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KEY=EQUATIONS - ERICKSON WOODARD

NONLINEAR DIFFUSION EQUATIONS AND THEIR EQUILIBRIUM STATES, 3

PROCEEDINGS FROM A CONFERENCE HELD AUGUST 20-29, 1989 IN GREGYNOG, WALES

Springer Science & Business Media Nonlinear diffusion equations have held a prominent place in the theory of partial differential equations, both for the challenging and deep mathematical questions posed by such equations and the important role they play in many areas of science and technology. Examples of current interest are biological and chemical pattern formation, semiconductor design, environmental problems such as solute transport in groundwater flow, phase transitions and combustion theory. Central to the theory is the equation $U_t = \sim \text{cp}(U) + f(u)$. Here \sim denotes the n -dimensional Laplacian, cp and f are given functions and the solution is defined on some domain $n \times [0, T]$ in space-time. Fundamental questions concern the existence, uniqueness and regularity of solutions, the existence of interfaces or free boundaries, the question as to whether or not the solution can be continued for all time, the asymptotic behavior, both in time and space, and the development of singularities, for instance when the solution ceases to exist after finite time, either through extinction or through blow up.

NONLINEAR DIFFUSION EQUATIONS AND THEIR EQUILIBRIUM STATES I

PROCEEDINGS OF A MICROPROGRAM HELD AUGUST 25-SEPTEMBER 12, 1986

Springer In recent years considerable interest has been focused on nonlinear diffusion problems, the archetypical equation for these being $U_t = D \cdot u + f(u)$. Here D denotes the n -dimensional Laplacian, the solution $u = u(x, t)$ is defined over some space-time domain of the form $n \times [0, T]$, and $f(u)$ is a given real function whose form is determined by various physical and mathematical applications. These applications have become more varied and widespread as problem after problem has been shown to lead to an equation of this type or to its time-independent counterpart, the elliptic equation of equilibrium $D \cdot u + f(u) = 0$. Particular cases arise, for example, in population genetics, the physics of nuclear stability, phase transitions between liquids and gases, flows in porous media, the Lend-Emden equation of astrophysics, various simplified combustion models, and in determining metrics which realize given scalar or Gaussian curvatures. In the latter direction, for example, the problem of finding conformal metrics with prescribed curvature leads to a ground state problem involving critical exponents. Thus not only analysts, but geometers as well, can find common ground in the present work. The corresponding mathematical problem is to determine how the structure of the nonlinear function $f(u)$ influences the behavior of the solution.

NONLINEAR DIFFUSION EQUATIONS AND THEIR EQUILIBRIUM STATES II

PROCEEDINGS OF A MICROPROGRAM HELD AUGUST 25-SEPTEMBER 12, 1986

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NONLINEAR DIFFUSION EQUATIONS AND THEIR EQUILIBRIUM STATES II

PROCEEDINGS OF A MICROPROGRAM HELD AUGUST 25-SEPTEMBER 12, 1986

Springer In recent years considerable interest has been focused on nonlinear diffusion problems, the archetypical equation for these being $U_t = \tilde{U} + f(u)$. Here \tilde{U} denotes the n -dimensional Laplacian, the solution $u = u(x, t)$ is defined over some space-time domain of the form $n \times [0, T]$, and $f(u)$ is a given real function whose form is determined by various physical and mathematical applications. These applications have become more varied and widespread as problem after problem has been shown to lead to an equation of this type or to its time-independent counterpart, the elliptic equation of equilibrium $\tilde{u} + f(u) = 0$. Particular cases arise, for example, in population genetics, the physics of nuclear stability, phase transitions between liquids and gases, flows in porous media, the Lend-Emden equation of astrophysics, various simplified combustion models, and in determining metrics which realize given scalar or Gaussian curvatures. In the latter direction, for example, the problem of finding conformal metrics with prescribed curvature leads to a ground state problem involving critical exponents. Thus not only analysts, but geometers as well, can find common ground in the present work. The corresponding mathematical problem is to determine how the structure of the nonlinear function $f(u)$ influences the behavior of the solution.

NONLINEAR DIFFUSION EQUATIONS AND THEIR EQUILIBRIUM STATES

PROCEEDINGS FROM A CONFERENCE HELD AUGUST 20 - 29, 1989 IN GREGYNOG, WALES

NONLINEAR DIFFUSION EQUATIONS AND THEIR EQUILIBRIUM STATES, 3

PROCEEDINGS FROM A CONFERENCE HELD AUGUST 20-29, 1989, IN GREGYNOG, WALES

Birkhauser

NONLINEAR DIFFUSION EQUATIONS AND THEIR EQUILIBRIUM STATES

NONLINEAR DIFFUSION EQUATIONS AND THEIR EQUILIBRIUM STATES II

PROCEEDINGS OF A MICROPROGRAM HELD AUGUST 25-SEPTEMBER 12, 1986

Springer Science & Business Media In recent years considerable interest has been focused on nonlinear diffusion problems, the archetypical equation for these being $U_t = \Delta U + f(u)$. Here Δ denotes the n -dimensional Laplacian, the solution $u = u(x, t)$ is defined over some space-time domain of the form $n \times [0, T]$, and $f(u)$ is a given real function whose form is determined by various physical and mathematical applications. These applications have become more varied and widespread as problem after problem has been shown to lead to an equation of this type or to its time-independent counterpart, the elliptic equation of equilibrium $\Delta u + f(u) = 0$. Particular cases arise, for example, in population genetics, the physics of nuclear stability, phase transitions between liquids and gases, flows in porous media, the Lend-Emden equation of astrophysics, various simplified combustion models, and in determining metrics which realize given scalar or Gaussian curvatures. In the latter direction, for example, the problem of finding conformal metrics with prescribed curvature leads to a ground state problem involving critical exponents. Thus not only analysts, but geometers as well, can find common ground in the present work. The corresponding mathematical problem is to determine how the structure of the nonlinear function $f(u)$ influences the behavior of the solution.

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NONLINEAR DIFFUSION EQUATIONS AND THEIR EQUILIBRIUM

STATES : VOL.: 1 : PROCEEDINGS OF A MICROPROGRAM HELD AUGUST 25 - : SEPTEMBER 12, 1986

NONLINEAR DIFFUSION EQUATIONS AND THEIR EQUILIBRIUM

STATES : VOL.: 2 : PROCEEDINGS OF A MICROPROGRAM HELD AUGUST 25 - : SEPTEMBER 12, 1986

SELECTED PAPERS ON ANALYSIS AND DIFFERENTIAL EQUATIONS

American Mathematical Soc. This volume contains translations of papers that originally appeared in the Japanese journal "Sugaku." The papers range over a variety of topics, including nonlinear partial differential equations, C^* -algebras, and Schrodinger operators. The volume is suitable for graduate students and research mathematicians interested in analysis and differential equations.

NONLINEAR ANALYSIS AND CONTINUUM MECHANICS

PAPERS FOR THE 65TH BIRTHDAY OF JAMES SERRIN

Springer Science & Business Media The chapters in this volume deal with four fields with deep historical roots that remain active areas research: partial differential equations, variational methods, fluid mechanics, and thermodynamics. The collection is intended to serve two purposes: First, to honor James Serrin, in whose work the four fields frequently interacted; and second, to bring together work in fields that are usually pursued independently but that remain remarkably interrelated. Serrin's contributions to mathematical analysis and its applications are fundamental and include such theorems and methods as the Gilbarg- Serrin theorem on isoated singularities, the Serrin symmetry theorem, the Alexandrov-Serrin moving-plane technique, The Peletier-Serrin uniqueness theorem, and the Serrin integral of the calculus of variations. Serrin has also been noted for the elegance of his mathematical work and for the effectiveness of his teaching and collaborations.

CLASSIFICATION OF RADIAL SOLUTIONS ARISING IN THE STUDY OF THERMAL STRUCTURES WITH THERMAL EQUILIBRIUM OR NO FLUX AT THE BOUNDARY

American Mathematical Soc. The authors provide a complete classification of the radial solutions to a class of reaction diffusion equations arising in the study of thermal structures such as plasmas with thermal equilibrium or no flux at the boundary. In particular, their study includes rapidly growing nonlinearities, that is, those where an exponent exceeds the critical exponent. They describe the corresponding bifurcation diagrams and determine existence and uniqueness of ground states, which play a central role in characterizing those diagrams. They also provide information on the stability-unstability of the radial steady states.

TRAVELLING WAVES IN NONLINEAR DIFFUSION-CONVECTION REACTION

Birkhäuser This monograph has grown out of research we started in 1987, although the foundations were laid in the 1970's when both of us were working on our doctoral theses, trying to generalize the now classic paper of Oleinik, Kalashnikov and Chzhou on nonlinear degenerate diffusion. Brian worked under the guidance of Bert Peletier at the University of Sussex in Brighton, England, and, later at Delft University of Technology in the Netherlands on extending the earlier mathematics to include nonlinear convection; while Robert worked at Lomonosov State University in Moscow under the supervision of Anatolii Kalashnikov on generalizing the earlier mathematics to include nonlinear absorption. We first met at a conference held in Rome in 1985. In 1987 we met again in Madrid at the invitation of Ildefonso Diaz, where we were both staying at 'La Residencia'. As providence would have it, the University 'Complutense' closed down during this visit in response to student demonstrations, and, we were very much left to our own devices. It was natural that we should gravitate to a research topic of common interest. This turned out to be the characterization of the phenomenon of finite speed of propagation for nonlinear reaction-convection-diffusion equations. Brian had just completed some work on this topic for nonlinear diffusion-convection, while Robert had earlier done the same for nonlinear diffusion-absorption. There was no question but that we bundle our efforts on the general situation.

SINGULARITIES OF SOLUTIONS OF SECOND-ORDER QUASILINEAR EQUATIONS

CRC Press This text examines the singularity problem for solutions of elliptic and parabolic quasilinear equations of second order.

EVOLUTION EQUATIONS AND LAGRANGIAN COORDINATES

Walter de Gruyter The aim of the series is to present new and important developments in pure and applied mathematics. Well established in the community over two decades, it offers a large library of mathematics including several important classics. The volumes supply thorough and detailed expositions of the methods and ideas essential to the topics in question. In addition, they convey their relationships to other parts of mathematics. The series is addressed to advanced readers wishing to thoroughly study the topic. Editorial Board Lev Birbrair, Universidade Federal do Ceará, Fortaleza, Brasil Victor P. Maslov, Russian Academy of Sciences, Moscow, Russia Walter D. Neumann, Columbia University, New York, USA Markus J. Pflaum, University of Colorado, Boulder, USA Dierk Schleicher, Jacobs University, Bremen, Germany

PARTIAL DIFFERENTIAL EQUATIONS III

NONLINEAR EQUATIONS

Springer Science & Business Media The third of three volumes on partial differential equations, this is devoted to nonlinear PDE. It treats a number of equations of classical

continuum mechanics, including relativistic versions, as well as various equations arising in differential geometry, such as in the study of minimal surfaces, isometric imbedding, conformal deformation, harmonic maps, and prescribed Gauss curvature. In addition, some nonlinear diffusion problems are studied. It also introduces such analytical tools as the theory of L^p Sobolev spaces, Hölder spaces, Hardy spaces, and Morrey spaces, and also a development of Calderon-Zygmund theory and paradifferential operator calculus. The book is aimed at graduate students in mathematics, and at professional mathematicians with an interest in partial differential equations, mathematical physics, differential geometry, harmonic analysis and complex analysis

ASYMPTOTIC ANALYSIS AND THE NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS

CRC Press Integrates two fields generally held to be incompatible, if not downright antithetical, in 16 lectures from a February 1990 workshop at the Argonne National Laboratory, Illinois. The topics, of interest to industrial and applied mathematicians, analysts, and computer scientists, include singular per

WORLD CONGRESS OF NONLINEAR ANALYSTS '92

PROCEEDINGS OF THE FIRST WORLD CONGRESS OF NONLINEAR ANALYSTS, TAMPA, FLORIDA, AUGUST 19-26, 1992

Walter de Gruyter

INTEGRAL AND INTEGRODIFFERENTIAL EQUATIONS

CRC Press This collection of 24 papers, which encompasses the construction and the qualitative as well as quantitative properties of solutions of Volterra, Fredholm, delay, impulse integral and integro-differential equations in various spaces on bounded as well as unbounded intervals, will conduce and spur further research in this direction.

HANDBOOK OF DIFFERENTIAL EQUATIONS: ORDINARY DIFFERENTIAL EQUATIONS

Elsevier This handbook is the third volume in a series of volumes devoted to self contained and up-to-date surveys in the theory of ordinary differential equations, written by leading researchers in the area. All contributors have made an additional effort to achieve readability for mathematicians and scientists from other related fields so that the chapters have been made accessible to a wide audience. These ideas faithfully reflect the spirit of this multi-volume and hopefully it becomes a very useful tool for research, learning and teaching. This volume consists of seven chapters covering a variety of problems in ordinary differential equations. Both pure mathematical research and real world applications are reflected by the contributions to this volume. Covers a variety of problems in ordinary differential equations Pure mathematical and real world applications Written for mathematicians and scientists of many related fields

NONLINEAR ANALYSIS AND MICROLOCAL ANALYSIS - PROCEEDINGS OF THE INTERNATIONAL CONFERENCE AT THE NANKAI INSTITUTE OF MATHEMATICS

World Scientific These proceedings contain recent developments on the following important topics: variational problems, fully nonlinear elliptic equations, PDE from differential geometry, hamiltonian systems, nonlinear evolution equations and nonlinear microlocal analysis. Included are many interesting survey papers with the latest research materials.

CONVEX ANALYSIS AND NONLINEAR GEOMETRIC ELLIPTIC EQUATIONS

Springer Science & Business Media Investigations in modern nonlinear analysis rely on ideas, methods and problems from various fields of mathematics, mechanics, physics and other applied sciences. In the second half of the twentieth century many prominent, exemplary problems in nonlinear analysis were subject to intensive study and examination. The united ideas and methods of differential geometry, topology, differential equations and functional analysis as well as other areas of research in mathematics were successfully applied towards the complete solution of complex problems in nonlinear analysis. It is not possible to encompass in the scope of one book all concepts, ideas, methods and results related to nonlinear analysis. Therefore, we shall restrict ourselves in this monograph to nonlinear elliptic boundary value problems as well as global geometric problems. In order that we may examine these problems, we are provided with a fundamental vehicle: The theory of convex bodies and hypersurfaces. In this book we systematically present a series of centrally significant results obtained in the second half of the twentieth century up to the present time. Particular attention is given to profound interconnections between various divisions in nonlinear analysis. The theory of convex functions and bodies plays a crucial role because the ellipticity of differential equations is closely connected with the

local and global convexity properties of their solutions. Therefore it is necessary to have a sufficiently large amount of material devoted to the theory of convex bodies and functions and their connections with partial differential equations.

HOLOMORPHIC SPACES

Cambridge University Press Expository articles describing the role Hardy spaces, Bergman spaces, Dirichlet spaces, and Hankel and Toeplitz operators play in modern analysis.

FREE BOUNDARY PROBLEMS

THEORY AND APPLICATIONS

CRC Press This research note consists of selected contributions from the 1993 International Conference on "Free Boundary Problems: Theory and Applications." These represent coherent and high-level research in the field of free boundary problems. Topics include mean curvature flows, phase transitions and material sciences, fluid mechanics and combustion problems.

ANALYTIC INEQUALITIES AND THEIR APPLICATIONS IN PDES

Birkhäuser This book presents a number of analytic inequalities and their applications in partial differential equations. These include integral inequalities, differential inequalities and difference inequalities, which play a crucial role in establishing (uniform) bounds, global existence, large-time behavior, decay rates and blow-up of solutions to various classes of evolutionary differential equations. Summarizing results from a vast number of literature sources such as published papers, preprints and books, it categorizes inequalities in terms of their different properties.

ARBOREAL GROUP THEORY

PROCEEDINGS OF A WORKSHOP HELD SEPTEMBER 13-16, 1988

Springer Science & Business Media During the week of September 13, 1988 the Mathematical Sciences Research Institute hosted a four day workshop on Arboreal Group Theory. This volume is the product of that meeting. The program centered on the topic of the theory of groups acting on trees and the various applications to hyperbolic geometry. Topics include the theory of length functions, structure of groups acting freely on trees, spaces of hyperbolic structures and their compactifications, and moduli for tree actions.

INSTANTONS AND FOUR-MANIFOLDS

Springer Science & Business Media From the reviews of the first edition: "This book exposes the beautiful confluence of deep techniques and ideas from mathematical physics and the topological study of the differentiable structure of compact four-dimensional manifolds, compact spaces locally modeled on the world in which we live and operate... The book is filled with insightful remarks, proofs, and contributions that have never before appeared in print. For anyone attempting to understand the work of Donaldson and the applications of gauge theories to four-dimensional topology, the book is a must." #Science#1 "I would strongly advise the graduate student or working mathematician who wishes to learn the analytic aspects of this subject to begin with Freed and Uhlenbeck's book." #Bulletin of the American Mathematical Society#2

NONCOMMUTATIVE RINGS

Springer Science & Business Media This volume collects some of the survey lectures delivered at the Micro program on Noncommutative Rings held at MSRI, July 10-21, 1989. While the program was concerned with recent advances in ring theory, it also had as an important component lectures on related areas of mathematics where ring theory might be expected to have an impact. Thus, there are lectures of S. P. Smith on quantum groups and Marc Rieffel on algebraic aspects of quantum field theory. Martin Lorenz and Donald Passman consider in their lectures various aspects of crossed products: homological and K-theoretic to group actions. Kenneth Brown presents the "modern" theory of Noetherian rings and localization. These contributions as well as the others not presented here show that ring theory remains a vigorous and useful area. The planning and organization of the program were done by the undersigned and the late Robert Warfield. His illness prevented his attendance at the meeting. It is to him we dedicate this volume. The organizers wish

to extend their thanks to Irving Kaplansky, Director of MSRI, and the staff for all of their efforts in making this conference such a success. Susan Montgomery Lance Small vii
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 Joseph SOME RING THEORETIC TECHNIQUES AND OPEN PROBLEMS IN ENVELOPING ALGEBRAS. 27 . . . M. Lorenz CROSSED PRODUCTS: CHARACTERS, CYCLIC HOMOLOGY,
 AND GROTHENDIECK GROUPS 69

TIGHT AND TAUT SUBMANIFOLDS

Cambridge University Press First published in 1997, this book contains six in-depth articles on various aspects of the field of tight and taut submanifolds and concludes with an extensive bibliography of the entire field. The book is dedicated to the memory of Nicolaas H. Kuiper; the first paper is an unfinished but insightful survey of the field of tight immersions and maps written by Kuiper himself. Other papers by leading researchers in the field treat topics such as the smooth and polyhedral portions of the theory of tight immersions, taut, Dupin and isoparametric submanifolds of Euclidean space, taut submanifolds of arbitrary complete Riemannian manifolds, and real hypersurfaces in complex space forms with special curvature properties. Taken together these articles provide a comprehensive survey of the field and point toward several directions for future research.

GEOMETRIC ANALYSIS AND COMPUTER GRAPHICS

PROCEEDINGS OF A WORKSHOP HELD MAY 23-25, 1988

Springer Science & Business Media This volume derives from a workshop on differential geometry, calculus of variations, 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. Hanrahan, 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 being 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.

CURRENT TOPICS IN COMPLEX ALGEBRAIC GEOMETRY

Cambridge University Press The 1992/93 academic year at the Mathematical Sciences Research Institute was devoted to complex algebraic geometry. This volume collects survey articles that arose from this event, which took place at a time when algebraic geometry was undergoing a major change. The editors of the volume, Herbert Clemens and János Kollár, chaired the organizing committee. This book gives a good idea of the intellectual content of the special year and of the workshops. Its articles represent very well the change of direction and branching out witnessed by algebraic geometry in the last few years.

GALOIS GROUPS OVER ?

PROCEEDINGS OF A WORKSHOP HELD MARCH 23-27, 1987

Springer Science & Business Media This volume is the offspring of a week-long workshop on "Galois groups over \mathbb{Q} and related topics," which was held at the Mathematical Sciences Research Institute during the week March 23-27, 1987. The organizing committee consisted of Kenneth Ribet (chairman), Yasutaka Ihara, and Jean-Pierre Serre. The conference focused on three principal themes: 1. Extensions of \mathbb{Q} with finite simple Galois groups. 2. Galois actions on fundamental groups, nilpotent extensions of \mathbb{Q} arising from Fermat curves, and the interplay between Gauss sums and cyclotomic units. 3. Representations of $\text{Gal}(\mathbb{Q}/\mathbb{Q})$ with values in $\text{GL}(2)_j$ deformations and connections with modular forms. Here is a summary of the conference program: • G. Anderson: "Gauss sums, circular units and the simplex" • G. Anderson and Y. Ihara: "Galois actions on $\mathbb{Z}[1/p]$ and higher circular units" • D. Blasius: "Maass forms and Galois representations" • P. Deligne: "Galois action on $\mathbb{Z}[1/p]$ and Hodge analogue" • W. Feit: "Some Galois groups over number fields" • Y. Ihara: "Arithmetic aspect of Galois actions on $\mathbb{Z}[1/p]$ " - survey talk • U. Jannsen: "Galois cohomology of p -adic representations" • B. Matzat: - "Rationality criteria for Galois extensions" - "How to construct polynomials with Galois group M_{11} over \mathbb{Q} " • B. Mazur: "Deforming $\text{GL}(2)$ Galois representations" • K. Ribet: "Lowering the level of modular representations of $\text{Gal}(\mathbb{Q}/\mathbb{Q})$ " • J-P. Serre: - Introductory Lecture - "Degree 2 modular representations of $\text{Gal}(\mathbb{Q}/\mathbb{Q})$ " • J.

ALGEBRAIC TOPOLOGY AND ITS APPLICATIONS

Springer Science & Business Media In 1989-90 the Mathematical Sciences Research Institute conducted a program on Algebraic Topology and its Applications. The main areas of concentration were homotopy theory, K-theory, and applications to geometric topology, gauge theory, and moduli spaces. Workshops were conducted in these three areas. This volume consists of invited, expository articles on the topics studied during this program. They describe recent advances and point to possible new directions. They should prove to be useful references for researchers in Algebraic Topology and related fields, as well as to graduate students.

COMMUTATIVE ALGEBRA

PROCEEDINGS OF A MICROPROGRAM HELD JUNE 15-JULY 2, 1987

Springer Science & Business Media During late June and early July of 1987 a three week program (dubbed "microprogram") in Commutative Algebra was held at the Mathematical Sciences Research Institute at Berkeley. The intent of the microprogram was to survey recent major results and current trends in the theory of commutative rings, especially commutative Noetherian rings. There was enthusiastic international participation. The papers in this volume, some of which are expository, some strictly research, and some a combination, reflect the intent of the program. They give a cross-section of what is happening now in this area. Nearly all of the manuscripts were solicited from the speakers at the conference, and in most instances the manuscript is based on the conference lecture. The editors hope that they will be of interest and of use both to experts and neophytes in the field. The editors would like to express their appreciation to the director of MSRI, Professor Irving Kaplansky, who first suggested the possibility of such a conference and made the task of organization painless. We would also like to thank the IVISRI staff who were unfailingly efficient, pleasant, and helpful during the meeting, and the manager of MSRI, Arlene Baxter, for her help with this volume. Finally we would like to express our appreciation to David Mostardi who did much of the typing and put the electronic pieces together.