Geometric Modelling Theoretical And Computational Basis Towards Advanced Cad Applications Ifip Tc5wg52 Sixth International Workshop On Geometric In Information And Communication Technology

Handbook of Computational Geometry
Geometric Modeling for Scientific Visualization
Computational Models in Architecture

Nonlinear Computational Geometry
Geometric Modeling: Techniques, Applications, Systems and Tools
Differential Geometry and Lie Groups
Curves and Surfaces in Geometric Modeling
Theoretical, Modelling and Numerical Simulations Toward Industry 4.0
Progress in Information Geometry
Guide to Computational Modelling for Decision Processes
Analytic Methods for Geometric Modeling
From Geometric Modeling to Shape Modeling
Conformal Geometry
Mathematical and Computational Modeling of Tonality
Combinatorial and Computational Geometry
Geometry, Morphology, and Computational Imaging
Geometric Computation
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Advances in Geometric Modeling and Processing
Mathematical Aspects of Geometric Modeling
ICGG 2018 - Proceedings of the 18th International Conference on Geometry and Graphics
Modern Geometric Computing for Visualization
Geometric Modeling: Theory and Practice
Computer Graphics and Geometric Modelling
Algebraic Geometry Modeling in Information Theory
Theory and Practice of Geometric Modeling
Nonlinear Computational Geometry

Geometric and Computational Spectral Theory
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Computational Geometry
Shape as Memory
Differential Geometry and Lie Groups
Computational Geometry with Independent and Dependent Uncertainties
Computational Hemodynamics – Theory, Modelling and Applications
Geometric Modeling
Shape Interrogation for Computer Aided Design and Manufacturing
An Invitation to 3-D Vision
Geometric Modeling

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Handbook of Computational Geometry World Scientific Computational Geometry is an area that provides solutions to geometric problems which arise in applications including Geographic Information Systems, Robotics and Computer Graphics. This Handbook provides an overview of key concepts and results in Computational Geometry. It may serve as a reference and study guide to the field. Not only the most advanced methods or solutions are described, but also

many alternate ways of looking at problems and how to solve them.

Geometric Modeling for Scientific Visualization Springer Science & Business Media

This book presents theoretical modeling and numerical simulations applied to drive several applications towards Industrial Revolution 4.0 (IR 4.0). The topics discussed range from theoretical parts to extensive simulations involving many efficient algorithms as well as various statistical techniques. This book is suitable for postgraduate students, researchers as well as other scientists who are working in mathematics, statistics and numerical modeling and simulation.

Computational Models in Architecture Springer

Computational Geometry: Curve and Surface Modeling provides information pertinent to the fundamental aspects of computational geometry. This book discusses the geometric properties of parametric polynomial curves by using the theory of affine invariants for algebraic curves. Organized into eight chapters, this book begins with an overview of the objects studies in computational geometry, namely surfaces and curves. This text then explores the developments in the theory and application of spline functions, which began with cubic spline

functions. Other chapters consider the mechanical background of the cubic spline functions, which is the wooden spline with small deflection. This book discusses as well that in mathematical lofting the information of a geometric shape is given by a set of data points, while in geometric design other ways of representations are available. The final chapter deals with the concepts in the theory of algebraic curves. This book is a valuable resource for mathematicians.

Nonlinear Computational Geometry Springer Nature

A comprehensive, up-to-date presentation of the indispensable core concepts of geometric modeling Now completely updated to include the most recent developments in the field, Geometric Modeling, Second Edition presents a comprehensive discussion of the core concepts of this subject. It describes and compares all the important mathematical methods for modeling curves, surfaces, and solids, and shows how to transform and assemble these elements into complex models. Written in a style free of the jargon of special applications, this unique book focuses on the essence of geometric modeling and treats it as a discipline in its own right. It integrates the three important functions of geometric modeling: to represent

elementary forms (i.e., curves, surfaces, and solids), to shape and assemble these into more complex forms, and to determine concomitant derivative geometric elements (i.e., intersections, offsets, and fillets). With more than 300 illustrations, Geometric Modeling, Second Edition appeals to the reader's visual and intuitive skills in a way that makes it easier to understand its more abstract concepts. An extensive bibliography lists many supporting works, directing the reader to more specialized treatments of this subject. Geometric Modeling, Second Edition serves as an invaluable guide to computer graphics and CAD/CAM specialists, applications designers, scientific programmers, teachers, and students.

Geometric Modeling: Techniques, Applications, Systems and Tools

American Mathematical Soc.

This book constitutes the thoroughly refereed post-proceedings of the 11th International Workshop on Theoretical Foundations of Computer Vision, held in Dagstuhl Castle, Germany in April 2002. The 27 revised full papers presented went through two rounds of reviewing and improvement and assess the state of the art in geometry, morphology, and computational imaging. The papers are organized in sections on geometry - models and algorithms;

property measurement in the grid and on finite samples; features, shape, and morphology; and computer vision and scene analysis.

Differential Geometry and Lie Groups World Scientific

This 2005 book deals with interest topics in Discrete and Algorithmic aspects of Geometry.

Curves and Surfaces in Geometric Modeling Springer Science & Business Media

Shape interrogation is the process of extraction of information from a geometric model. It is a fundamental component of Computer Aided Design and Manufacturing (CAD/CAM) systems. This book provides a bridge between the areas geometric modeling and solid modeling. Apart from the differential geometry topics covered, the entire book is based on the unifying concept of recasting all shape interrogation problems to the solution of a nonlinear system. It provides the mathematical fundamentals as well as algorithms for various shape interrogation methods including nonlinear polynomial solvers, intersection problems, differential geometry of intersection curves, distance functions, curve and surface interrogation, umbilics and lines of curvature, and geodesics.

Theoretical, Modelling and Numerical Simulations Toward Industry 4.0 Springer

Science & Business Media
This scientific work focuses on computer-aided computational models in architecture. The author initially investigates established computational models and then expands these with newer approaches to modeling. In his research the author integrates approaches to analytical philosophy, probability theory, formal logic, quantum physics, abstract algebra, computer-aided design, computer graphics, glossematics, machine learning, architecture, and others. For researchers in the fields of information technology and architecture.

Progress in Information Geometry Elsevier
This book contains tutorial surveys and original research contributions in geometric computing, modeling, and reasoning. Highlighting the role of algebraic computation, it covers: surface blending, implicitization, and parametrization; automated deduction with Clifford algebra and in real geometry; and exact geometric computation. Basic techniques, advanced methods, and new findings are presented coherently, with many examples and illustrations. Using this book the reader will easily cross the frontiers of symbolic computation, computer aided geometric design, and automated reasoning. The book is also a valuable

reference for people working in other relevant areas, such as scientific computing, computer graphics, and artificial intelligence. Contents: Algebraic Methods in Computer Aided Geometric Design: Theoretical and Practical Applications (L Gonzilez-Vega et al.); Constructing Piecewise Algebraic Blending Surfaces (Y Feng et al.); Rational Curves and Surfaces: Algorithms and Some Applications (J R Sendra); Panorama of Methods for Exact Implicitization of Algebraic Curves and Surfaces (I S Kotsireas); Implicitization and Offsetting via Regular Systems (D Wang); Determining the Intersection Curve of Two 3D Implicit Surfaces by Using Differential Geometry and Algebraic Techniques (L Gonzilez-Vega et al.); Analytical Properties of Semi-Stationary Subdivision Schemes (H Zhang & G Wang); Meshless Method for Numerical Solution of PDE Using Hermitian Interpolation with Radial Basis (Z Wu & J Liu); Clifford Algebras in Geometric Computation (H Li); Automated Deduction in Real Geometry (L Yang & B Xia); Automated Derivation of Unknown Relations and Determination of Geometric Loci (Y Li); On Guaranteed Accuracy Computation (C K Yap); Dixon A-Resultant Quotients for 6-Point Isosceles Triangular Corner Cutting (M-C Foo & E-W Chionh); Face

Recognition Using Hidden Markov Models and Artificial Neural Network Techniques (Z Ou & B Xue). Readership: Upper-level undergraduates, graduate students, researchers and engineers in geometric modeling."

Guide to Computational Modelling for Decision Processes

Springer Science & Business Media

This textbook explores advanced topics in differential geometry, chosen for their particular relevance to modern geometry processing. Analytic and algebraic perspectives augment core topics, with the authors taking care to motivate each new concept. Whether working toward theoretical or applied questions, readers will appreciate this accessible exploration of the mathematical concepts behind many modern applications. Beginning with an in-depth study of tensors and differential forms, the authors go on to explore a selection of topics that showcase these tools. An analytic theme unites the early chapters, which cover distributions, integration on manifolds and Lie groups, spherical harmonics, and operators on Riemannian manifolds. An exploration of bundles follows, from definitions to connections and curvature in vector bundles, culminating in a glimpse of Pontrjagin and Chern classes. The final chapter on Clifford algebras and Clifford

groups draws the book to an algebraic conclusion, which can be seen as a generalized viewpoint of the quaternions. Differential Geometry and Lie Groups: A Second Course captures the mathematical theory needed for advanced study in differential geometry with a view to furthering geometry processing capabilities. Suited to classroom use or independent study, the text will appeal to students and professionals alike. A first course in differential geometry is assumed; the authors' companion volume Differential Geometry and Lie Groups: A Computational Perspective provides the ideal preparation.

Analytic Methods for Geometric Modeling Birkhäuser

This book introduces the geometry of 3-D vision, that is, the reconstruction of 3-D models of objects from a collection of 2-D images. It details the classic theory of two view geometry and shows that a more proper tool for studying the geometry of multiple views is the so-called rank consideration of the multiple view matrix. It also develops practical reconstruction algorithms and discusses possible extensions of the theory.

From Geometric Modeling to Shape Modeling Geometric Modelling

This monograph examines in detail certain concepts that are useful for the modeling of curves and

surfaces and emphasizes the mathematical theory that underlies these ideas. The two principal themes of the text are the use of piecewise polynomial representation (this theme appears in one form or another in every chapter), and iterative refinement, also called subdivision. Here, simple iterative geometric algorithms produce, in the limit, curves with complex analytic structure. In the first three chapters, the de Casteljau subdivision for Bernstein-Bezier curves is used to introduce matrix subdivision, and the Lane-Riesenfield algorithm for computing cardinal splines is tied into stationary subdivision. This ultimately leads to the construction of prewavelets of compact support. The remainder of the book deals with concepts of "visual smoothness" of curves, along with the intriguing idea of generating smooth multivariate piecewise polynomials as volumes of "slices" of polyhedra. The final chapter contains an evaluation of polynomials by finite recursive algorithms. Each chapter contains introductory material as well as more advanced results.

Conformal Geometry

Springer Science & Business Media

Possibly the most comprehensive overview of computer graphics as seen in the context of geometric modelling, this two volume work covers implementation and

theory in a thorough and systematic fashion. Computer Graphics and Geometric Modelling: Implementation and Algorithms, covers the computer graphics part of the field of geometric modelling and includes all the standard computer graphics topics. The first part deals with basic concepts and algorithms and the main steps involved in displaying photorealistic images on a computer. The second part covers curves and surfaces and a number of more advanced geometric modelling topics including intersection algorithms, distance algorithms, polygonizing curves and surfaces, trimmed surfaces, implicit curves and surfaces, offset curves and surfaces, curvature, geodesics, blending etc. The third part touches on some aspects of computational geometry and a few special topics such as interval analysis and finite element methods. The volume includes two companion programs.

Mathematical and Computational Modeling of Tonality

Morgan Kaufmann

"Curves and Surfaces in Geometric Modeling: Theory and Algorithms offers a theoretically unifying understanding of polynomial curves and surfaces as well as an effective approach to implementation that you can apply to your own work as a graduate student, scientist, or practitioner." "The

focus here is on blossoming - the process of converting a polynomial to its polar form - as a natural, purely geometric explanation of the behavior of curves and surfaces. This insight is important for more than just its theoretical elegance - the author demonstrates the value of blossoming as a practical algorithmic tool for generating and manipulating curves and surfaces that meet many different criteria. You'll learn to use this and other related techniques drawn from affine geometry for computing and adjusting control points, deriving the continuity conditions for splines, creating subdivision surfaces, and more." "It will be an essential acquisition for readers in many different areas, including computer graphics and animation, robotics, virtual reality, geometric modeling and design, medical imaging, computer vision, and motion planning."--BOOK JACKET.Title Summary field provided by Blackwell North America, Inc. All Rights Reserved

Combinatorial and Computational Geometry Springer Science & Business Media

From the Preface: Blending ideas from operations research, music psychology, music theory, and cognitive science, this book aims to tell a coherent story of how tonality pervades our experience, and hence our models, of music. The story is told

through the developmental stages of the Spiral Array model for tonality, a geometric model designed to incorporate and represent principles of tonal cognition, thereby lending itself to practical applications of tonal recognition, segmentation, and visualization. Mathematically speaking, the coils that make up the Spiral Array model are in effect helices, a spiral referring to a curve emanating from a central point. The use of “spiral” here is inspired by spiral staircases, intertwined spiral staircases: nested double helices within an outer spiral. The book serves as a compilation of knowledge about the Spiral Array model and its applications, and is written for a broad audience, ranging from the layperson interested in music, mathematics, and computing to the music scientist-engineer interested in computational approaches to music representation and analysis, from the music-mathematical and computational sciences student interested in learning about tonality from a formal modeling standpoint to the computer musician interested in applying these technologies in interactive composition and performance. Some chapters assume no musical or technical knowledge, and some are more musically or computationally involved.

Geometry, Morphology, and Computational Imaging Cambridge University Press
A co-publication of the AMS and Centre de Recherches Mathématiques The book is a collection of lecture notes and survey papers based on the mini-courses given by leading experts at the 2015 Séminaire de Mathématiques Supérieures on Geometric and Computational Spectral Theory, held from June 15–26, 2015, at the Centre de Recherches Mathématiques, Université de Montréal, Montréal, Quebec, Canada. The volume covers a broad variety of topics in spectral theory, highlighting its connections to differential geometry, mathematical physics and numerical analysis, bringing together the theoretical and computational approaches to spectral theory, and emphasizing the interplay between the two.

Geometric Computation Springer Nature
This book is based on lectures presented at an international workshop on geometric modeling held at Hewlett Packard GmbH in Boblingen, FRG, in June 1990. International experts from academia and industry were selected to speak on the most interesting topics in geometric modeling. The resulting papers, published in this volume, give a state-of-the-art survey of the relevant problems and

issues. The following topics are discussed: - Methods for constructing surfaces on surfaces: four different solutions to the multidimen sional problem of constructing an interpolant from surface data are provided. - Surfaces in solid modeling: current results on the implementation of free-fonn solids in three well established solid models are reviewed. - Box splines and applications: an introduction to box spline methods for the representation of surfaces is given. Basic properties of box splines are derived, and refinement and evaluation methods for box splines are presented in detail. Shape preserving properties, the construction of non-rectangular box spline surfaces, applications to surface modeling, and imbedding problems, are discussed. - Advanced computer graphics techniques for volume visualization: the steps to be executed in the visualization process of volume data are described and tools are discussed that assist in handling this data. - Rational B-splines: an introduction to the representation of curves and surfaces using rational B-splines is given, together with a critical evaluation of their potential for industrial application.

Geometric Modelling

Springer

This book discusses geometric and mathematical models that can be used to study fluid and

structural mechanics in the cardiovascular system. Where traditional research methodologies in the human cardiovascular system are challenging due to its invasive nature, several recent advances in medical imaging and computational fluid and solid mechanics modelling now provide new and exciting research opportunities. This emerging field of study is multi-disciplinary, involving numerical methods, computational science, fluid and structural mechanics, and biomedical engineering. Certainly any new student or researcher in this field may feel overwhelmed by the wide range of disciplines that need to be understood. This unique book is one of the first to bring together knowledge from multiple disciplines, providing a starting point to each of the individual disciplines involved, attempting to ease the steep learning curve. This book presents elementary knowledge on the physiology of the cardiovascular system; basic knowledge and techniques on reconstructing geometric models from medical imaging; mathematics that describe fluid and structural mechanics, and corresponding numerical/computational methods to solve its equations and problems. Many practical examples and case studies are presented to reinforce best practice guidelines for setting

high quality computational models and simulations. These examples contain a large number of images for visualization, to explain cardiovascular physiological functions and disease. The reader is then exposed to some of the latest research activities through a summary of breakthrough research models, findings, and techniques. The book's approach is aimed at students and researchers entering this field from engineering, applied mathematics, biotechnology or medicine, wishing to engage in this emerging and exciting field of computational hemodynamics modelling.

Numerical Geometry of Images Springer Science & Business Media

How do buildings store information and experience in their shape and form? Michael Leyton has attracted considerable attention with his interpretation of geometrical form as a medium for the storage of information and memory. In this publication he draws specific conclusions for the field of architecture and construction, attaching fundamental importance to the complex relationship between symmetry and asymmetry.

Advances in Geometric Modeling and Processing Springer Science & Business Media

This comprehensive compendium describes a parametric model and algorithmic theory

to represent geometric entities with dependent uncertainties between them. The theory, named Linear Parametric Geometric Uncertainty Model (LPGUM), is an expressive and computationally efficient framework that allows to systematically study geometric uncertainty and its related algorithms in computer geometry.The self-contained monograph is of great scientific, technical, and economic importance as geometric uncertainty is ubiquitous in mechanical CAD/CAM, robotics, computer vision, wireless networks and many other fields. Geometric models, in contrast, are usually exact and do not account for these inaccuracies.This useful reference text benefits academics, researchers, and practitioners in computer science, robotics, mechanical engineering and related fields.

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