

Zemax Tutorial

This tutorial introduces the theory and applications of MTF, used to specify the image quality achieved by an imaging system. It covers basic linear systems theory and the relationship between impulse response, resolution, MTF, OTF, PTF, and CTF. Practical measurement and testing issues are discussed.

This book provides all the essential and best elements of Kidger's many courses taught worldwide on lens and optical design. It is written in a direct style that is compact, logical, and to the point--a tutorial in the best sense of the word. "I read my copy late last year and read it straight through, cover to cover. In fact, I read it no less than three times. Its elegant expositions, valuable insights, and up-front espousal of pre-design theory make it an outstanding work. It's in the same league with Conrady and Kingslake." Warren Smith.

An illustrated guide for anesthesia providers for congenital heart disease patients, with a focus on non-cardiac operating room settings.

The process of designing lenses is both an art and a science. While advancements in the field over the past two centuries have done much to transform it from the former category to the latter, much of the lens design process remains encapsulated in the experience and knowledge of industry veterans. This Field Guide provides a working reference for practicing physicists, engineers, and scientists for deciphering the nuances of basic lens design. The book begins with an outline of the general process before delving into aberrations, basic lens design forms, and optimization. An entire section is devoted to techniques for improving lens performance. Sections on tolerancing, stray light, and optical systems are followed by an appendix covering related topics such as optical materials, nonimaging concepts, designing for sampled imaging, and ray tracing fundamentals.

Plasmonics and its Applications

Engineered Biomimicry

Field Guide to Lens Design

14th European Conference, Amsterdam, The Netherlands, October 11-14, 2016, Proceedings, Part VI

Congenital Cardiac Anesthesia

"This book presents astronomical optical systems in the simplest form, with an emphasis on clear explanations of the ideas that underpin various systems. At the same time, it explains the deep connection between classical and contemporary telescopes, as well as the continuity of ideas for telescope construction. A number of new designs are described, including those recently proposed and those already operational, that provide a previously unattainable field of view"--

Plasmonics is a rapidly developing field that combines fundamental research and applications ranging from areas such as physics to engineering, chemistry, biology, medicine, food sciences, and the environmental sciences. Plasmonics appeared in the 1950s with the discovery of surface plasmon polaritons. Plasmonics then went through a novel propulsion in the mid-1970s, when surface-enhanced Raman scattering was discovered. Nevertheless, it is in this last decade that a very significant explosion of plasmonics and its applications has occurred. Thus, this book provides a snapshot of the current advances in these various areas of plasmonics and its applications, such as engineering, sensing, surface-enhanced fluorescence, catalysis, and photovoltaic devices.

This tutorial presents optomechanical modeling techniques to effectively design and analyze high-performance optical systems. It discusses thermal and structural modeling methods that use finite-element analysis to predict the integrity and performance of optical elements and optical support structures. Includes accompanying CD-ROM with examples.

Unique within the field for being written in a tutorial style, this textbook adopts a step-by-step approach to the background needed for understanding a wide range of full-field optical measurement techniques in solid mechanics. This method familiarizes readers with the essentials of imaging and full-field optical measurement techniques, helping them to identify the appropriate techniques and in assessing measurement systems. In addition, readers learn the appropriate rules of thumb as a guide to better experimental performance from the applied techniques. Rather than presenting an exhaustive overview on the subject, each chapter provides a concise introduction to the concepts and principles, integrates solved problems within the text, summarizes the essence at the end, and includes unsolved problems. With its coverage of topics also relevant for industry, this text is aimed at graduate students, researchers, and engineers involved in non-destructive testing for acoustics, mechanics, medicine, diagnosis on artwork and construction, and civil engineering.

Monte Carlo Simulation and Analysis in Modern Optical Tolerancing

A Practical Guide to Experimental Geometrical Optics

Handbook of Optical Design

Optics of the Human Eye

Publishes papers reporting on research and development in optical science and engineering and the practical applications of known optical science, engineering, and technology.

This classic resource provides a clear, well-illustrated introduction to the essentials of optical design--from basic principles to cutting-edge design methods.

A concise, yet deep introduction to geometrical optics, developing the practical skills and research techniques routinely used in modern laboratories. Suitable for both students and self-learners, this accessible text teaches readers how to build their own optical laboratory, and design and perform optical experiments.

Modern optical systems rely on leading-edge production technologies, especially when using aspherical optical elements. Due to the inherent complexity of aspheres, all efforts to push the technological limits are risky. Thus, to minimize risk, clear decisions based on a good understanding of technology are indispensable. This compendium is written as an optical technology reference book for development and production engineers. With contributions from worldwide experts, this book aids in mitigating the risk in adopting new asphere production technologies.

With Practical ZEMAX Examples

10-12 December 2003, Perth, Australia

Introduction to Lens Design

Engineering Optics with MATLAB

Digital Endoscope Design

This volume in the SPIE Tutorial Text series presents a practical approach to optical testing, with emphasis on techniques, procedures, and instrumentation rather than mathematical analysis. The author provides the reader with a basic understanding of the measurements made and the tools used to make those measurements. Detailed information is given on how to measure and characterize imaging systems, perform optical bench measurements to determine first- and third-order properties of optical systems, set up and operate a Fizeau interferometer and evaluate fringe data,

conduct beam diagnostics (such as wavefront sensing), and perform radiometric calibrations.

This book is a tutorial written by researchers and developers behind the FEniCS Project and explores an advanced, expressive approach to the development of mathematical software. The presentation spans mathematical background, software design and the use of FEniCS in applications. Theoretical aspects are complemented with computer code which is available as free/open source software. The book begins with a special introductory tutorial for beginners. Following are chapters in Part I addressing fundamental aspects of the approach to automating the creation of finite element solvers. Chapters in Part II address the design and implementation of the FEniCS software. Chapters in Part III present the application of FEniCS to a wide range of applications, including fluid flow, solid mechanics, electromagnetics and geophysics.

This text aims to expose students to the science of optics and optical engineering without the complications of advanced physics and mathematical theory.

A concise introduction to lens design, including the fundamental theory, concepts, methods and tools used in the field. Covering all the essential concepts and providing suggestions for further reading at the end of each chapter, this book is an essential resource for graduate students working in optics and photonics.

NASA Tech Briefs

A Full-Field Approach

Device and Process Technologies for MEMS, Microelectronics, and Photonics III

Advanced Optics Using Aspherical Elements

The Design of Optical Systems

Elliptical Mirrors: Applications in microscopy discusses the importance of the elliptical mirror; the third solution after parabolic reflectors and lenses for which apodization factors were established in 1921 and 1959 respectively. This detailed and highly insightful book will be an important reference in a growing subject area that will benefit PhD students, optical physicists, metrologists and researchers.

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.

Engineered Biomimicry covers a broad range of research topics in the emerging discipline of biomimicry. Biologically inspired science and technology, using the principles of math and physics, has led to the development of products as ubiquitous as Velcro™ (modeled after the spiny hooks on plant seeds and fruits). Readers will learn to take ideas and concepts like this from nature, implement them in research, and understand and explain diverse phenomena and their related functions. From bioinspired computing and medical products to biomimetic applications like artificial muscles, MEMS, textiles and vision sensors, Engineered Biomimicry explores a wide range of technologies informed by living natural systems. Engineered Biomimicry helps physicists, engineers and material scientists seek solutions in nature to the most pressing technical problems of our times, while providing a solid understanding of the important role of biophysics. Some physical applications include adhesion superhydrophobicity and self-cleaning, structural coloration, photonic devices, biomaterials and composite materials, sensor systems, robotics and locomotion, and ultra-lightweight structures. Explores biomimicry, a fast-growing, cross-disciplinary field in which researchers study biological activities in nature to make critical advancements in science and engineering Introduces bioinspiration, biomimetics, and bioreplication, and provides biological background and practical applications for each Cutting-edge topics include bio-inspired robotics, microflyers, surface modification and more

Until recently B-spline curves and surfaces (NURBS) were principally of interest to the computer aided design community, where they have become the standard for curve and surface description. Today we are seeing expanded use of NURBS in modeling objects for the visual arts, including the film and entertainment industries, art, and sculpture. NURBS are now also being used for modeling scenes for virtual reality applications. These applications are expected to increase.

Consequently, it is quite appropriate for The NURBS Book to be part of the Monographs in Visual Communication Series. B-spline curves and surfaces have been an enduring element throughout my professional life. The first edition of Mathematical Elements for Computer Graphics, published in 1972, was the first computer aided design/interactive computer graphics textbook to contain material on B-splines. That material was obtained through the good graces of Bill Gordon and Louie Knapp while they were at Syracuse University. A paper of mine, presented during the Summer of 1977 at a Society of Naval Architects and Marine Engineers meeting on computer aided ship surface design, was arguably the first to examine the use of B-spline curves for ship design. For many, B-splines, rational B-splines, and NURBS have been a bit mysterious.

A Programmer's Guide to ZPL

With Practical Examples Using Zemax(R) OpticStudio(TM)

Basic Optical Engineering for Engineers and Scientists

The FEniCS Tutorial I

Survey Telescope Optics

This invaluable second edition provides more in-depth discussions and examples in various chapters. Based largely on the author's class lectures as well as research in the area, the comprehensive textbook serves two purposes. The first introduces some 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 using a commonly used software tool MATLAB®. Request Inspection Copy

Optical System Design covers the basic knowledge of optics and the flow of light through an optical system. This book is organized into chapters that deal with various components of an optical system, from light and images to spectroscopic apparatus. The book covers simple components of an optical system, including its light, lens, oblique beams, and photochemical aspects. It then deals with more complex systems such as projection, plane mirrors, prisms, magnifying instruments, and telescope. Other components considered are the surveying instruments, imaging systems, photographic optics, and spectroscopic apparatus. This book is of value to undergraduate students with courses in geometrical optics and system design.

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 reselected 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

methods; physics-based 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. The book is organized in topical sections on detection, recognition and retrieval; scene understanding; optimization; image and video processing; action, activity and tracking; 3D; and 9 poster sessions.

ZPL is a new array programming language for science and engineering computation. Designed for fast execution on both sequential and parallel computers, it is intended to replace languages such as Fortran and C. This guide provides a complete introduction to ZPL so that the reader is experienced with an imperative language such as C, Fortran, or Pascal. Though precise and thorough, it does not serve as a complete reference manual, but rather it illustrates typical ZPL usage and explains in an intuitive manner how the constant features of ZPL are used. The emphasis is on teaching the reader to be a ZPL programmer. Scientific computations are used as examples throughout, and a list of features is printed on the inside back cover for easy reference.

Optical Engineering

OPTICAL SYSTEM DESIGN

Laser Focus World

Optical Methods for Solid Mechanics

The FEniCS Book

Handbook of Optical Design, Third Edition covers the fundamental principles of geometric optics and their application to lens design in one volume. It incorporates classic aspects of lens design along with important modern methods, tools, and instruments, including contemporary astronomical telescopes, Gaussian beams, and computer lens design. Written by respected researchers, the book has been extensively classroom-tested and developed in their lens design courses. This well-illustrated handbook clearly and concisely explains the intricacies of optical system design and evaluation. It also discusses component selection, optimization, and integration for the development of effective optical apparatus. The authors analyze the performance of a wide range of optical materials, components, and systems, from simple magnifiers to complex lenses used in photography, ophthalmology, telescopes, microscopes, and projection systems. Throughout, the book includes a wealth of design examples, illustrations, and equations, most of which are derived from basic principles. Appendices supply additional background information. What's New in This Edition Improved figures, including 32 now in color Updates throughout, reflecting advances in the field New material on Buchdahl high-order aberrations Expanded and improved coverage of the calculation of wavefront aberrations based on optical path An updated list of optical materials in the appendix A clearer, more detailed description of primary aberrations References to important new publications Optical system design examples updated to include newly available glasses 25 new design examples This comprehensive book combines basic theory and practical details for the design of optical systems. It is an invaluable reference for optical students as well as scientists and engineers working with optical instrumentation.

Introduction to Lens Design With Practical ZEMAX Examples Solving PDEs in Python The FEniCS Tutorial ISpringer

This book offers the reader a practical guide to the control and characterization of laser diode beams. Laser diodes are the most widely used lasers, accounting for 50% of the global laser market. Correct handling of laser diode beams is the key to the successful use of laser diodes, and this requires an in-depth understanding of their unique properties. Following a short introduction to the working principles of laser diodes, the book describes the basics of laser diode beams and beam propagation, including Zemax modeling of a Gaussian beam propagating through a lens. The core of the book is concerned with laser diode beam manipulations: collimating and focusing, circularization and astigmatism correction, coupling into a single mode optical fiber, diffractive optics and beam shaping, and manipulation of multi transverse mode beams. The final chapter of the book covers beam characterization methods, describing the measurement of spatial and spectral properties, including wavelength and linewidth measurement techniques. The book is a significantly revised and expanded version of the title *Laser Diode Beam Basics, Manipulations and Characterizations* by the same author. New topics introduced in this volume include: laser diode types and working principles, non-paraxial Gaussian beam, Zemax modeling, numerical analysis of a laser diode beam, spectral property characterization methods, and power and energy characterization techniques. The book approaches the subject in a practical way with mathematical content kept to the minimum level required, making the book a convenient reference for laser diode users.

Zemax is widely used in optical designs because it is powerful, flexible, easy to learn, and cost-effective. Besides many standard functions, Zemax also provides a tool called Zemax Programming Language (ZPL). This tool allows people to extend the standard functions of Zemax to meet their special needs. However, the learning process is usually not smooth, sometimes even quite frustrating. This book intends to help readers to learn ZPL quicker and easier. The examples and plots in this book are based on Zemax version 13, but the basic idea should remain the same for different versions of Zemax software. Since Zemax is continuously developing, we encourage readers to refer to official Zemax User's Manual for the updates on ZPL.

A Practical Guide to Handling Laser Diode Beams

Integrated Optomechanical Analysis

Application of Zemax Programming Language

Solving PDEs in Python

Perspectives on Modern Optics and Imaging

Reuse and integration are defined as synergistic concepts, where reuse addresses how to minimize redundancy in the creation of components; while, integration focuses on component composition.

Integration supports reuse and vice versa. These related concepts support the design of software and systems for maximizing performance while minimizing cost. Knowledge, like data, is subject to reuse; and, each can be interpreted as the other. This means that inherent complexity, a measure of the potential utility of a system, is directly proportional to the extent to which it maximizes reuse and integration. Formal methods can provide an appropriate context for the rigorous handling of these synergistic concepts. Furthermore, formal languages allow for non-ambiguous model specification; and, formal verification techniques provide support for insuring the validity of reuse and integration mechanisms. This edited book includes 12 high quality research papers written by experts in formal aspects of reuse and integration to cover the most recent advances in the field. These papers are extended versions of some of the best papers, which were presented at the IEEE International Conference on Information Reuse and Integration

and the IEEE International Workshop on Formal Methods Integration - both of which were held in San Francisco in August 2014.

This text describes the optical structures and optical properties of the human eye. It is divided into five sections, covering topics such as basic optical structure of the human eye and image formation and refraction of the eye.

"Global electro-optic technology and markets." "Photonics technologies & solutions for technical professionals worldwide."

This Spotlight offers a perspective on the role of Monte Carlo simulation in the analysis and tolerancing of optical systems. The book concisely explores two overarching questions: (1) What principles can we adopt from a variety of statistical methods - such as the analysis of variance (ANOVA), "root sum of squares" (RSS), and Monte Carlo simulation - to analyze variability in complex optical systems? (2) When we assign perturbations to component variables (such as tilts and radii of curvatures) subject to arbitrary probability distributions, are the resulting distributions of system parameters (such as EFL, RMS spot size, and MTF) necessarily normal? These questions address the problem of analyzing and managing variability in modern product development, where many functions integrate to produce a complete instrument. By discussing key concepts from optics, multivariable calculus, and statistics, and applying them to two practical examples in modern technology, this book highlights the role Monte Carlo simulations play in the tolerancing of optical systems that comprise many components of variation.

Modulation Transfer Function in Optical and Electro-optical Systems

The Journal of the Society of Photo-optical Instrumentation Engineers

A Case-based Approach

Computer Vision - ECCV 2016

Lasers & Optronics

A revised version of a text which was first published in 1966. The book is designed as a general reference book for engineers and assumes a broad knowledge of current optical systems and their design. Additional topics include fibre optics, thin films and CAD systems.

This authoritative collection introduces the reader to the state of the art in iris recognition technology. Topics and features: with a Foreword by the "father of iris recognition," Professor John Daugman of Cambridge University; presents work from an international selection of preeminent researchers, reflecting the uses of iris recognition in many different social contexts; provides viewpoints from researchers in government, industry and academia, highlighting how iris recognition is both a thriving industry and an active research area; surveys previous developments in the field, and covers topics ranging from the low-level (e.g., physics of iris image acquisition) to the high level (e.g., alternative non-Daugman approaches to iris matching); introduces many active and open areas of research in iris recognition, including cross-wavelength matching and iris template aging. This book is an essential resource for anyone wishing to improve their understanding of iris recognition technology.

This book offers a concise and gentle introduction to finite element programming in Python based on the popular FEniCS software library. Using a series of examples, including the Poisson equation, the equations of linear elasticity, the incompressible Navier-Stokes equations, and systems of nonlinear advection-diffusion-reaction equations, it guides readers through the essential steps to quickly solving a PDE in FEniCS, such as how to define a finite variational problem, how to set boundary conditions, how to solve linear and nonlinear systems, and how to visualize solutions and structure finite element Python programs. This book is open access under a CC BY license.

Miniature optical systems required for digital endoscopes present unique challenges in lens design and manufacture. This Spotlight provides a tutorial on the key optical design considerations required for video endoscope systems. The text compares different types of endoscopes and discusses their advantages and disadvantages. Key areas of clinical importance to the medical industry are stressed. The book also presents endoscope specifications, international standards, and several design examples.

Optical Engineering Fundamentals

Optical System Design

The NURBS Book

Handbook of Iris Recognition

Formalisms for Reuse and Systems Integration

This book provides a brief review of key optics principles, and offers fresh insights and perspectives on the theory and operational principles of a selection of modern optical imaging systems not found in many texts. Practical examples using Zemax's OpticStudio program with lens prescriptions are also provided throughout various relevant sections of the book. Want a "flavor" of the technical content of this book? Cut and paste the following link to view the section on Gaussian apodization and resolution enhancement (note that content in the printed book are in BLACK & WHITE, as shown in the sample pages): <https://drive.google.com/open?id=1rfC0ByDsl2ICLCSpoxqmqnYdZbtTT2Hr>

Automated Solution of Differential Equations by the Finite Element Method

Introduction to Optical Testing

Elliptical Mirrors: Applications in Microscopy

Modern Optical Engineering

Fundamental Optical Design