Solving Nonlinear Partial Differential Equations With Maple And Mathematica

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 Sobolev spaces, H lder 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
'Et moi ..., si j'avait su comment en reveru.r, One service mathematics has rendered the je n'y scrais point alle.' human race. It has put common sense back Jules Verne where it belongs, on the topmost shelf next to the dusty canister labelled 'discarded non The series is divergent; therefore we may be sense'. Eric T. Bell able to do something with it. o. Heaviside Mathematics is a tool for thought. A highly necessary tool in a world where both feedback and non linearities abound. Similarly, all kinds of parts of mathematics serve as tools for other parts and for other sciences. Applying a simple rewriting rule to the quote on the right above one finds such statements as: 'One service topology has rendered mathematical physics .. .'; 'One service logic has rendered com puter science .. .'; 'One service category theory has rendered mathematics .. .'. All arguably true. And all statements obtainable this way form part of the raison d'etre of this series.
Solving Nonlinear Partial Differential Equations with Maple and MathematicaSpringer Science & Business Media
This is an introduction to methods for solving nonlinear partial differential equations (NLPDEs). After the introduction of several PDEs drawn from science and engineering, the

reader is introduced to techniques used to obtain exact solutions of NPDEs. The chapters include the following topics: Compatibility, Differential Substitutions, Point and Contact Transformations, First Integrals, and Functional Separability. The reader is guided through these chapters and is provided with several detailed examples. Each chapter ends with a series of exercises illustrating the material presented in each chapter. The book can be used as a textbook for a second course in PDEs (typically found in both science and engineering programs) and has been used at the University of Central Arkansas for more than ten years.

On Differential Geometric Techniques for Solving Nonlinear Partial Differential Equations

Asymptotic Behavior of Solutions and Self-Similar Solutions

Nonlinear Partial Differential Equations and Free Boundaries: Elliptic equations

Numerical Methods for Nonlinear Partial Differential Equations

Applications to Biology and Engineering

The emphasis of the book is given in how to construct different types of solutions (exact, approximate analytical, numerical, graphical) of numerous nonlinear PDEs correctly, easily, and quickly. The reader can learn a wide variety of techniques and solve numerous nonlinear PDEs included and many other differential equations, simplifying and transforming the equations and solutions, arbitrary functions and parameters, presented in the book). Numerous comparisons and relationships between various types of solutions, different methods and approaches are provided, the results obtained in Maple and Mathematica, facilitates a deeper understanding of the subject. Among a big number of CAS, we choose the two systems, Maple and Mathematica, that are used worldwide by students, research mathematicians, scientists, and engineers. As in the our previous books, we propose the idea to use in parallel both systems, Maple and Mathematica, since in many research problems frequently it is required to compare independent results obtained by using different computer algebra systems, Maple and/or Mathematica, at all stages of the solution process. One of the main points (related to CAS) is based on the implementation of a whole solution method (e.g. starting from an analytical derivation of exact governing equations, constructing discretizations and analytical formulas of a numerical method, performing numerical procedure, obtaining various visualizations, and comparing the numerical solution obtained with other types of solutions considered in the book, e.g. with asymptotic solution).

In this Research Note the author brings together the body of known work and presents many recent results relating to nonlinear partial differential equations that give rise to a free boundary--usually the boundary of the set where the solution vanishes identically. The formation of such a boundary depends on an adequate balance between two of the terms of the equation that represent the particular characteristics of the phenomenon under consideration: diffusion, absorption, convection, evolution etc. These balances do not occur in the case of a linear equation or an arbitrary nonlinear equation. Their characterization is studied for several classes of nonlinear equations relating to applications such as chemical reactions, non-Newtonian fluids, flow through porous media and biological populations. In this first volume, the free boundary for nonlinear elliptic equations is discussed. A second volume dealing with parabolic and hyperbolic equations is in preparation.

This book primarily concerns quasilinear and semilinear elliptic and parabolic partial differential equations, inequalities, and systems. The exposition quickly leads general theory to analysis of concrete equations, which have specific applications in such areas as electrically (semi-) conductive media, modeling of biological systems, and mechanical engineering. Methods of Galerkin or of Rothe are exposed in a large generality.

The description of many interesting phenomena in science and engineering leads to infinite-dimensional minimization or evolution problems that define nonlinear partial differential equations. While the development and analysis of numerical methods for linear partial differential equations is nearly complete, only few results are available in the case of nonlinear equations. This monograph devises numerical methods for nonlinear model problems arising in the mathematical description of phase transitions, large bending problems, image processing, and inelastic material behavior. For each of these problems the underlying mathematical model is discussed, the essential analytical properties are explained, and the proposed numerical method is rigorously analyzed. The practicality of the algorithms is illustrated by means of short implementations.

Separation of Variables and Exact Solutions to Nonlinear PDEs

An Introduction to Nonlinear Partial Differential Equations

Nonlinear Partial Differential Equations and Their Applications

Mathematics in Science and Engineering: A Series of Monographs and Textbooks

An Introduction

Nonlinear Ordinary Differential Equations in Transport Processes

New to the Second Edition More than 1,000 pages with over 1,500 new first-, second-, third-, fourth-, and higher-order nonlinear equations with solutions Parabolic, hyperbolic, elliptic, and other systems of equations with solutions Some exact methods and transformations Symbolic and numerical methods for solving nonlinear PDEs with MapleTM, Mathematica®, and MATLAB® Many new illustrative examples and tables A large list of references consisting of over 1,300 sources To accommodate different mathematical backgrounds, the authors avoid wherever possible the use of special terminology. They outline the methods in a schematic, simplified manner and arrange the material in increasing order of complexity.

This book contains the written versions of lectures delivered since 1997 in the well-known weekly seminar on Applied Mathematics at the Collège de France in Paris, directed by Jacques-Louis Lions. It is the 14th and last of the series, due to the recent and untimely death of Professor Lions. The texts in this volume deal mostly with various aspects of the theory of nonlinear partial differential equations. They present both theoretical and applied results in many fields of growing importance such as Calculus of variations and optimal control, optimization, system theory and control, operations research, fluids and continuum mechanics, nonlinear dynamics, meteorology and climate, homogenization and material science, numerical analysis and scientific computations The book is of interest to everyone from postgraduate, who wishes to follow the most recent progress in these fields.

The maximum principle induces an order structure for partial differential equations, and has become an important tool in nonlinear analysis. This book is the first of two volumes to systematically introduce the applications of order structure in certain nonlinear partial differential equation problems.The maximum principle is revisited through the use of the Krein-Rutman theorem and the principal

eigenvalues. Its various versions, such as the moving plane and sliding plane methods, are applied to a variety of important problems of current interest. The upper and lower solution method, especially its weak version, is presented in its most up-to-date form with enough generality to cater for wide applications. Recent progress on the boundary blow-up problems and their applications are discussed, as well as some new symmetry and Liouville type results over half and entire spaces. Some of the results included here are published for the first time.

Non-Linear Partial Differential Equations

Three Numerical Schemes for Solving Nonlinear Partial Differential Equations

A Symposium on Methods of Solution

A Unified Approach for Solving Nonlinear Partial Differential Equations in Chemical Engineering Applications

Nonlinear Partial Differential Equations in Engineering

This volume consists of the proceedings of the conference on Physical Mathematics and Nonlinear Partial Differential Equations held at West Virginia University in Morgantown. It describes some work dealing with weak limits of solutions to nonlinear systems of partial differential equations.

In recent years, the Fourier analysis methods have expereinced a growing interest in the study of partial differential equations. In particular, those techniques based on the Littlewood-Paley decomposition have proved to be very efficient for the study of evolution equations. The present book aims at presenting self-contained, state- of- the- art models of those techniques with applications to different classes of partial differential equations: transport, heat, wave and Schrödinger equations. It also offers more sophisticated models originating from fluid mechanics (in particular the incompressible and compressible Navier-Stokes equations) or general relativity. It is either directed to anyone with a good undergraduate level of knowledge in analysis or useful for experts who are eager to know the benefit that one might gain from Fourier analysis when dealing with nonlinear partial differential equations.

Partial Differential Equations presents a balanced and comprehensive introduction to the concepts and techniques required to solve problems containing unknown functions of multiple variables. While focusing on the three most classical partial differential equations (PDEs)—the wave, heat, and Laplace equations—this detailed text also presents a broad practical perspective that merges mathematical concepts with real-world application in diverse areas including molecular structure, photon and electron interactions, radiation of electromagnetic waves, vibrations of a solid, and many more. Rigorous pedagogical tools aid in student comprehension; advanced topics are introduced frequently, with minimal technical jargon, and a wealth of exercises reinforce vital skills and invite additional self-study. Topics are presented in a logical progression, with major concepts such as wave propagation, heat and diffusion, electrostatics, and quantum mechanics placed in contexts familiar to students of various fields in science and engineering. By understanding the properties and applications of PDEs, students will be equipped to better analyze and interpret central processes of the natural world.

PETSc for Partial Differential Equations: Numerical Solutions in C and Python

Non-linear Partial Differential Equations

Nonlinear Systems of Partial Differential Equations
Nonlinear Partial Differential Equations
Maple and Mathematica

A massive transition of interest from solving linear partial differential equations to solving nonlinear ones has taken place during the last two or three decades. The availability of better computers has often made numerical experimentations progress faster than the theoretical understanding of nonlinear partial differential equations. The three most important nonlinear phenomena observed so far both experimentally and numerically, and studied theoretically in connection with such equations have been the solitons, shock waves and turbulence or chaotical processes. In many ways, these phenomena have presented increasing difficulties in the mentioned order. In particular, the latter two phenomena necessarily lead to nonclassical or generalized solutions for nonlinear partial differential equations.

Nonlinear Partial Differential Equations in Engineering discusses methods of solution for nonlinear partial differential equations, particularly by using a unified treatment of analytic and numerical procedures. The book also explains analytic methods, approximation methods (such as asymptotic processes, perturbation procedures, weighted residual methods), and specific numerical procedures associated with these equations. The text presents exact methods of solution including the quasi-linear theory, the Poisson-Euler-Darboux equation, a general solution for anisentropic flow, and other solutions obtained from ad hoc assumptions. The book explores analytic methods such as an ad hoc solution from magneto-gas dynamics. Noh and Protter have found the Lagrange formulation to be a convenient vehicle for obtaining "soft" solutions of the equations of gas dynamics. The book notes that developing solutions in two and three dimensions can be achieved by employing Lagrangian coordinates. The book explores approximate methods that use analytical procedures to obtain solutions in the form of functions approximating solutions of nonlinear problems. Approximate methods include integral equations, boundary theory, maximum operation, and equations of elliptic types. The book can serve and benefit mathematicians, students of, and professors of calculus, statistics, or advanced mathematics.

In the history of mathematics there are many situations in which cal- lations were performed incorrectly for important practical applications. Let us look at some examples, the history of computing the number ? began in Egypt and Babylon about 2000 years BC, since then many mathematicians have calculated ? (e. g. , Archimedes, Ptolemy, Vi` ete, etc.). The ?rst formula for computing decimal digits of ? was disc- ered by J. Machin (in 1706), who was the ?rst to correctly compute 100 digits of ?. Then many people used his method, e. g. , W. Shanks calculated ? with 707 digits (within 15 years), although due to mistakes only the ?rst 527 were correct. For the next examples, we can mention the history of computing the ?ne-structure constant ? (that was ?rst discovered by A. Sommerfeld), and the mathematical tables, exact - lutions, and formulas, published in many mathematical textbooks, were not veri?ed rigorously [25]. These errors could have a large e?ect on results obtained by engineers. But sometimes, the solution of such problems required such techn- ogy that was not available at that time. In modern mathematics there exist computers that can perform various mathematical operations for which humans are incapable. Therefore the computers can be used to verify the results obtained by humans, to discovery new results, to - provetheresultsthatahumancanobtainwithoutanytechnology. With respectto our example of computing?, we can mention that recently (in 2002) Y. Kanada, Y. Ushiro, H. Kuroda, and M.

During the last few years, several fairly systematic nonlinear theories of generalized solutions of rather arbitrary nonlinear partial differential equations have emerged. The aim of this volume is to offer the reader a sufficiently detailed introduction to two of these recent nonlinear theories which have so far contributed most to the study of generalized solutions of nonlinear partial differential equations, bringing the reader to the level of ongoing research. The essence of the two nonlinear theories presented in this volume is the observation that much of the mathematics concerning existence, uniqueness regularity, etc., of generalized solutions for nonlinear partial differential equations can be reduced to elementary calculus in Euclidean spaces, combined with elementary algebra in quotient rings of families of smooth functions on Euclidean spaces, all of that joined by certain asymptotic interpretations. In this way, one avoids the complexities and difficulties of the customary functional analytic methods which would involve sophisticated topologies on various function spaces. The result is a rather elementary yet powerful and far-reaching method which can, among others, give generalized solutions to linear and nonlinear partial differential equations previously unsolved or even unsolvable within distributions or hyperfunctions. Part 1 of the volume discusses the basic limitations of the linear theory of distributions when dealing with linear or nonlinear partial differential equations, particularly the impossibility and degeneracy results. Part 2 examines the way Colombeau constructs a nonlinear theory of generalized functions and then succeeds in proving quite impressive existence, uniqueness, regularity, etc., results concerning generalized solutions of large classes of linear and nonlinear partial differential equations. Finally, Part 3 is a short presentation of the nonlinear theory of Rosinger, showing its connections with Colombeau's theory, which it contains as a particular case.

Fourier Analysis and Nonlinear Partial Differential Equations

Solving Nonlinear Partial Differential Equations on a CRAY X-MP

Nonlinear Equations

Analytical Techniques for Solving Nonlinear Partial Differential Equations

Handbook of Nonlinear Partial Differential Equations, Second Edition

The Portable, Extensible Toolkit for Scientific Computation (PETSc) is an open-source library of advanced data structures and methods for solving linear and nonlinear equations and for managing discretizations. This book uses these modern numerical tools to demonstrate how to solve nonlinear partial differential equations (PDEs) in parallel. It starts from key mathematical concepts, such as Krylov space methods, preconditioning, multigrid, and Newton's method. In PETSc these components are composed at run time into fast solvers. Discretizations are introduced from the beginning, with an emphasis on finite difference and finite element methodologies. The example C programs of the first 12 chapters, listed on the inside front cover, solve (mostly) elliptic and parabolic PDE problems. Discretization leads to large, sparse, and generally nonlinear systems of algebraic equations. For such problems, mathematical solver concepts are explained and illustrated through the examples, with *sufficient context to speed further development. PETSc for Partial Differential Equations addresses both discretizations and fast solvers for PDEs, emphasizing practice more than theory. Well-structured examples lead to run-time choices that result in high solver performance and parallel scalability. The last two chapters build on the reader's understanding of fast solver concepts when applying the Firedrake Python finite element solver library. This textbook, the first to cover PETSc programming for nonlinear PDEs, provides an on-ramp for graduate students and researchers to a major area of high-performance computing for science and engineering. It is suitable as a supplement for courses in scientific computing or numerical methods for differential equations.*

Nonlinear differential equations are ubiquitous in computational science and engineering modeling, fluid dynamics, finance, and quantum mechanics, among other areas. Nowadays, solving challenging problems in an industrial setting requires a continuous interplay between the theory of such systems and the development and use of sophisticated computational methods that can guide and support the theoretical findings via practical computer simulations. Owing to the impressive development in computer technology and the introduction of fast numerical methods with reduced algorithmic and memory complexity, rigorous solutions in many applications have become possible. This book collects research papers from leading world experts in the field, highlighting ongoing trends, progress, and open problems in this critically important area of mathematics.

Contents: Direct and Inverse Diffraction by Periodic Structures (G Bao)Weak Flow of H-Systems (Y-M Chen)Strongly Compact Attractor for Dissipative Zakharov Equations (B-L Guo et al.)C∞-Solutions of Generalized Porous Medium Equations (M Ôtani & Y Sugiyama)Cauchy Problem for Generalized IMBq Equation (G-W Chen & S-B Wang)Inertial Manifolds for a Nonlocal Kuramoto-Sivashinsky Equation (J-Q Duan et al.)Weak Solutions of the Generalized Magnetic Flow Equations (S-H He & Z-D Dai)The Solution of Hammerstein Integral Equation Without Coercive Conditions (Y-L Shu)Global Behaviour of the Solution of Nonlinear Forest Evolution Equation (D-J Wang)Uniqueness of Generalized Solutions for Semiconductor Equations (J-S Xing & Y Hu)On the Vectorial Hamilton-Jacobi System (B-S Yan)An Integrable Hamiltonian System Associated with cKdV Hierarchy (J-S Zhang et al.)and other papers Readership: Mathematicians. Keywords:Diffraction;Weak Flow;Zakharov Equations;Porous Medium Equations;Cauchy Problem;IMBq Equation;Kuramoto-Sivashinsky Equation;Magnetic Flow Equations;Hammerstein Integral Equation;Nonlinear Forest Evolution Equation;Uniqueness;Generalized Solutions;Semiconductor Equations;Hamiltonâ��Jacobi System;Hamiltonian System;cKdV Hierarchy

This textbook presents the essential parts of the modern theory of nonlinear partial differential equations, including the calculus of variations. After a short review of results in real and functional analysis, the author introduces the main mathematical techniques for solving both semilinear and quasilinear elliptic PDEs, and the associated boundary value problems. Key topics include infinite *dimensional fixed point methods, the Galerkin method, the maximum principle, elliptic regularity, and the calculus of variations. Aimed at graduate students and researchers, this textbook contains numerous examples and exercises and provides several comments and suggestions for further study.*

Solving Nonlinear Partial Differential Equations with Maple and Mathematica

Order Structure and Topological Methods in Nonlinear Partial Differential Equations

Nonlinear Partial Differential Equations for Scientists and Engineers

Symmetry and Ad-hoc Methods for Solving Nonlinear Partial Differential Equations

An Algebraic View of Generalized Solutions

An Introduction to Nonlinear Partial Differential Equations is a textbook on nonlinear partial differential equations. It is technique oriented with an emphasis on applications and is designed to build a foundation for studying advanced treatises in the field. The Second Edition features an updated bibliography as well as an increase in the number of exercises. All software references have been updated with the latest version of MATLAB@, the corresponding graphics have also been updated using MATLAB@. An increased focus on hydrogeology...

Separation of Variables and Exact Solutions to Nonlinear PDEs is devoted to describing and applying methods of generalized and functional separation of variables used to find exact solutions of nonlinear partial differential equations (PDEs). It also presents the direct method of symmetry reductions and its more general version. In addition, the authors describe the differential constraint method, which generalizes many other exact methods. The presentation involves numerous examples of utilizing the methods to find exact solutions to specific nonlinear equations of mathematical physics. The equations of heat and mass transfer, wave theory, hydrodynamics, nonlinear optics, combustion theory, chemical technology, biology, and other disciplines are studied. Particular attention is paid to nonlinear equations of a reasonably general form that depend on one or several arbitrary functions. Such equations are the most difficult to analyze. Their exact solutions are of significant practical interest, as they are suitable to assess the accuracy of various approximate analytical and numerical methods. The book contains new material previously unpublished in monographs. It is intended for a broad audience of scientists, engineers, instructors, and students specializing in applied and computational mathematics, theoretical physics, mechanics, control theory, chemical engineering science, and other disciplines. Individual sections of the book and examples are suitable for lecture courses on partial differential equations, equations of mathematical physics, and methods of mathematical physics, for delivering special courses and for practical training.

This expanded and revised second edition is a comprehensive and systematic treatment of linear and nonlinear partial differential equations and their varied applications. Building upon the successful material of the first book, this edition contains updated modern examples and applications from diverse

fields. Methods and properties of solutions, along with their physical significance, help make the book more useful for a diverse readership. The book is an exceptionally complete text/reference for graduates, researchers, and professionals in mathematics, physics, and engineering.

Linear and nonlinear systems of equations are the basis for many, if not most, of the models of phenomena in science and engineering, and their efficient numerical solution is critical to progress in these areas. This is the first book to be published on nonlinear equations since the mid-1980s. Although it stresses recent developments in this area, such as Newton-Krylov methods, considerable material on linear equations has been incorporated. This book focuses on a small number of methods and treats them in depth. The author provides a complete analysis of the conjugate gradient and generalized minimum residual iterations as well as recent advances including Newton-Krylov methods, incorporation of inexactness and noise into the analysis, new proofs and implementations of Broyden's method, and globalization of inexact Newton methods. Examples, methods, and algorithmic choices are based on applications to infinite dimensional problems such as partial differential equations and integral equations. The analysis and proof techniques are constructed with the infinite dimensional setting in mind and the computational examples and exercises are based on the MATLAB environment.

Maximum principles and applications

Generalized Solutions of Nonlinear Partial Differential Equations

Recent Developments in the Solution of Nonlinear Differential Equations

Nonlinear Elliptic Partial Differential Equations

Physical Mathematics and Nonlinear Partial Differential Equations

This work will serve as an excellent first course in modern analysis. The main focus is on showing how self-similar solutions are useful in studying the behavior of solutions of nonlinear partial differential equations, especially those of parabolic type. This textbook will be an excellent resource for self-study or classroom use.

The aim of this book is to put together all the results that are known about the existence of formal, holomorphic and singular solutions of singular non linear partial differential equations.

Nonlinear Partial Differential Equations: A Symposium on Methods of Solution is a collection of papers presented at the seminar on methods of solution for nonlinear partial differential equations, held at the University of Delaware, Newark, Delaware on December 27-29, 1965. The sessions are divided into four Symposia: Analytic Methods, Approximate Methods, Numerical Methods, and Applications. Separating 19 lectures into chapters, this book starts with a presentation of the methods of similarity analysis, particularly considering the merits, advantages and disadvantages of the methods. The subsequent chapters describe the fundamental ideas behind the methods for the solution of partial differential equation derived from the theory of dynamic programming and from finite systems of ordinary differential equations. These topics are followed by reviews of the principles to the lubrication approximation and compressible boundary-layer flow computation. The discussion then shifts to several applications of nonlinear partial differential equations, including in electrical problems, two-phase flow, hydrodynamics, and heat transfer. The remaining chapters cover other solution methods for partial differential equations, such as the synergetic approach. This book will prove useful to applied mathematicians, physicists, and engineers.

The purpose of the book is to provide research workers in applied mathematics, physics, and engineering with practical geometric methods for solving systems of nonlinear partial differential equations. The first two chapters provide an introduction to the more or less classical results of Lie dealing with symmetries and similarity solutions. The results, however, are presented in the context of contact manifolds rather than the usual jet bundle formulation and provide a number of new conclusions. The remaining three chapters present essentially new methods of solution that are based on recent publications of the authors'. The text contains numerous fully worked examples so that the reader can fully appreciate the power and scope of the new methods. In effect, the problem of solving systems of nonlinear partial differential equations is reduced to the problem of solving families of autonomous ordinary differential equations. This allows the graphs of solutions of the system of partial differential equations to be realized as certain leaves of a foliation of an appropriately defined contact manifold. In fact, it is often possible to obtain families of solutions whose graphs foliate an open subset of the contact manifold. These ideas are extended in the final chapter by developing the theory of transformations that map a foliation of a contact manifold onto a foliation. This analysis gives rise to results of surprising depth and practical significance. In particular, an extended Hamilton-Jacobi method for solving systems of partial differential equations is obtained.

Nonlinear Partial Differential Equations and Applications

Nonlinear Partial Differential Equations with Applications

Systems of Nonlinear Partial Differential Equations

Nonlinear Partial Differential Equations in Engineering

A Problem Solving Approach for Mathematics

In this volume are twenty-eight papers from the Conference on Nonlinear Partial Differential Equationsin Engineering and Applied Science, sponsored by the Office of Naval Research and held at the Universityof Rhode Island in June, 1979. Included are contributions from an international group of distinguishedmathematicians, scientists, and engineers coming from a wide variety of disciplines and having a commoninterest in the application of mathematics, particularly nonlinear partial differential equations, to realworld problems.The subject matter ranges from almost purely mathematical topics in numerical analysis and bifurcationtheory to a host of practical applications that involve nonlinear partial differential equations, suchas fluid dynamics, nonlinear waves, elasticity, viscoelasticity, hyperelasticity, solitons, metallurgy, shocklessairfoil design, quantum fields, and Darcy's law on flows in porous media.Non/inear Partial Differential Equations in Engineering and Applied Science focuses on a variety oftopics of specialized, contemporary concern to mathematicians, physical and biological scientists, andengineers who work with phenomena that can be described by nonlinear partial differential equations.

College de France Seminar

Nonlinear Partial Differential Equations in Engineering and Applied Science

Singular Nonlinear Partial Differential Equations

Partial Differential Equations

Partial Differential Equations III