Differential Geometry Of Curves And Surfaces

Differential Geometry of Curves and SurfacesDifferential Geometry of Curves and SurfacesCurves and Surfaces in Geometric ModelingCurves and SurfacesCurves and Surfaces for CAGDDifferential Geometry of Curves and SurfacesCurves and Surfaces for Computer GraphicsDifferential GeometryCurves and SurfacesDifferential Geometry of Curves and SurfacesDifferential Geometry Of Curves And SurfacesCurves and Surfaces in Computer Aided Geometric DesignGeometry of Curves and Surfaces with MAPLECurves and SurfacesDifferential Geometry of Curves and SurfacesModern Differential Geometry of Curves and Surfaces with Mathematica, Second EditionInteractive Curves and SurfacesModern Differential Geometry of Curves and Surfaces with MathematicaDesigning Fair Curves and SurfacesCRC Standard Curves and Surfaces Victor Andreevich Toponogov Manfredo Perdigão do Carmo Jean H. Gallier Sebasti n Montiel Gerald Farin Manfredo P. do Carmo David Salomon Wolfgang Kühnel Pierre-Jean Laurent Thomas F. Banchoff Masaaki Umehara Fujio Yamaguchi Vladimir Rovenski Pierre Jean Laurent Thomas F. Banchoff mary Gray Alyn Rockwood Elsa Abbena Nickolas S. Sapidis David H. von Seggern

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central topics covered include curves surfaces geodesics intrinsic geometry and the alexandrov global angle comparision theorem many nontrivial and original problems some with hints and solutions standard theoretical material is combined with more difficult theorems and complex problems while maintaining a clear distinction between the two levels

this volume covers local as well as global differential geometry of curves and surfaces

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

this introductory textbook puts forth a clear and focused point of view on the differential geometry of curves and surfaces following the modern point of view on differential geometry the book emphasizes the global aspects of the subject the excellent collection of examples and exercises with hints will help students in learning the material advanced undergraduates and graduate students will find this a nice entry point to differential geometry in order to study the global properties of curves and surfaces it is necessary to have more sophisticated tools than are usually found in textbooks on the topic in particular students must have a firm grasp on certain topological theories indeed this monograph treats the gauss bonnet theorem and discusses the euler characteristic the authors also cover alexandrov s theorem on embedded compact surfaces in mathbb r 3 with constant mean curvature the last chapter addresses the global geometry of curves including periodic space curves and the four vertices theorem for plane curves that are not necessarily convex besides being an introduction to the lively subject of curves and surfaces this book can also be used as an entry to a wider study of differential geometry it is suitable as the text for a first year graduate course or an advanced undergraduate course

this fifth edition has been fully updated to cover the many advances made in cagd and curve and surface theory since 1997 when the fourth edition appeared material has been restructured into theory and applications chapters the theory material has been streamlined using the blossoming approach the applications material includes least squares techniques in addition to the traditional interpolation methods in all other respects it is thankfully the same this means you get the informal friendly style and unique approach that has made curves and surfaces for cagd a practical guide a true classic the book s unified treatment of all significant methods of curve and surface design is heavily focused on the movement from theory to application the author provides complete c implementations of many of the theories he discusses ranging from the traditional to the leading edge you ll gain a deep practical understanding of their advantages disadvantages and interrelationships and in the process you ll see why this book has emerged as a proven resource for thousands of other professionals and academics provides authoritative and accessible information for those working with or developing computer aided geometric design applications covers all significant cagd curve and surface design techniques from the traditional to the experimental includes a new chapter on recursive subdivision and triangular meshes presents topical programming exercises useful to professionals and students alike

one of the most widely used texts in its field this volume s clear well written exposition is enhanced by many examples and exercises some with hints and answers 1976 edition

computer graphics is important in many areas including engineering design architecture education and computer art and animation this book examines a wide

array of current methods used in creating real looking objects in the computer one of the main aims of computer graphics key features good foundational mathematical introduction to curves and surfaces no advanced math required topics organized by different interpolation approximation techniques each technique providing useful information about curves and surfaces exposition motivated by numerous examples and exercises sprinkled throughout aiding the reader includes a gallery of color images mathematica code listings and sections on curves and surfaces by refinement and on sweep surfaces site maintained and updated by the author providing readers with errata and auxiliary material this engaging text is geared to a broad and general readership of computer science architecture engineers using computer graphics to design objects programmers for computer gamemakers applied mathematicians and students majoring in computer graphics and its applications it may be used in a classroom setting or as a general reference

our first knowledge of differential geometry usually comes from the study of the curves and surfaces in i r 3 that arise in calculus here we learn about line and surface integrals divergence and curl and the various forms of stokes theorem if we are fortunate we may encounter curvature and such things as the serret frenet formulas with just the basic tools from multivariable calculus plus a little knowledge of linear algebra it is possible to begin a much richer and rewarding study of differential geometry which is what is presented in this book it starts with an introduction to the classical differential geometry of curves and surfaces in euclidean space then leads to an introduction to the riemannian geometry of more general manifolds including a look at einstein spaces an important bridge from the low dimensional theory to the general case is provided by a chapter on the intrinsic geometry of surfaces the first half of the book covering the geometry of curves and surfaces would be suitable for a one semester undergraduate course the local and global theories of curves and surfaces are presented including detailed discussions of surfaces of rotation ruled surfaces and minimal surfaces the second half of the book which could be used for a more advanced course begins with an introduction to differentiable manifolds riemannian structures and the curvature tensor two special topics are treated in detail spaces of constant curvature and einstein spaces the main goal of the book is to get started in a fairly elementary way then to guide the reader toward more sophisticated concepts and more advanced topics there are many examples and exercises to help along the way numerous figures help the reader visualize key concepts and examples especially in lower dimensions for the second edition a number of errors were corrected and some text and a number of figures have been added

this volume documents the results and presentations related to aspects of geometric design of the second international conference on curves and surfaces held in chamonix in 1993 the papers represent directions for future research and development in many areas of application from the table of contents object oriented spline software an int

through two previous editions the third edition of this popular and intriguing text takes both an analytical theoretical approach and a visual intuitive approach to the local and global properties of curves and surfaces requiring only multivariable calculus and linear algebra it develops students geometric intuition through interactive graphics applets applets are presented in maple workbook format which readers can access using the free maple player the book explains the reasons for various definitions while the interactive applets offer motivation for definitions allowing students to explore examples further and give a visual explanation of complicated theorems the ability to change parametric curves and parametrized

surfaces in an applet lets students probe the concepts far beyond what static text permits investigative project ideas promote student research at users of the previous editions request this third edition offers a broader list of exercises more elementary exercises are added and some challenging problems are moved later in exercise sets to assure more graduated progress the authors also add hints to motivate students grappling with the more difficult exercises this student friendly and readable approach offers additional examples well placed to assist student comprehension in the presentation of the gauss bonnet theorem the authors provide more intuition and stepping stones to help students grasp phenomena behind it also the concept of a homeomorphism is new to students even though it is a key theoretical component of the definition of a regular surface providing more examples show students how to prove certain functions are homeomorphisms

this book contains various types of mathematical descriptions of curves and surfaces such as ferguson coons spline bézier and b spline curves and surfaces the materials are classified and arranged in a unified way so that beginners can easily understand the whole spectrum of parametric curves and surfaces this book will be useful to many researchers designers teachers and students who are working on curves and surfaces the book can be used as a textbook in computer aided design classes

this concise text on geometry with computer modeling presents some elementary methods for analytical modeling and visualization of curves and surfaces the author systematically examines such powerful tools as 2 d and 3 d animation of geometric images transformations shadows and colors and then further studies more complex problems in differential geometry well illustrated with more than 350 figures reproducible using maple programs in the book the work is devoted to three main areas curves surfaces and polyhedra pedagogical benefits can be found in the large number of maple programs some of which are analogous to c programs including those for splines and fractals to avoid tedious typing readers will be able to download many of the programs from the birkhauser web site aimed at a broad audience of students instructors of mathematics computer scientists and engineers who have knowledge of analytical geometry i e method of coordinates this text will be an excellent classroom resource or self study reference with over 100 stimulating exercises problems and solutions it geometry of curves and surfaces with maple will integrate traditional differential and non euclidean geometries with more current computer algebra systems in a practical and user friendly format

differential geometry of curves and surfaces second edition takes both an analytical theoretical approach and a visual intuitive approach to the local and global properties of curves and surfaces requiring only multivariable calculus and linear algebra it develops students geometric intuition through interactive computer graphics applets suppor

the second edition combines a traditional approach with the symbolic manipulation abilities of mathematica to explain and develop the classical theory of curves and surfaces you will learn to reproduce and study interesting curves and surfaces many more than are included in typical texts using computer methods by plotting geometric objects and studying the printed result teachers and students can understand concepts geometrically and see the effect of changes in parameters modern differential geometry of curves and surfaces with mathematica explains how to define and compute standard geometric functions for example the curvature of curves and presents a dialect of mathematica for constructing new curves and surfaces from old the book also explores how to apply techniques from

analysis although the book makes extensive use of mathematica readers without access to that program can perform the calculations in the text by hand while single and multi variable calculus some linear algebra and a few concepts of point set topology are needed to understand the theory no computer or mathematica skills are required to understand the concepts presented in the text in fact it serves as an excellent introduction to mathematica and includes fully documented programs written for use with mathematica ideal for both classroom use and self study modern differential geometry of curves and surfaces with mathematica has been tested extensively in the classroom and used in professional short courses throughout the world

the growing importance of animation and 3d design has caused computer aided geometric design cagd to be of interest to a wide audience of programmers and designers this interactive software book tutorial teaches fundamental cagd concepts and discusses the growing number of applications in such areas as geological modeling molecular modeling commercial advertising and animation using interactive examples and animations to illustrate the mathematical concepts this hands on multimedia tutorial enables users without a substantial mathematical background to quickly gain intuition about cagd interactive curves and surfaces guides you in learning the uses of cagd as it is applied in computer graphics and engineering creating curved lines and surfaces using bezier curves b splines and parametric surface patches understanding the mathematical tools behind the generation of these objects and the development of computer based cagd algorithms experimenting with powerful interactive test benches to explore the behavior and characteristics of the most popular cagd curves application oriented readers will find this animated tutorial presentation more accessible than the standard formal texts on the subject

presenting theory while using mathematica in a complementary way modern differential geometry of curves and surfaces with mathematica the third edition of alfred gray s famous textbook covers how to define and compute standard geometric functions using mathematica for constructing new curves and surfaces from existing ones since gray s death authors abbena and salamon have stepped in to bring the book up to date while maintaining gray s intuitive approach they reorganized the material to provide a clearer division between the text and the mathematica code and added a mathematica notebook as an appendix to each chapter they also address important new topics such as quaternions the approach of this book is at times more computational than is usual for a book on the subject for example brioshi s formula for the gaussian curvature in terms of the first fundamental form can be too complicated for use in hand calculations but mathematica handles it easily either through computations or through graphing curvature another part of mathematica that can be used effectively in differential geometry is its special function library where nonstandard spaces of constant curvature can be defined in terms of elliptic functions and then plotted using the techniques described in this book readers will understand concepts geometrically plotting curves and surfaces on a monitor and then printing them containing more than 300 illustrations the book demonstrates how to use mathematica to plot many interesting curves and surfaces including as many topics of the classical differential geometry and surfaces as possible it highlights important theorems with many examples it includes 300 miniprograms for computing and plotting various geometric objects alleviating the drudgery of computing things such as the curvature and torsion of a curve in space

the authors define fairness mathematically demonstrate how newly developed curve and surface schemes guarantee fairness and assist the user in identifying

and removing shape aberrations in a surface model without destroying the principal shape characteristics of the model a valuable resource for engineers working in cad cam or computer aided engineering

crc standard curves and surfaces is a comprehensive illustrated catalog of curves and surfaces of geometric figures and algebraic transcendental and integral equations used in elementary and advanced mathematics more than 800 graphics images are featured based on the successful crc handbook of mathematical curves and surfaces this new volume retains the easy to use catalog format of the original book illustrations are presented in a common format organized by type of equation associated equations are printed in their simplest form along with any notes required to understand the illustrations equations and graphics appear in a side by side format with figures printed on righthand pages and text on lefthand pages most curves and surfaces are plotted with several parameter selections so that the variation of the mathematical functions are easily understandable coverage on algebraic surfaces and transcendental surfaces has been expanded by 30 over the original edition material on functions in mathematical physics has expanded by 50 new material on functions of random processes and functions of complex variable surfaces has been added a complementary software program see the next title listed in this catalog enables you to plot all of the functions found in this book

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