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Equations Curvature of Space and Time, with an Introduction to Geometric Analysis Methods of Geometric Analysis in Extension and Trace Problems Geometric Analysis of Quasilinear Inequalities on Complete Manifolds Convexity and Concentration Geometric Analysis on Real Analytic Manifolds Asymptotic Geometric Analysis Vanishing and Finiteness Results in Geometric Analysis A Geometric Analysis of the Platonic Solids and Other Semi-Regular Polyhedra Aspects of Differential Geometry I Geometric Analysis and Computer Graphics Geometric Analysis of Hyperbolic Differential Equations: An Introduction

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Differential Geometry is a wide field. We have chosen to concentrate upon certain aspects that are appropriate for an introduction to the subject; we have not attempted an encyclopedic treatment. In Book I, we focus on preliminaries. Chapter 1 provides an introduction to multivariable calculus and treats the Inverse Function Theorem, Implicit Function Theorem, the theory of the Riemann Integral, and the Change of Variable Theorem. Chapter 2 treats smooth manifolds, the tangent and cotangent bundles, and Stokes' Theorem. Chapter 3 is an introduction to Riemannian geometry. The Levi-Civita connection is presented, geodesics introduced, the Jacobi operator is discussed, and the Gauss-Bonnet Theorem is proved. The material is appropriate for an undergraduate course in the subject. We have given some different proofs than those that are classically given and there is some new material in these volumes. For example, the treatment of the Chern-Gauss-Bonnet Theorem for pseudo-Riemannian manifolds with boundary is new. This book contains an expanded version of lectures delivered by the authors at the CRM in Spring of 2009. It contains four series of lectures.

The first one is an application of harmonic analysis and the Heisenberg group to understand human vision. The second and third series of lectures cover some of the main topics on linear and multilinear harmonic analysis. The last one is a clear introduction to a deep result of De Giorgi, Moser and Nash on regularity of elliptic partial differential equations in divergence form. Graduate lectures on the interface between mathematics and physics. This book introduces advanced undergraduates to Riemannian geometry and mathematical general relativity. The overall strategy of the book is to explain the concept of curvature via the Jacobi equation which, through discussion of tidal forces, further helps motivate the Einstein field equations. After addressing concepts in geometry such as metrics, covariant differentiation, tensor calculus and curvature, the book explains the mathematical framework for both special and general relativity. Relativistic concepts discussed include (initial value formulation of) the Einstein equations, stress-energy tensor, Schwarzschild space-time, ADM mass and geodesic incompleteness. The concluding chapters of the book introduce the reader to geometric analysis: original results of the author and her undergraduate student collaborators illustrate how methods of analysis and differential equations are used in addressing questions from geometry and relativity. The book is mostly self-contained and the reader is only expected to have a solid foundation in multivariable and vector calculus and linear algebra. The material in this book was first developed for the 2013 summer program in geometric analysis at the Park City Math Institute, and was recently modified and expanded to reflect the author's experience of teaching mathematical general relativity to advanced undergraduates at Lewis & Clark College. This volume, the second of Helgason's impressive three books on Lie groups and the geometry and analysis of symmetric spaces, is an introduction to group-theoretic methods in analysis on spaces with a group action. The first chapter deals with the three two-dimensional spaces of constant curvature, requiring only elementary methods and no Lie theory. It is remarkably accessible and would be suitable for a first-year graduate course. The remainder of the book covers more advanced topics, including the work of Harish-Chandra and others, but especially that of Helgason himself. Indeed, the exposition can be seen as an account of the author's tremendous contributions to the subject.Chapter I deals with modern integral geometry and Radon transforms. The second chapter examines the interconnection between Lie groups and differential operators. Chapter IV develops the theory of spherical functions on semisimple Lie groups with a certain degree of completeness, including a study of Harish-Chandra's c-function. The treatment of analysis on compact symmetric spaces (Chapter V) includes some finite-dimensional representation theory for compact Lie groups and Fourier analysis on compact groups. Each chapter ends with exercises (with solutions given at the end of the book!) and historical notes.This book, which is new to the AMS publishing program, is an excellent example of the author's well-known clear and careful writing style. It has become the standard text for the study of spherical functions and invariant differential operators on symmetric spaces. Sigurdur Helgason was awarded the Steele Prize for Groups and Geometric Analysis and the companion volume, ""Differential Geometry, Lie Groups and Symmetric Spaces."" This book covers recent advances in several important areas of geometric analysis including extremal eigenvalue problems, mini-max methods in minimal surfaces, CR geometry in dimension three, and the Ricci flow and Ricci limit spaces. An output of the CIME Summer School "Geometric Analysis" held in Cetraro in 2018, it offers a collection of lecture notes prepared by Ailana Fraser (UBC), André Neves (Chicago), Peter M. Topping (Warwick), and Paul C. Yang (Princeton). These notes will be a valuable asset for researchers and advanced graduate students in geometric analysis. This book is a continuation of Asymptotic Geometric Analysis, Part I, which was published as volume 202 in this series. Asymptotic geometric analysis studies properties of geometric objects, such as normed spaces, convex bodies, or convex functions, when the dimensions of these objects increase to infinity. The asymptotic approach reveals many very novel phenomena which influence other fields in mathematics, especially where a large data set is of main concern, or a number of parameters which becomes uncontrollably large. One of the important features of this new theory is in developing tools which allow studying high parametric families. Among the topics covered in the book are measure concentration, isoperimetric constants of log-concave measures, thin-shell estimates, stochastic localization, the geometry of Gaussian measures, volume inequalities for convex bodies, local theory of Banach spaces, type and cotype, the Banach-Mazur compactum, symmetrizations, restricted invertibility, and functional versions of geometric notions and inequalities. This volume contains the proceedings of the AMS Special Session on Radon Transforms and Geometric Analysis, in honor of Sigurdur Helgason's 85th Birthday, held from January 4-7, 2012, in Boston, MA, and the Tufts University Workshop on Geometric Analysis on Euclidean and Homogeneous Spaces, held from January 8-9, 2012, in Medford, MA. This volume provides an historical overview of several decades in integral geometry and geometric analysis as well as recent advances in these fields and closely related areas. It contains several articles focusing on the mathematical work of Sigurdur Helgason, including an overview of his research by Gestur Olafsson and Robert Stanton. The first article in the volume contains Helgason's own reminiscences about the development of the group-theoretical aspects of the Radon transform and its relation to geometric analysis. Other contributions cover Radon transforms, harmonic analysis, Penrose transforms, representation theory, wavelets, partial differential operators on groups, and inverse problems in tomography and cloaking that are related to integral geometry. Many articles contain both an overview of their respective fields as well as new research results. The volume will therefore appeal to experienced researchers as well as a younger generation of mathematicians. With a good blend of pure and applied topics the volume will be a valuable source for interdisciplinary research. The interplay of geometry, spectral theory and stochastics has a long and fruitful history, and is the driving force behind many developments in modern mathematics. Bringing together contributions from a 2017 conference at the University of Potsdam, this volume focuses on global effects of local properties. Exploring the similarities and differences between the discrete and the continuous settings is of great interest to both researchers and graduate students in geometric analysis. The range of survey articles presented in this volume give an expository overview of various topics, including curvature, the effects of geometry on the spectrum, geometric group theory, and spectral theory of Laplacian and Schrödinger operators. Also included are shorter articles focusing on specific techniques and problems, allowing the reader to get to the heart of several key topics. Its self-contained presentation and 'do-it-yourself' approach make this the perfect guide for graduate students and researchers wishing to access recent literature in the field of nonlinear wave equations and general relativity. It introduces all of the key tools and concepts from Lorentzian geometry (metrics, null frames, deformation tensors, etc.) and provides complete elementary proofs. The author also discusses applications to topics in nonlinear equations, including null conditions and stability of Minkowski space. No previous knowledge of geometry or relativity is required. This book is intended for advanced students and young researchers interested in the analysis of partial differential equations and differential geometry. It discusses elementary concepts of surface geometry in higher-dimensional Euclidean spaces, in particular the differential equations of Gauss-Weingarten together with various integrability conditions and corresponding surface curvatures. It includes a chapter on curvature estimates for such surfaces, and, using results from potential theory and harmonic analysis, it addresses geometric and analytic methods to establish the existence and regularity of Coulomb frames in their normal bundles, which arise as critical points for a functional of total torsion. "Geometric Analysis combines differential equations with differential geometry. An important aspect of geometric analysis is to approach geometric problems by studying differential equations. Besides some known linear differential operators such as the Laplace operator, many differential equations arising from differential geometry are nonlinear. A particularly important example is the Monge-Amperè equation. Applications to geometric problems have also motivated new methods and techniques in differential equations. The field of geometric analysis is broad and has had many striking applications. This handbook of geometric analysis--the first of the two to be published in the ALM series--presents introductions and survey papers treating important topics in geometric analysis, with their applications to related fields. It can be used as a reference by graduate students and by researchers in related areas."--Back cover. This book brings into focus the synergistic interaction between analysis and geometry by examining a variety of topics in function theory, real analysis, harmonic analysis, several complex variables, and group actions. Krantz's approach is motivated by examples, both classical and modern, which highlight the symbiotic relationship between analysis and geometry. Creating a synthesis among a host of different topics, this book is useful to researchers in geometry and analysis and may be of interest to physicists, astronomers, and engineers in certain areas. The book is based on lectures presented at an NSF-CBMS Regional Conference held in May 1992. Offering some of the topics of contemporary mathematical research, this fourth edition includes a systematic introduction to Kahler geometry and the presentation of additional techniques from geometric analysis. The book presents a comprehensive exposition of extension results for maps between different geometric objects and of extension-trace results for smooth functions on subsets with no a priori differential structure (Whitney problems). The account covers development of the area from the initial classical works of the first half of the 20th century to the flourishing period of the last decade. Seemingly very specific these problems have been from the very beginning a powerful source of ideas, concepts and methods that essentially influenced and in some cases even transformed considerable areas of analysis. Aside from the material linked by the aforementioned problems the book also is unified by geometric analysis approach used in the proofs of basic results. This requires a variety of geometric tools from convex and combinatorial geometry to geometry of metric space theory to Riemannian and coarse geometry and more. The necessary facts are presented mostly with detailed proofs to make the book accessible to a wide audience. This book demonstrates the influence of geometry on the qualitative behaviour of solutions of quasilinear PDEs on Riemannian manifolds. Motivated by examples arising, among others, from the theory of submanifolds, the authors study classes of coercive elliptic differential inequalities on domains of a manifold M with very general nonlinearities depending on the variable x, on the solution u and on its gradient. The book highlights the mean curvature operator and its variants, and investigates the validity of strong maximum principles, compact support principles and Liouville type theorems. In particular, it identifies sharp thresholds involving curvatures or volume growth of geodesic balls in M to guarantee the above properties under appropriate Keller-Osserman type conditions, which are investigated in detail throughout the book, and discusses the geometric reasons behind the existence of such thresholds. Further, the book also provides a unified review of recent results in the literature, and creates a bridge with geometry by studying the validity of weak and strong maximum principles at infinity, in the spirit of

Omori-Yau’s Hessian and Laplacian principles and subsequent improvements. The papers in this volume cover important topics in spectral theory and geometric analysis such as resolutions of smooth group actions, spectral asymptotics, solutions of the Ginzburg-Landau equation, scattering theory, Riemann surfaces of infinite genus and tropical mathematics. This book describes very recent results involving an extensive use of analytical tools in the study of geometrical and topological properties of complete Riemannian manifolds. It analyzes in detail an extension of the Bochner technique to the non compact setting, yielding conditions which ensure that solutions of geometrically significant differential equations either are trivial (vanishing results) or give rise to finite dimensional vector spaces (finiteness results). The book develops a range of methods, from spectral theory and qualitative properties of solutions of PDEs, to comparison theorems in Riemannian geometry and potential theory. This volume includes expanded versions of the lectures delivered in the Graduate Minicourse portion of the 2013 Park City Mathematics Institute session on Geometric Analysis. The papers give excellent high-level introductions, suitable for graduate students wishing to enter the field and experienced researchers alike, to a range of the most important areas of geometric analysis. These include: the general issue of geometric evolution, with more detailed lectures on Ricci flow and Kähler-Ricci flow, new progress on the analytic aspects of the Willmore equation as well as an introduction to the recent proof of the Willmore conjecture and new directions in min-max theory for geometric variational problems, the current state of the art regarding minimal surfaces in R3, the role of critical metrics in Riemannian geometry, and the modern perspective on the study of eigenfunctions and eigenvalues for Laplace–Beltrami operators. This text provides a masterful and systematic treatment of all the basic analytic and geometric aspects of Bergman's classic theory of the kernel and its invariance properties. These include calculation, invariance properties, boundary asymptotics, and asymptotic expansion of the Bergman kernel and metric. Moreover, it presents a unique compendium of results with applications to function theory, geometry, partial differential equations, and interpretations in the language of functional analysis, with emphasis on the several complex variables context. Several of these topics appear here for the first time in book form. Each chapter includes illustrative examples and a collection of exercises which will be of interest to both graduate students and experienced mathematicians. Graduate students who have taken courses in complex variables and have a basic background in real and functional analysis will find this textbook appealing. Applicable courses for either main or supplementary usage include those in complex variables, several complex variables, complex differential geometry, and partial differential equations. Researchers in complex analysis, harmonic analysis, PDEs, and complex differential geometry will also benefit from the thorough treatment of the many exciting aspects of Bergman's theory. This edited volume has a two-fold purpose. First, comprehensive survey articles provide a way for beginners to ease into the corresponding sub-fields. These are then supplemented by original works that give the more advanced readers a glimpse of the current research in geometric analysis and related PDEs. The book is of significant interest for researchers, including advanced Ph.D. students, working in geometric analysis. Readers who have a secondary interest in geometric analysis will benefit from the survey articles. The results included in this book will stimulate further advances in the subjects: geometric analysis, including complex differential geometry, symplectic geometry, PDEs with a geometric origin, and geometry related to topology. Contributions by Claudio Arezzo, Alberto Della Vedova, Werner Ballmann, Henrik Matthiesen, Panagiotis Polymerakis, Sun-Yung A. Chang, Zheng-Chao Han, Paul Yang, Tobias Holck Colding, William P. Minicozzi II, Panagiotis Dimakis, Richard

Melrose, Akito Futaki, Hajime Ono, Jiyuan Han, Jeff A. Viaclovsky, Bruce Kleiner, John Lott, Sławomir Kołodziej, Ngoc Cuong Nguyen, Chi Li, Yuchen Liu, Chenyang Xu, YanYan Li, Luc Nguyen, Bo Wang, Shiguang Ma, Jie Qing, Xiaonan Ma, Sean Timothy Paul, Kyriakos Sergiou, Tristan Rivière, Yanir A. Rubinstein, Natasa Sesum, Jian Song, Jeffrey Streets, Neil S. Trudinger, Yu Yuan, Weiping Zhang, Xiaohua Zhu and Aleksey Zinger. This book contains a meticulous geometric investigation of the five Platonic Solids and five other important polyhedra, as well as reference charts for each solid. (Mathematics) This book contains a collection of twelve papers that reflect the state of the art of nonlinear differential equations in modern geometrical theory. It comprises miscellaneous topics of the local and nonlocal geometry of differential equations and the applications of the corresponding methods in hydrodynamics, symplectic geometry, optimal investment theory, etc. The contents will be useful for all the readers whose professional interests are related to nonlinear PDEs and differential geometry, both in theoretical and applied aspects. Convex geometry is at once simple and amazingly rich. While the classical results go back many decades, during that previous to this book's publication in 1999, the integral geometry of convex bodies had undergone a dramatic revitalization, brought about by the introduction of methods, results and, most importantly, new viewpoints, from probability theory, harmonic analysis and the geometry of finite-dimensional normed spaces. This book is a collection of research and expository articles on convex geometry and probability, suitable for researchers and graduate students in several branches of mathematics coming under the broad heading of 'Geometric Functional Analysis'. It continues the Israel GAFA Seminar series, which is widely recognized as the most useful research source in the area. The collection reflects the work done at the program in Convex Geometry and Geometric Analysis that took place at MSRI in 1996. The book presents a comprehensive exposition of extension results for maps between different geometric objects and of extension-trace results for smooth functions on subsets with no a priori differential structure (Whitney problems). The account covers development of the area from the initial classical works of the first half of the 20th century to the flourishing period of the last decade. Seemingly very specific these problems have been from the very beginning a powerful source of ideas, concepts and methods that essentially influenced and in some cases even transformed considerable areas of analysis. Aside from the material linked by the aforementioned problems the book also is unified by geometric analysis approach used in the proofs of basic results. This requires a variety of geometric tools from convex and combinatorial geometry to geometry of metric space theory to Riemannian and coarse geometry and more. The necessary facts are presented mostly with detailed proofs to make the book accessible to a wide audience. This book is not a textbook, but rather a coherent collection of papers from the field of partial differential equations. Nevertheless we believe that it may very well serve as a good introduction into some topics of this classical field of analysis which, despite of its long history, is highly modem and well prospering. Richard Courant wrote in 1950: "It has always been a temptationfor mathematicians to present the crystallized product of their thought as a deductive general theory and to relegate the individual mathematical phenomenon into the role of an example. The reader who submits to the dogmatic form will be easily indoctrinated. Enlightenment, however, must come from an understanding of motives; live mathematical development springs from specific natural problems which can be easily understood, but whose solutions are difficult and demand new methods or more general significance. " We think that many, if not all, papers of this book are written in this spirit and will give the reader access to an important branch of analysis by exhibiting interest ing problems worth to be studied. Most of the collected articles have an extensive introductory part describing the history of the presented problems as well as the state of the art and offer a well chosen guide to the literature. This way the papers became lengthier than customary these days, but the level of presentation is such that an advanced graduate student should find the various articles both readable and stimulating. This volume presents some of the research topics discussed at the 2014-2015 Annual Thematic Program Discrete Structures: Analysis and Applications at the Institute of Mathematics and its Applications during the Spring 2015 where geometric analysis, convex geometry and concentration phenomena were the focus. Leading experts have written surveys of research problems, making state of the art results more conveniently and widely available. The volume is organized into two parts. Part I contains those contributions that focus primarily on problems motivated by probability theory, while Part II contains those contributions that focus primarily on problems motivated by convex geometry and geometric analysis. This book will be of use to those who research convex geometry, geometric analysis and probability directly or apply such methods in other fields. This established reference work continues to provide its readers with a gateway to some of the most interesting developments in contemporary geometry. It offers insight into a wide range of topics, including fundamental concepts of Riemannian geometry, such as geodesics, connections and curvature; the basic models and tools of geometric analysis, such as harmonic functions, forms, mappings, eigenvalues, the Dirac operator and the heat flow method; as well as the most important variational principles of theoretical physics, such as Yang-Mills, Ginzburg-Landau or the nonlinear sigma model of quantum field theory. The present volume connects all these topics in a systematic geometric framework. At the same time, it equips the reader with the working tools of the field and enables her or him to delve into geometric research. The 7th edition has been systematically reorganized and updated. Almost no page has been left unchanged. It also includes new material, for instance on symplectic geometry, as well as the Bishop-Gromov volume growth theorem which elucidates the geometric role of Ricci curvature. From the reviews:“This book provides a very readable introduction to Riemannian geometry and geometric analysis... With the vast development of the mathematical subject of geometric analysis, the present textbook is most welcome.” Mathematical Reviews “For readers familiar with the basics of differential geometry and some acquaintance with modern analysis, the book is reasonably self-contained. The book succeeds very well in laying out the foundations of modern Riemannian geometry and geometric analysis. It introduces a number of key techniques and provides a representative overview of the field.” Monatshefte für Mathematik This graduate-level text demonstrates the basic techniques for researchers interested in the field of geometric analysis. Asymptotic Geometric Analysis is concerned with the geometric and linear properties of finite dimensional objects, normed spaces, and convex bodies, especially with the asymptotics of their various quantitative parameters as the dimension tends to infinity. The deep geometric, probabilistic, and combinatorial methods developed here are used outside the field in many areas of mathematics and mathematical sciences. The Fields Institute Thematic Program in the Fall of 2010 continued an established tradition of previous large-scale programs devoted to the same general research direction. The main directions of the program included: * Asymptotic theory of convexity and normed spaces * Concentration of measure and isoperimetric inequalities, optimal transportation approach * Applications of the concept of concentration * Connections with transformation groups and Ramsey theory * Geometrization of probability * Random matrices * Connection with asymptotic combinatorics and complexity theory These directions are represented in this volume and reflect the present state of this important area of research. It will be of benefit to researchers working in a wide range of mathematical sciences—in particular functional analysis, combinatorics, convex geometry, dynamical systems, operator algebras, and computer science. This volume presents the proceedings of the Southeast Geometry Seminar for the meetings that took place bi-annually between the fall of 2009 and the fall of 2011, at Emory University, Georgia Institute of Technology, University of Alabama Birmingham, and the University of Tennessee. Talks at the seminar are devoted to various aspects of geometric analysis and related fields, in particular, nonlinear partial differential equations, general relativity, and geometric topology. Articles in this volume cover the following topics: a new set of axioms for General Relativity, CR manifolds, the Mane Conjecture, minimal surfaces, maximal measures, pendant drops, the Funk-Radon-Helgason method, ADM-mass and capacity, and extrinsic curvature in metric spaces. This volume contains three expanded lecture notes from the program Scalar Curvature in Manifold Topology and Conformal Geometry that was held at the Institute for Mathematical Sciences from 1 November to 31 December 2014. The first chapter surveys the recent developments on the fourth-order equations with negative exponent from geometric points of view such as positive mass theorem and uniqueness results. The next chapter deals with the recent important progress on several conjectures such as the existence of non-flat smooth hyper-surfaces and Serrin's over-determined problem. And the final chapter induces a new technique to handle the equation with critical index and the sign change coefficient as well as the negative index term. These topics will be of interest to those studying conformal geometry and geometric partial differential equations. Contents:Lectures on the Fourth-Order Q Curvature Equation (Fengbo Hang and Paul C Yang)An Introduction to the Finite and Infinite Dimensional Reduction Methods (Manuel del Pino and Juncheng Wei)Einstein Constraint Equations on Riemannian Manifolds (Quôc Anh Ngô) Readership: Advanced undergraduates, graduate students and researchers interested in the study of conformal geometry and geometric partial differential equations. In the last decade there has been an extraordinary confluence of ideas in mathematics and theoretical physics brought about by pioneering discoveries in geometry and analysis. The various chapters in this volume, treating the interface of geometric analysis and mathematical physics, represent current research interests. No suitable succinct account of the material is available elsewhere. Key topics include: * A self-contained derivation of the partition function of Chern- Simons gauge theory in the semiclassical approximation (D.H. Adams) * Algebraic and geometric aspects of the Knizhnik-Zamolodchikov equations in conformal field theory (P. Bouwknegt) * Application of the representation theory of loop groups to simple models in quantum field theory and to certain integrable systems (A.L. Carey and E. Langmann) * A study of variational methods in Hermitian geometry from the viewpoint of the critical points of action functionals together with physical backgrounds (A. Harris) * A review of monopoles in nonabelian gauge theories (M.K. Murray) * Exciting developments in quantum cohomology (Y. Ruan) * The physics origin of Seiberg-Witten equations in 4-manifold theory (S. Wu) Graduate students, mathematicians and mathematical physicists in the above-mentioned areas will benefit from the user-friendly introductory style of each chapter as well as the comprehensive bibliographies provided for each topic. Prerequisite knowledge is minimal since sufficient background material motivates each chapter. This volume contains the refereed proceedings of the Special Session on Geometric Analysis held at the AMS meeting in Philadelphia in October 1991. The term ''geometric analysis'' is being used with increasing frequency in the mathematical community, but its meaning is not entirely fixed. The papers in this collection should help to better define the notion of geometric analysis by illustrating emerging trends in the subject. The topics covered range over a broad spectrum:

integral geometry, Radon transforms, geometric inequalities, microlocal analysis, harmonic analysis, analysis on Lie groups and symmetric spaces, and more. Containing articles varying from the expository to the technical, this book presents the latest results in a broad range of analytic and geometric topics. This monograph provides some useful tools for performing global geometric analysis on real analytic manifolds. At the core of the methodology of the book is a variety of descriptions for the topologies for the space of real analytic sections of a real analytic vector bundle and for the space of real analytic mappings between real analytic manifolds. Among the various descriptions for these topologies is a development of geometric seminorms for the space of real analytic sections. To illustrate the techniques in the book, a number of fundamental constructions in differential geometry are shown to induce continuous mappings on spaces of real analytic sections and mappings. Aimed at researchers at the level of Doctoral students and above, the book introduces the reader to the challenges and opportunities of real analytic analysis and geometry. This volume derives from a workshop on differential geometry, calculus of vari ations, and computer graphics at the Mathematical Sciences Research Institute in Berkeley, May 23-25, 1988. The meeting was structured around principal lectures given by F. Almgren, M. Callahan, J. Ericksen, G. Francis, R. Gulliver, P. Hanra han, J. Kajiya, K. Polthier, J. Sethian, I. Sterling, E. L. Thomas, and T. Vogel. The divergent backgrounds of these and the many other participants, as reflected in their lectures at the meeting and in their papers presented here, testify to the unifying element of the workshop's central theme. Any such meeting is ultimately dependent for its success on the interest and motivation of its participants. In this respect the present gathering was especially fortunate. The depth and range of the new developments presented in the lectures and also in informal discussion point to scientific and technological frontiers be ing crossed with impressive speed. The present volume is offered as a permanent record for those who were present, and also with a view toward making the material available to a wider audience than were able to attend.

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