional Display** Ting-Chung Poon,2006-09-01 Digital or electronic holography and its application to 3 D display is one of the formidable problems of evolving areas of high technology that has been receiving great attention in recent years Indeed the Holy Grail for 3 D display is the realization of life size interactive 3 D displays Obviously we are not there yet but advances in 3 D display allow us to make important steps towards the Holy Grail The theme of this book is to organize a collection of key chapters that covers digital holography and 3 D display techniques so as to provide the reader with the state of the art developments in these important areas around the world

**Proceedings of Optical Biophysics** Halina Podbielska,1995 **International Aerospace Abstracts** ,1999  
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