

W. Osten · M. Kujawinska (Eds.)

Fringe 2009

The 6th International Workshop
on Advanced Optical Metrology

Proceedings 2009



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Fringe 2009 6th International Workshop On Advanced Optical Metrology

Victor M. Corman



Fringe 2009 6th International Workshop On Advanced Optical Metrology:

Fringe 2009 Wolfgang Osten, Malgorzata Kujawinska, 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. In 2001 the first meeting in the 21st century was focused on optical methods for microm measurements, hybrid measurement technologies, and new sensor solutions for industrial inspection.

Optical Imaging and Metrology Wolfgang Osten, Nadya Reingand, 2012-09-10 A comprehensive review of the state of the art and advances in the field, while also outlining the future potential and development trends of optical imaging and optical metrology, an area of fast growth with numerous applications in nanotechnology and nanophysics. Written by the world's leading experts in the field, it fills the gap in the current literature by bridging the fields of optical imaging and metrology and is the only up-to-date resource in terms of fundamental knowledge, basic concepts, methodologies, applications, and development trends.

New Techniques in Digital Holography Pascal Picart, 2015-03-16 A state-of-the-art presentation of important advances in the field of digital holography, detailing advances related to fundamentals of digital holography, in-line holography applied to fluid mechanics, digital color holography, digital holographic microscopy, infrared holography, special techniques in full-field vibrometry, and inverse problems in digital holography.

A Practical Guide to Surface Metrology Michael Quinten, 2020-01-01 This book offers a genuinely practical introduction to the most commonly encountered optical and non-optical systems used for the metrology and characterization of surfaces, including guidance on best practice, calibration, advantages and disadvantages, and interpretation of results. It enables the user to select the best approach in a given context. Most methods in surface metrology are based upon the interaction of light or electromagnetic radiation. UV, NIR, IR, and different optical effects are utilized to get a certain optical response from the surface; some of them record only the intensity reflected or scattered by the surface, others use interference of EM waves to obtain a characteristic response from the surface. The book covers techniques ranging from microscopy, including confocal SNOM and digital holographic microscopy, through interferometry, including white light multi-

wavelength grazing incidence and shearing to spectral reflectometry and ellipsometry The non optical methods comprise tactile methods stylus tip AFM as well as capacitive and inductive methods capacitive sensors eddy current sensors The book provides Overview of the working principles Description of advantages and disadvantages Currently achievable numbers for resolutions repeatability and reproducibility Examples of real world applications A final chapter discusses examples where the combination of different surface metrology techniques in a multi sensor system can reasonably contribute to a better understanding of surface properties as well as a faster characterization of surfaces in industrial applications The book is aimed at scientists and engineers who use such methods for the measurement and characterization of surfaces across a wide range of fields and industries including electronics energy automotive and medical engineering *Optical Inspection of Microsystems, Second Edition* Wolfgang Osten,2019-06-21 Where conventional testing and inspection techniques fail at the microscale optical techniques provide a fast robust noninvasive and relatively inexpensive alternative for investigating the properties and quality of microsystems Speed reliability and cost are critical factors in the continued scale up of microsystems technology across many industries and optical techniques are in a unique position to satisfy modern commercial and industrial demands Optical Inspection of Microsystems Second Edition extends and updates the first comprehensive survey of the most important optical measurement techniques to be successfully used for the inspection of microsystems Under the guidance of accomplished researcher Wolfgang Osten expert contributors from industrial and academic institutions around the world share their expertise and experience with techniques such as image processing image correlation light scattering scanning probe microscopy confocal microscopy fringe projection grid and moire techniques interference microscopy laser Doppler vibrometry digital holography speckle metrology spectroscopy and sensor fusion technologies They also examine modern approaches to data acquisition and processing such as the determination of surface features and the estimation of uncertainty of measurement results The book emphasizes the evaluation of various system properties and considers encapsulated components to increase quality and reliability Numerous practical examples and illustrations of optical testing reinforce the concepts Supplying effective tools for increased quality and reliability this book Provides a comprehensive up to date overview of optical techniques for the measurement and inspection of microsystems Discusses image correlation displacement and strain measurement electro optic holography and speckle metrology techniques Offers numerous practical examples and illustrations Includes calibration of optical measurement systems for the inspection of MEMS Presents the characterization of dynamics of MEMS **Paradigm of Optical Imaging** Swapan K. Saha,2025-10-14 This book deals with various aspects of optical imaging such as technologies and design evaluation and calibration and their scientific applications and results It discusses the fundamental aspects of optical imaging Fourier optics and imaging physics with emphasis on image retrieval techniques and anatomy and diagnostics of optical imaging systems In addition to ray optics the book describes the technical details of several important instruments such as spectroscopes

microscopes telescopes interferometers and medical diagnosis related instruments Added further are the factors that affect the quality of the images speckles and holography and passive and active methods that permit a telescope to achieve diffraction limited imaging from the ground The book will be a valuable resource for astronomers and students involved in the design of modern instrumentation or those attempting to make use of data with instrumentation designed by others

Optical Holography Pierre-Alexandre Blanche,2019-10-23 Optical Holography Materials Theory and Applications provides researchers the fundamentals of holography through diffraction optics and an overview of the most relevant materials and applications ranging from computer holograms to holographic data storage Dr Pierre Blanche leads a team of thought leaders in academia and industry in this practical reference for researchers and engineers in the field of holography This book presents all the information readers need in order to understand how holographic techniques can be applied to a variety of applications the benefits of those techniques and the materials that enable these technologies Researchers and engineers will gain comprehensive knowledge on how to select the best holographic techniques for their needs Covers current applications of holographic techniques in areas such as 3D television solar concentration non destructive testing and data storage Describes holographic recording materials and their most relevant applications Provides the fundamentals of holography and diffraction optics

Retratamientos. Soluciones para patología apical de origen endodóntico Pio Bertani,Massimo Gagliani,Federico Gorni,2020-09-22T00:00:00+02:00 El objetivo específico de este libro es proporcionar al clínico una guía razonada del enfoque diagnóstico y la realización de retratamientos endodónticos con el claro deseo de proporcionar todos los elementos discriminatorios para tratar tales operaciones con tranquilidad y experiencia elementos esenciales para obtener el mejor resultado posible en la salud bucal general del paciente

Prozesskette
Präzisionsschmieden Friedrich-Wilhelm Bach,Kai Kerber,2013-10-28 Signifikante Potenziale zur Optimierung der Produktqualität und Effizienz können bei etablierten Fertigungsverfahren nur erkannt werden wenn der gesamte Herstellungsprozess sowohl unter technologischen als auch unter logistischen Gesichtspunkten untersucht wird Um nachhaltige Erfolge zu erzielen müssen radikale Veränderungen der Prozesskette wie beispielsweise der Einsatz von innovativen und wirtschaftlich risikoreichen Fertigungsverfahren oder die vollständige Umgestaltung der bekannten Prozessketten in Betracht gezogen werden Durch prozessbergreifend abgestimmte technologische sowie logistische Maßnahmen können so bisher unbekannte und ungenutzte Optimierungspotenziale auch bei etablierten und hochgradig optimierten Einzelprozessen gewinnbringend genutzt werden Vor diesem Hintergrund beschäftigt sich das vorliegende Werk mit der Vorstellung und detaillierten Untersuchung der Prozesskette zur Herstellung von präzisionsgeschmiedeten Hochleistungsbauteilen sowohl unter technologischen als auch logistischen Aspekten Für die Einzelprozesse der Prozesskette wird der aktuelle Stand der Forschung und Technik beschrieben und darauf aufbauend eine prozessbergreifende Technologieentwicklung vorgestellt

'Advances in Optics: Reviews', Vol. 4 Sergey Yurish,2019-07-18 The fourth volume of

this popular Book Series is devoted to optics lasers and optical sensors and written by 29 authors from academia and industry from 10 countries Brazil China France Germany Greece Israel Russia Serbia USA and Vietnam This book ensures that the readers will stay at the cutting edge of the field and get the right and effective start point and road map for the further researches and developments By this way they will be able to save more time for productive research activity and eliminate routine work

Fringe 2013 Wolfgang Osten,2013-08-15 In continuation of the FRINGE Workshop Series this Proceeding contains all contributions presented at the 7 International Workshop on Advanced Optical Imaging and Metrology The FRINGE Workshop Series is dedicated to the presentation discussion and dissemination of recent results in Optical Imaging and Metrology Topics of particular interest for the 7 Workshop are New methods and tools for the generation acquisition processing and evaluation of data in Optical Imaging and Metrology digital wavefront engineering computational imaging model based reconstruction compressed sensing inverse problems solution Application driven technologies in Optical Imaging and Metrology high resolution adaptive active robust reliable flexible in line real time High dynamic range solutions in Optical Imaging and Metrology from macro to nano Hybrid technologies in Optical Imaging and Metrology hybrid optics sensor and data fusion model based solutions multimodality New optical sensors imaging and measurement systems integrated miniaturized in line real time traceable remote Special emphasis is put on new strategies taking into account the active combination of physical modeling computer aided simulation and experimental data acquisition In particular attention is directed towards new approaches for the extension of existing resolution limits that open the gates to wide scale metrology ranging from macro to nano by considering dynamic changes and using advanced optical imaging and sensor systems

Fringe 2005 Wolfgang Osten,2006-01-26 In 1989 the time was hot to create a workshop series 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 applications of optical metrology However such a workshop must take place in a dynamic environment The fore the main topics of the previous events were always adapted to the most interesting subjects of the new period In 1993 new principles of optical shape measurement setup calibration phase unwrapping and nondestructive testing were the focus of discussion 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 dedicated to optical methods for micrometrology hybrid measurement technologies and new sensor solutions for industrial inspection The fifth workshop takes place in Stuttgart the capital of the state of Baden Württemberg and the centre of a region with a long and remarkable tradition in engineering Thus after Berlin 1989 Bremen 1993 1997 and 2001 Stuttgart is the third Fringe city where international experts will meet each other to share new ideas and concepts in optical metrology This volume contains the papers presented during FRINGE 2005

Fringe Pattern Analysis for Optical Metrology Manuel Servin,J. Antonio Quiroga,Moises Padilla,2014-08-18 The main objective of this

book is to present the basic theoretical principles and practical applications for the classical interferometric techniques and the most advanced methods in the field of modern fringe pattern analysis applied to optical metrology A major novelty of this work is the presentation of a unified theoretical framework based on the Fourier description of phase shifting interferometry using the Frequency Transfer Function FTF along with the theory of Stochastic Process for the straightforward analysis and synthesis of phase shifting algorithms with desired properties such as spectral response detuning and signal to noise robustness harmonic rejection etc

Optical Metrology Kjell J. Gåsvik, 2003-04-11 New material on computerized optical processes computerized ray tracing and the fast Fourier transform Bibre Bragg sensors and temporal phase unwrapping New introductory sections to all chapters Detailed discussion on lasers and laser principles including an introduction to radiometry and photometry Thorough coverage of the CCD camera

Optical Metrology Kjell J. G?svik, 1987-05-06 Covers the four optical metrology techniques of holographic interferometry moire techniques speckle methods and photoelasticity in a single volume

Optical Metrology Olivério D.D. Soares, 2012-12-06 Optical Metrology is a rapidly expanding field i n both its scientific foundations and technological developments being of major concern to measurements quality control non destructive tes ting and in fundamental research In order to define the state of the art and to evaluate pre sent accomplishments whilst giving an appraisal of how each of the particular topics will evolve the Optical Metrology anAdvancedStudy Institute was organized with a concourse of the world s acknowledged experts Thus the Institute provided a forum for tutorial reviews blended with topics of current research in the form of a progressive and comprehensive presentation of recent promising developments lea ding techniques and instrumentation in incoherent and coherent optics for Metrology Sensing and Control in Science Industry and Biomedici ne Optical Metrology is a very broad field which is highly inter disciplinary in its applications and in its scientific and technolo gical background It is related to such diverse disciplines as physi cal and chemical sciences engineering electronics computer scien ces biological sciences and theoretical sciences such as statistics Although there was an emphasis on photomechanics and industri al applications a marked diversity was reflected in the different background and interests of the participants The vitality and viabi lity of the discipline was enhanced not only by the encouraging number of young scientists and industrialists participating and authoring but also by the remarkably promising prospects found in x the practical applications supported by advanced electronic hybridi zation

Introduction to Optical Metrology Rajpal S. Sirohi, 2025-09-26 This book describes both the theory and practice of optical techniques to measure various parameters encountered routinely in science and engineering Introduction to Optical Metrology Second Edition examines the theory and practice of various measurement methodologies utilizing both the corpuscular and the wave nature of light The book begins by introducing the subject of optics and then addresses the propagation of laser beams through free space and optical systems It discusses interferometry holography speckle metrology the moir phenomenon photoelasticity and microscopy The remaining chapters describe techniques and methods of

measurements of refractive index thickness radii of curvature angle velocity pressure length optical testing and fiber optic based methods Apart from these this edition includes a chapter on temperature measurement sections on fringe unwrapping methods testing of free form optics shearography etc Featuring new and updated exercise problems at the end of each chapter this edition provides an applied understanding of essential optical measurement concepts techniques and procedures The primary audience for this book is undergraduate and graduate students who specialize in optics It will also be useful to researchers and professionals working on optical testing and fiber optic based and MEMS based measurements A solutions manual and figure slides are available for adopting professors Proceedings of the International Symposium on Optical Metrology in Industrial, Medical and Daily Life Applications International symposium on optical metrology in industrial, medical, and daily life applications, 2008 *Advances in Speckle Metrology and Related Techniques* Guillermo H. Kaufmann, 2011-04-11 Speckle metrology includes various optical techniques that are based on the speckle fields generated by reflection from a rough surface or by transmission through a rough diffuser These techniques have proven to be very useful in testing different materials in a non destructive way They have changed dramatically during the last years due to the development of modern optical components with faster and more powerful digital computers and novel data processing approaches This most up to date overview of the topic describes new techniques developed in the field of speckle metrology over the last decade as well as applications to experimental mechanics material science optical testing and fringe analysis

Optical Methods of Measurement Rajpal Sirohi, 2018-09-03 Optical Methods of Measurement Wholefield Techniques Second Edition provides a comprehensive collection of wholefield optical measurement techniques for engineering applications Along with the reorganization of contents this edition includes a new chapter on optical interference new material on nondiffracting and singular beams and their applications and updated bibliography and additional reading sections The book explores the propagation of laser beams metrological applications of phase singular beams various detectors such as CCD and CMOS devices and recording materials It also covers interference diffraction and digital fringe pattern measurement techniques with special emphasis on phase measurement interferometry and algorithms The remainder of the book focuses on theory experimental arrangements and applications of wholefield techniques The author discusses digital hologram interferometry digital speckle photography digital speckle pattern interferometry Talbot interferometry and holophotoelasticity This updated book compiles the major wholefield methods of measurement in one volume It provides a solid understanding of the techniques by describing the physics behind them In addition the examples given illustrate how the techniques solve measurement problems

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