

An Introduction To Nurbs With Historical Perspective The Morgan Kaufmann Series In Computer Graphics By David F Rogers 2000 08 04

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Computational Mechanics with Deep Learning - Genki

Yagawa 2022-12-02

This book is intended for students, engineers, and researchers interested in both computational mechanics and deep learning. It presents the mathematical and computational foundations of Deep Learning with detailed mathematical formulas in an easy-to-understand manner. It also discusses various applications of Deep Learning in Computational Mechanics, with detailed explanations of the Computational Mechanics fundamentals selected there. Sample programs are included for the reader to try out in practice. This book is therefore useful for a wide range of readers interested in computational mechanics and deep learning.

Digital Modeling - William

Vaughan 2011-12-27

Professional modeling is the foundation of every aspect of the 3D production pipeline and

is essential to the success of any 3D computer graphics project. [digital] Modeling is unlike any other modeling book you've seen—it gets to the core of what it takes to create efficient production-ready models and demystifies the process of producing realistic and jaw-dropping graphics. Taking a software-neutral approach, it teaches you the essential skills and concepts that you can apply to modeling in any industry 3D software, such as 3ds Max, LightWave 3D, Maya, Modo, Silo, XSI, ZBrush and other leading programs. Modelers, animators, texture artists, and technical directors can all benefit from the valuable information covered in this jam-packed guide containing years of industry knowledge. Simply put, if you work in 3D, you must have this book. In this inspiring and informative guide to modeling, industry veteran William Vaughan teaches you how to: Master

modeling techniques to produce professional results in any 3D application Use the tools of a professional digital modeler Control your models polygon-count as well as polygon-flow Create both organic and hard surface models Understand a modeler's role in a production environment Gain the knowledge to land a job in the industry as a digital modeler Model using specific tools such as LightWave and 3ds Max in over 6 hours of video training in the accompanying downloadable lesson files (see below for details) And much more! All of Peachpit's eBooks contain the same content as the print edition. You will find a link in the last few pages of your eBook that directs you to the media files. Helpful tips: If you are able to search the book, search for "Where are the lesson files?" Go to the very last page of the book and scroll backwards. You will need a web-enabled device or computer in order to access the media files that accompany this ebook. Entering the URL

supplied into a computer with web access will allow you to get to the files. Depending on your device, it is possible that your display settings will cut off part of the URL. To make sure this is not the case, try reducing your font size and turning your device to a landscape view. This should cause the full URL to appear.

3D Rendering -

Proceedings Of The International Congress Of Mathematicians 2010 (Icm 2010) (In 4 Volumes) - Vol. I: Plenary Lectures And Ceremonies, Vols. Ii-iv: Invited Lectures - Bhatia Rajendra 2011-06-06

ICM 2010 proceedings comprises a four-volume set containing articles based on plenary lectures and invited section lectures, the Abel and Noether lectures, as well as contributions based on lectures delivered by the recipients of the Fields Medal, the Nevanlinna, and Chern Prizes. The first volume will also contain the speeches at the opening and closing

ceremonies and other highlights of the Congress. *An Introduction to NURBS* - David F. Rogers 2001 NURBS (Non-uniform Rational B-Splines) are the computer graphics industry standard for curve and surface description. They are now incorporated into all standard computer-aided design and drafting programs (for instance, Autocad). They are also extensively used in all aspects of computer graphics including much of the modeling used for special effects in film and animation, consumer products, robot control, and automobile and aircraft design. So, the topic is particularly important at this time because NURBS are really at the peak of interest as applied to computer graphics and CAD of all kind.

Proceedings of the 15th International Meshing Roundtable - Philippe P. Pebay 2007-07-20

The papers in this volume were selected for presentation at the 15th International Meshing Roundtable, held September 17-20, 2006 in Birmingham,

Alabama, U.S.A.. The conference was started by Sandia National Laboratories in 1992 as a small meeting of organizations striving to establish a common focus for research and development in the field of mesh generation. Now after 15 consecutive years, the International Meshing Roundtable has become recognized as an international focal point annually attended by researchers and developers from dozens of countries around the world. The 15th International Meshing Roundtable consists of technical presentations from contributed papers, keynote and invited talks, short course presentations, and a poster session and competition. The Program Committee would like to express its appreciation to all who participate to make the IMR a successful and enriching experience. The papers in these proceedings were selected from among 42 submissions by the Program Committee. Based on input from peer reviews, the

committee selected these papers for their perceived quality, originality, and appropriateness to the theme of the International Meshing Roundtable. The Program Committee would like to thank all who submitted papers. We would also like to thank the colleagues who provided reviews of the submitted papers. The names of the reviewers are acknowledged in the following pages. As Program Chair, I would like to extend special thanks to the Program Committee and to the Conference Coordinators for their time and effort to make the 15th IMR another outstanding conference.

Computational Science - ICCS 2019 - João M. F. Rodrigues
2019-06-07

The five-volume set LNCS 11536, 11537, 11538, 11539, and 11540 constitutes the proceedings of the 19th International Conference on Computational Science, ICCS 2019, held in Faro, Portugal, in June 2019. The total of 65 full papers and 168 workshop papers presented in this book

set were carefully reviewed and selected from 573 submissions (228 submissions to the main track and 345 submissions to the workshops). The papers were organized in topical sections named: Part I: ICCS Main Track Part II: ICCS Main Track; Track of Advances in High-Performance Computational Earth Sciences: Applications and Frameworks; Track of Agent-Based Simulations, Adaptive Algorithms and Solvers; Track of Applications of Matrix Methods in Artificial Intelligence and Machine Learning; Track of Architecture, Languages, Compilation and Hardware Support for Emerging and Heterogeneous Systems Part III: Track of Biomedical and Bioinformatics Challenges for Computer Science; Track of Classifier Learning from Difficult Data; Track of Computational Finance and Business Intelligence; Track of Computational Optimization, Modelling and Simulation; Track of Computational Science in IoT and Smart

Systems Part IV: Track of Data-Driven Computational Sciences; Track of Machine Learning and Data Assimilation for Dynamical Systems; Track of Marine Computing in the Interconnected World for the Benefit of the Society; Track of Multiscale Modelling and Simulation; Track of Simulations of Flow and Transport: Modeling, Algorithms and Computation Part V: Track of Smart Systems: Computer Vision, Sensor Networks and Machine Learning; Track of Solving Problems with Uncertainties; Track of Teaching Computational Science; Poster Track ICCS 2019 Chapter “Comparing Domain-decomposition Methods for the Parallelization of Distributed Land Surface Models” is available open access under a Creative Commons Attribution 4.0 International License via link.springer.com.

The Second Digital Turn - Mario Carpo 2017-10-20

The first digital turn in architecture changed our ways of making; the second changes

our ways of thinking. Almost a generation ago, the early software for computer aided design and manufacturing (CAD/CAM) spawned a style of smooth and curving lines and surfaces that gave visible form to the first digital age, and left an indelible mark on contemporary architecture. But today's digitally intelligent architecture no longer looks that way. In The Second Digital Turn, Mario Carpo explains that this is because the design professions are now coming to terms with a new kind of digital tools they have adopted—no longer tools for making but tools for thinking. In the early 1990s the design professions were the first to intuit and interpret the new technical logic of the digital age: digital mass-customization (the use of digital tools to mass-produce variations at no extra cost) has already changed the way we produce and consume almost everything, and the same technology applied to commerce at large is now heralding a new society without scale—a flat marginal

cost society where bigger markets will not make anything cheaper. But today, the unprecedented power of computation also favors a new kind of science where prediction can be based on sheer information retrieval, and form finding by simulation and optimization can replace deduction from mathematical formulas. Designers have been toying with machine thinking and machine learning for some time, and the apparently unfathomable complexity of the physical shapes they are now creating already expresses a new form of artificial intelligence, outside the tradition of modern science and alien to the organic logic of our mind.

3D Computer Graphics -

Samuel R. Buss 2003-05-19

This textbook, first published in 2003, emphasises the fundamentals and the mathematics underlying computer graphics. The minimal prerequisites, a basic knowledge of calculus and vectors plus some programming experience in C

or C++, make the book suitable for self study or for use as an advanced undergraduate or introductory graduate text. The author gives a thorough treatment of transformations and viewing, lighting and shading models, interpolation and averaging, Bézier curves and B-splines, ray tracing and radiosity, and intersection testing with rays. Additional topics, covered in less depth, include texture mapping and colour theory. The book covers some aspects of animation, including quaternions, orientation, and inverse kinematics, and includes source code for a Ray Tracing software package. The book is intended for use along with any OpenGL programming book, but the crucial features of OpenGL are briefly covered to help readers get up to speed. Accompanying software is available freely from the book's web site.

The Computer Graphics Manual - David Salomon

2011-09-18

This book presents a broad overview of computer graphics

(CG), its history, and the hardware tools it employs. Covering a substantial number of concepts and algorithms, the text describes the techniques, approaches, and algorithms at the core of this field. Emphasis is placed on practical design and implementation, highlighting how graphics software works, and explaining how current CG can generate and display realistic-looking objects. The mathematics is non-rigorous, with the necessary mathematical background introduced in the Appendixes. Features: includes numerous figures, examples and solved exercises; discusses the key 2D and 3D transformations, and the main types of projections; presents an extensive selection of methods, algorithms, and techniques; examines advanced techniques in CG, including the nature and properties of light and color, graphics standards and file formats, and fractals; explores the principles of image compression; describes the important input/output graphics devices.

An Introduction to the Locally Corrected Nyström Method - Andrew Peterson 2022-05-31

This lecture provides a tutorial introduction to the Nyström and locally-corrected Nyström methods when used for the numerical solutions of the common integral equations of two-dimensional electromagnetic fields. These equations exhibit kernel singularities that complicate their numerical solution. Classical and generalized Gaussian quadrature rules are reviewed. The traditional Nyström method is summarized, and applied to the magnetic field equation for illustration. To obtain high order accuracy in the numerical results, the locally-corrected Nyström method is developed and applied to both the electric field and magnetic field equations. In the presence of target edges, where current or charge density singularities occur, the method must be extended through the use of appropriate singular basis functions and special

quadrature rules. This extension is also described.
Table of Contents: Introduction / Classical Quadrature Rules / The Classical Nyström Method / The Locally-Corrected Nyström Method / Generalized Gaussian Quadrature / LCN Treatment of Edge Singularities
Dynamics of Multibody Systems - Ahmed A. Shabana
2020-03-05

"The primary purpose of this book is to develop methods for the dynamic analysis of multibody systems (MBS) that consist of interconnected rigid and deformable components. In that sense, the objective may be considered as a generalization of methods of structural and rigid body analysis. Many mechanical and structural systems such as vehicles, space structures, robotics, mechanisms, and aircraft consist of interconnected components that undergo large translational and rotational displacements. Figure 1.1 shows examples of such systems that can be modeled as

multibody systems. In general, a multibody system is defined to be a collection of subsystems called bodies, components, or substructures. The motion of the subsystems is kinematically constrained because of different types of joints, and each subsystem or component may undergo large translations and rotational displacements"--

Isogeometric Analysis - J. Austin Cottrell 2009-08-11

"The authors are the originators of isogeometric analysis, are excellent scientists and good educators. It is very original. There is no other book on this topic."

—René de Borst, Eindhoven University of Technology
Written by leading experts in the field and featuring fully integrated colour throughout, *Isogeometric Analysis* provides a groundbreaking solution for the integration of CAD and FEA technologies. Tom Hughes and his researchers, Austin Cottrell and Yuri Bazilevs, present their pioneering isogeometric approach, which aims to integrate the two techniques of CAD and FEA using precise

NURBS geometry in the FEA application. This technology offers the potential to revolutionise automobile, ship and airplane design and analysis by allowing models to be designed, tested and adjusted in one integrative stage. Providing a systematic approach to the topic, the authors begin with a tutorial introducing the foundations of Isogeometric Analysis, before advancing to a comprehensive coverage of the most recent developments in the technique. The authors offer a clear explanation as to how to add isogeometric capabilities to existing finite element computer programs, demonstrating how to implement and use the technology. Detailed programming examples and datasets are included to impart a thorough knowledge and understanding of the material. Provides examples of different applications, showing the reader how to implement isogeometric models Addresses readers on both sides of the CAD/FEA divide Describes

Non-Uniform Rational B-Splines (NURBS) basis functions

Numerical Simulation in Physics and Engineering - Inmaculada Higuera
2016-07-01

This book presents lecture notes from the XVI 'Jacques-Louis Lions' Spanish-French School on Numerical Simulation in Physics and Engineering, held in Pamplona (Navarra, Spain) in September 2014. The subjects covered include: numerical analysis of isogeometric methods, convolution quadrature for wave simulations, mathematical methods in image processing and computer vision, modeling and optimization techniques in food processes, bio-processes and bio-systems, and GPU computing for numerical simulation. The book is highly recommended to graduate students in Engineering or Science who want to focus on numerical simulation, either as a research topic or in the field of industrial applications. It can also benefit senior

researchers and technicians working in industry who are interested in the use of state-of-the-art numerical techniques in the fields addressed here. Moreover, the book can be used as a textbook for master courses in Mathematics, Physics, or Engineering.

Reverse Engineering - Vinesh Raja 2007-10-24

This edited collection of essays from world-leading academic and industrial authors yields insight into all aspects of reverse engineering. Methods of reverse engineering analysis are covered, along with special emphasis on the investigation of surface and internal structures. Frequently-used hardware and software are assessed and advice given on the most suitable choice of system. Also covered is rapid prototyping and its relationship with successful reverse engineering.

Real-Time Rendering -

Tomas Akenine-Möller
2019-01-18

Thoroughly revised, this third edition focuses on modern techniques used to generate

synthetic three-dimensional images in a fraction of a second. With the advent of programmable shaders, a wide variety of new algorithms have arisen and evolved over the past few years. This edition discusses current, practical rendering methods used in games and other applications.

It also presents a solid theoretical framework and relevant mathematics for the field of interactive computer graphics, all in an approachable style. The authors have made the figures used in the book available for download for fair use.:Download Figures.

Reviews Rendering has been a required reference for professional graphics practitioners for nearly a decade. This latest edition is as relevant as ever, covering topics from essential mathematical foundations to advanced techniques used by today's cutting edge games. -- Gabe Newell, President, Valve, May 2008 Rendering ... has been completely revised and revamped for its updated third

edition, which focuses on modern techniques used to generate three-dimensional images in a fraction of the time old processes took. From practical rendering for games to math and details for better interactive applications, it's not to be missed. -- The Bookwatch, November 2008 You'll get brilliantly lucid explanations of concepts like vertex morphing and variance shadow mapping—as well as a new respect for the incredible craftsmanship that goes into today's PC games. -- Logan Decker, PC Gamer Magazine , February 2009

Computational Modeling, Optimization and Manufacturing Simulation of Advanced Engineering Materials

- Pablo Andrés Muñoz-Rojas 2016-06-20
This volume presents recent research work focused in the development of adequate theoretical and numerical formulations to describe the behavior of advanced engineering materials. Particular emphasis is devoted to applications in the fields of

biological tissues, phase changing and porous materials, polymers and to micro/nano scale modeling. Sensitivity analysis, gradient and non-gradient based optimization procedures are involved in many of the chapters, aiming at the solution of constitutive inverse problems and parameter identification. All these relevant topics are exposed by experienced international and inter institutional research teams resulting in a high level compilation. The book is a valuable research reference for scientists, senior undergraduate and graduate students, as well as for engineers acting in the area of computational material modeling.

Fundamentals of Computer Graphics - Steve Marschner 2018-10-24

Drawing on an impressive roster of experts in the field, Fundamentals of Computer Graphics, Fourth Edition offers an ideal resource for computer course curricula as well as a user-friendly personal or

professional reference. Focusing on geometric intuition, the book gives the necessary information for understanding how images get onto the screen by using the complementary approaches of ray tracing and rasterization. It covers topics common to an introductory course, such as sampling theory, texture mapping, spatial data structure, and splines. It also includes a number of contributed chapters from authors known for their expertise and clear way of explaining concepts. Highlights of the Fourth Edition Include: Updated coverage of existing topics Major updates and improvements to several chapters, including texture mapping, graphics hardware, signal processing, and data structures A text now printed entirely in four-color to enhance illustrative figures of concepts The fourth edition of Fundamentals of Computer Graphics continues to provide an outstanding and comprehensive introduction to basic computer graphic

technology and theory. It retains an informal and intuitive style while improving precision, consistency, and completeness of material, allowing aspiring and experienced graphics programmers to better understand and apply foundational principles to the development of efficient code in creating film, game, or web designs. Key Features Provides a thorough treatment of basic and advanced topics in current graphics algorithms Explains core principles intuitively, with numerous examples and pseudo-code Gives updated coverage of the graphics pipeline, signal processing, texture mapping, graphics hardware, reflection models, and curves and surfaces Uses color images to give more illustrative power to concepts

Digital Media - Rimon Elias
2014-03-27

Focusing on the computer graphics required to create digital media this book discusses the concepts and provides hundreds of solved examples and unsolved

problems for practice. Pseudo codes are included where appropriate but these coding examples do not rely on specific languages. The aim is to get readers to understand the ideas and how concepts and algorithms work, through practicing numeric examples. Topics covered include: 2D Graphics 3D Solid Modelling Mapping Techniques Transformations in 2D and 3D Space Illuminations, Lighting and Shading Ideal as an upper level undergraduate text, Digital Media - A Problem-solving Approach for Computer Graphic, approaches the field at a conceptual level thus no programming experience is required, just a basic knowledge of mathematics and linear algebra.

Geometric Tools for Computer Graphics - Philip Schneider 2002-10-10

Do you spend too much time creating the building blocks of your graphics applications or finding and correcting errors? Geometric Tools for Computer Graphics is an extensive, conveniently organized

collection of proven solutions to fundamental problems that you'd rather not solve over and over again, including building primitives, distance calculation, approximation, containment, decomposition, intersection determination, separation, and more. If you have a mathematics degree, this book will save you time and trouble. If you don't, it will help you achieve things you may feel are out of your reach. Inside, each problem is clearly stated and diagrammed, and the fully detailed solutions are presented in easy-to-understand pseudocode. You also get the mathematics and geometry background needed to make optimal use of the solutions, as well as an abundance of reference material contained in a series of appendices. Features Filled with robust, thoroughly tested solutions that will save you time and help you avoid costly errors. Covers problems relevant for both 2D and 3D graphics programming. Presents each problem and solution in stand-alone form

allowing you the option of reading only those entries that matter to you. Provides the math and geometry background you need to understand the solutions and put them to work. Clearly diagrams each problem and presents solutions in easy-to-understand pseudocode. Resources associated with the book are available at the companion Web site www.mkp.com/gtcg. * Filled with robust, thoroughly tested solutions that will save you time and help you avoid costly errors. * Covers problems relevant for both 2D and 3D graphics programming. * Presents each problem and solution in stand-alone form allowing you the option of reading only those entries that matter to you. * Provides the math and geometry background you need to understand the solutions and put them to work. * Clearly diagrams each problem and presents solutions in easy-to-understand pseudocode. * Resources associated with the book are available at the

companion Web site
www.mkp.com/gtcg.

Advances in Mechanical Engineering - B. B. Biswal
2020-01-16

This book comprises select proceedings of the International Conference on Recent Innovations and Developments in Mechanical Engineering (IC-RIDME 2018). The book contains peer reviewed articles covering thematic areas such as fluid mechanics, renewable energy, materials and manufacturing, thermal engineering, vibration and acoustics, experimental aerodynamics, turbo machinery, and robotics and mechatronics. Algorithms and methodologies of real-time problems are described in this book. The contents of this book will be useful for both academics and industry professionals.

Advances in Computational Vision and Medical Image Processing - Joao Tavares
2008-12-21

Computational methodologies of signal processing and imaging analysis, namely

considering 2D and 3D images, are commonly used in different applications of the human society. For example, Computational Vision systems are progressively used for surveillance tasks, traffic analysis, recognition process, inspection poses, human-machine interfaces, 3D vision and deformation analysis. One of the main characteristics of the Computational Vision domain is its interdisciplinary. In fact, in this domain, methodologies of several more fundamental sciences, such as Informatics, Mathematics, Statistics, Psychology, Mechanics and Physics are usually used. Besides this interdisciplinary characteristic, one of the main reasons that contributes for the continually effort done in this domain of the human knowledge is the number of applications in the medical area. For instance, it is possible to consider the use of statistical or physical procedures on medical images in order to model the

represented structures. This modeling can have different goals, for example: shape reconstruction, segmentation, registration, behavior interpretation and simulation, motion and deformation analysis, virtual reality, computer-assisted therapy or tissue characterization. The main objective of the ECCOMAS Thematic Conferences on Computational Vision and Medical Image Processing (VIPImage) is to promote a comprehensive forum for discussion on the recent advances in the related fields trying to identify widespread areas of potential collaboration between researchers of different sciences.

Isogeometric Methods for Numerical Simulation - Gernot Beer 2015-01-29

The book presents the state of the art in isogeometric modeling and shows how the method has advantaged. First an introduction to geometric modeling with NURBS and T-splines is given followed by the implementation into computer

software. The implementation in both the FEM and BEM is discussed.

3D Computer Graphics - Sam Buss 2003-05-19

Table of contents

Context-Aware Systems and Applications - Phan Cong Vinh 2013-02-02

This book constitutes the thoroughly refereed proceedings of the first International Conference on Context-Aware Systems and Applications, ICCASA 2012, held in Ho Chi Minh City, Vietnam, in November 2012. The 34 revised full papers presented were carefully selected and reviewed from over 100 submissions. The papers cover a wide spectrum of issues in the area of Context-Aware Systems (CAS). CAS are going to shape networked computing systems of the future

Advanced RenderMan -

Anthony A. Apodaca

1999-12-08

From contributors to animated films such as Toy Story and A Bug's Life, comes this text to help animators create the

sophisticated computer-generated special effects seen in such features as Jurassic Park.

IsoGeometric Analysis: A New Paradigm in the Numerical Approximation of PDEs -

Annalisa Buffa 2016-10-05

Providing an introduction to isogeometric methods with a focus on their mathematical foundations, this book is composed of four chapters, each devoted to a topic of special interests for isogeometric methods and their theoretical understanding. It contains a tutorial on splines and generalizations that are used in CAD parametrizations, and gives an overview of geometric modeling techniques that can be used within the isogeometric approach, with a focus on non-tensor product splines. Finally, it presents the mathematical properties of isogeometric spaces and spline spaces for vector field approximations, and treats in detail an application of fundamental importance: the isogeometric simulation of a viscous incompressible flow.

The contributions were written by Carla Manni and Hendrik Speelers, Vibeke Skytt and Tor Dokken, Lourenco Beirao da Veiga, Annalisa Buffa, Giancarlo Sangalli and Rafael Vazquez, and finally by John Evans and Thomas J.R. Hughes.

The NURBS Book - Les Piegl
2012-12-06

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.

Mathematical Elements for Computer Graphics - David F. Rogers 1990

This text is ideal for junior-, senior-, and graduate-level courses in computer graphics and computer-aided design taught in departments of mechanical and aeronautical engineering and computer

science. It presents in a unified manner an introduction to the mathematical theory underlying computer graphic applications. It covers topics of keen interest to students in engineering and computer science: transformations, projections, 2-D and 3-D curve definition schemes, and surface definitions. It also includes techniques, such as B-splines, which are incorporated as part of the software in advanced engineering workstations. A basic knowledge of vector and matrix algebra and calculus is required.

Approximation and Modeling with B-Splines - Klaus Hollig
2015-07-01

B-splines are fundamental to approximation and data fitting, geometric modeling, automated manufacturing, computer graphics, and numerical simulation. With an emphasis on key results and methods that are most widely used in practice, this textbook provides a unified introduction to the basic components of B-spline theory: approximation methods (mathematics),

modeling techniques (engineering), and geometric algorithms (computer science). A supplemental Web site will provide a collection of problems, some with solutions, slides for use in lectures, and programs with demos.

Fundamentals of Computer Graphics - Peter Shirley
2009-07-21

With contributions by Michael Ashikhmin, Michael Gleicher, Naty Hoffman, Garrett Johnson, Tamara Munzner, Erik Reinhard, Kelvin Sung, William B. Thompson, Peter Willemsen, Brian Wyvill. The third edition of this widely adopted text gives students a comprehensive, fundamental introduction to computer graphics. The authors present the mathematical fo

Image and Signal Processing - Abderrahim Elmoataz
2014-06-04

This book constitutes the refereed proceedings of the 6th International Conference, ICISP 2014, held in June/July 2014 in Cherbourg, France. The 76 revised full papers were carefully reviewed and selected

from 164 submissions. The contributions are organized in topical sections on multispectral colour science, color imaging and applications, digital cultural heritage, document image analysis, graph-based representations, image filtering and representation, computer vision and pattern recognition, computer graphics, biomedical, and signal processing.

Procedural Elements for Computer Graphics - David F. Rogers 1985

Splines and PDEs: From Approximation Theory to Numerical Linear Algebra - Angela Kunoth 2018-09-20
This book takes readers on a multi-perspective tour through state-of-the-art mathematical developments related to the numerical treatment of PDEs based on splines, and in particular isogeometric methods. A wide variety of research topics are covered, ranging from approximation theory to structured numerical linear algebra. More precisely, the book provides (i) a self-

contained introduction to B-splines, with special focus on approximation and hierarchical refinement, (ii) a broad survey of numerical schemes for control problems based on B-splines and B-spline-type wavelets, (iii) an exhaustive description of methods for computing and analyzing the spectral distribution of discretization matrices, and (iv) a detailed overview of the mathematical and implementational aspects of isogeometric analysis. The text is the outcome of a C.I.M.E. summer school held in Cetraro (Italy), July 2017, featuring four prominent lecturers with different theoretical and application perspectives. The book may serve both as a reference and an entry point into further research.

Advanced Computing - Michael Bader 2013-09-26
This proceedings volume collects review articles that summarize research conducted at the Munich Centre of Advanced Computing (MAC) from 2008 to 2012. The articles address the increasing gap

between what should be possible in Computational Science and Engineering due to recent advances in algorithms, hardware, and networks, and what can actually be achieved in practice; they also examine novel computing architectures, where computation itself is a multifaceted process, with hardware awareness or ubiquitous parallelism due to many-core systems being just two of the challenges faced. Topics cover both the methodological aspects of advanced computing (algorithms, parallel computing, data exploration, software engineering) and cutting-edge applications from the fields of chemistry, the geosciences, civil and mechanical engineering, etc., reflecting the highly interdisciplinary nature of the Munich Centre of Advanced Computing.

Variational Views in Mechanics

- Paolo Maria Mariano 2021

This volume provides a timely survey of interactions between the calculus of variations and

theoretical and applied mechanics. Chapters have been significantly expanded since preliminary versions appeared in a special issue of the Journal of Optimization Theory and Applications (184(1), 2020) on Calculus of Variations in Mechanics and Related Fields. The variety of topics covered offers researchers an overview of problems in mechanics that can be analyzed with variational techniques, making this a valuable reference for researchers in the field. It also presents ideas for possible future areas of research, showing how the mastery of these foundational mathematical techniques can be used for many exciting applications. Specific topics covered include: Topology optimization Identification of material properties Optimal control Plastic flows Gradient polyconvexity Obstacle problems Quasi-monotonicity Variational Views in Mechanics will appeal to researchers in mathematics, solid-states physics, and mechanical, civil, and materials engineering.

Computer Aided Geometric Design - Robert E. Barnhill

2014-05-10

Computer Aided Geometric Design covers the proceedings of the First International Conference on Computer Aided Geometric Design, held at the University of Utah on March 18-21, 1974. This book is composed of 15 chapters and starts with reviews of the properties of surface patch equation and the use of computers in geometrical design. The next chapters deal with the principles of smooth interpolation over triangles and without twist constraints, as well as the graphical representation of surfaces over triangles and rectangles. These topics are followed by discussions of the B-spline curves and surfaces; mathematical and practical possibilities of UNISURF; nonlinear splines; and some piecewise polynomial alternatives to splines under tension. Other chapters explore the smooth parametric surfaces, the space curve as a folded edge, and the

interactive computer graphics application of the parametric bi-cubic surface to engineering design problems. The final chapters look into the three-dimensional human-machine communication and a class of local interpolating splines. This book will prove useful to design engineers.

An Introduction to Structural Optimization - Peter W.

Christensen 2008-10-20

This book has grown out of lectures and courses given at Linköping University, Sweden, over a period of 15 years. It gives an introductory treatment of problems and methods of structural optimization. The three basic classes of geometrical - timization problems of mechanical structures, i. e. , size, shape and topology optimization, are treated. The focus is on concrete numerical solution methods for d- crete and (?nite element) discretized linear elastic structures. The style is explicit and practical: mathematical proofs are provided when arguments can be kept e- mentary but are

otherwise only cited, while implementation details are frequently provided. Moreover, since the text has an emphasis on geometrical design problems, where the design is represented by continuously varying—frequently very many— variables, so-called first order methods are central to the treatment. These methods are based on sensitivity analysis, i. e. , on establishing first order derivatives for objectives and constraints. The classical first order methods that we emphasize are CONLIN and MMA, which are based on explicit, convex and separable approximations. It should be remarked that the classical and frequently used so-called optimality criteria method is also of this kind. It may also be noted in this context that zero order methods such as response surface methods, surrogate models, neural networks, genetic algorithms, etc. , essentially apply to different types of problems than the ones treated here and should be presented elsewhere.

Geometry for Naval Architects - Adrian Biran 2018-11-19

Geometry for Naval Architects is the essential guide to the principles of naval geometry. Formerly fragmented throughout various sources, the topic is now presented in this comprehensive book that explains the history and specific applications of modern naval architecture mathematics and techniques, including numerous examples, applications and references to further enhance understanding. With a natural four-section organization (Traditional Methods, Differential Geometry, Computer Methods, and Applications in Naval Architecture), users will quickly progress from basic fundamentals to specific applications. Careful instruction and a wealth of practical applications spare readers the extensive searches once necessary to understand the mathematical background of naval architecture and help them understand the meanings

and uses of discipline-specific computer programs. Explains the basics of geometry as applied to naval architecture, with specific practical applications included throughout the book for real-life insights Presents traditional methods and computational techniques (including MATLAB) Provides a wealth of examples in MATLAB and MultiSurf (a computer-aided design package for naval architects and engineers) Includes supplemental MATLAB and MultiSurf code available on a companion site

The History of Visual Magic in Computers - Jon Peddie
2013-06-13

If you have ever looked at a fantastic adventure or science fiction movie, or an amazingly complex and rich computer game, or a TV commercial where cars or gas pumps or biscuits behaved liked people and wondered, "How do they do that?", then you've experienced the magic of 3D worlds generated by a computer. 3D in computers began as a way to represent

automotive designs and illustrate the construction of molecules. 3D graphics use evolved to visualizations of simulated data and artistic representations of imaginary worlds. In order to overcome the processing limitations of the computer, graphics had to exploit the characteristics of the eye and brain, and develop visual tricks to simulate realism. The goal is to create graphics images that will overcome the visual cues that cause disbelief and tell the viewer this is not real. Thousands of people over thousands of years have developed the building blocks and made the discoveries in mathematics and science to make such 3D magic possible, and The History of Visual Magic in Computers is dedicated to all of them and tells a little of their story. It traces the earliest understanding of 3D and then foundational mathematics to explain and construct 3D; from mechanical computers up to today's tablets. Several of the amazing computer graphics

algorithms and tricks came of periods where eruptions of new ideas and techniques seem to occur all at once. Applications emerged as the fundamentals of how to draw lines and create

realistic images were better understood, leading to hardware 3D controllers that drive the display all the way to stereovision and virtual reality.