Imme van den Berg

Nonstandard Asymptotic Analysis

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Nonstandard Asymptotic Analysis:

   Nonstandard Asymptotic Analysis Imme van den Berg,2006-11-15 This research monograph considers the subject of asymptotics from a nonstandard view point It is intended both for classical asymptoticists they will discover a new approach to problems very familiar to them and for nonstandard analysts but includes topics of general interest like the remarkable behaviour of Taylor polynomials of elementary functions Noting that within nonstandard analysis small large and domain of validity of asymptotic behaviour have a precise meaning a nonstandard alternative to classical asymptotics is developed Special emphasis is given to applications in numerical approximation by convergent and divergent expansions in the latter case a clear asymptotic answer is given to the problem of optimal approximation which is valid for a large class of functions including many special functions The author s approach is didactical The book opens with a large introductory chapter which can be read without much knowledge of nonstandard analysis Here the main features of the theory are presented via concrete examples with many numerical and graphic illustrations N   <u>Introduction to Asymptotics</u> Douglas Samuel Jones,1997 A very attractive feature of the book is the numerous examples illustrating the methods A fine collection of exercises enriches each chapter challenging the reader to check his progress in understanding the methods Mathematical ReviewsAs an introductory book to asymptotics with chapters on uniform asymptotics and exponential asymptotics this book clearly fills a gap it has a friendly size and contains many convincing numerical examples and interesting exercises Hence I recommend the book to everyone who works in asymptotics SIAM 1998 it is an excellent book that contains interesting results and methods for the researchers It will be useful for the students interested in analysis and lectures on asymptotic methods The reviewer recommends the book to everyone who is interested in analysis engineers and specialists in ODE sActa Sci Math Szeged 1999   **Introduction To Asymptotics - A Treatment Using Nonstandard Analysis** Douglas S Jones,1997-01-16 Many branches of science and engineering involve applications of mathematical analysis An important part of applied analysis is asymptotic approximation which is therefore an active area of research with new methods and publications being found constantly This book gives an introduction to the subject sufficient for scientists and engineers to grasp the fundamental techniques both those which have been known for some time and those which have been discovered more recently The asymptotic approximation of both integrals and differential equations is discussed and the discussion includes hyperasymptotics as well as uniform asymptotics There are many numerical examples to illustrate the relation between theory and practice Exercises in the chapters enable the book to be used as a text for an introductory course

   Nonstandard Analysis, Axiomatically Vladimir Kanovei,Michael Reeken,2013-03-09 In the aftermath of the discoveries in foundations of mathematiC s there was surprisingly little effect on mathematics as a whole If one looks at stan dard textbooks in different mathematical disciplines especially those closer to what is referred to as applied mathematics there is little trace of those developments outside of mathematical logic and model theory But it seems fair to say that there is a

widespread conviction that the principles embodied in the Zermelo Fraenkel theory with Choice ZFC are a correct description of the set theoretic underpinnings of mathematics In most textbooks of the kind referred to above there is of course no discussion of these matters and set theory is assumed informally although more advanced principles like Choice or sometimes Replacement are often mentioned explicitly This implicitly fixes a point of view of the mathemat ical universe which is at odds with the results in foundations For example most mathematicians still take it for granted that the real number system is uniquely determined up to isomorphism which is a correct point of view as long as one does not accept to look at unnatural interpretations of the membership relation   *An Asymptotic Analysis for a Nonstandard Cahn-Hilliard System with Viscosity* ,2011   Nonstandard Analysis and Its Applications Nigel Cutland,1988-09-30 This textbook is an introduction to non standard analysis and to its many applications Non standard analysis NSA is a subject of great research interest both in its own right and as a tool for answering questions in subjects such as functional analysis probability mathematical physics and topology The book arises from a conference held in July 1986 at the University of Hull which was designed to provide both an introduction to the subject through introductory lectures and surveys of the state of research The first part of the book is devoted to the introductory lectures and the second part consists of presentations of applications of NSA to dynamical systems topology automata and orderings on words the non linear Boltzmann equation and integration on non standard hulls of vector lattices One of the book s attractions is that a standard notation is used throughout so the underlying theory is easily applied in a number of different settings Consequently this book will be ideal for graduate students and research mathematicians coming to the subject for the first time and it will provide an attractive and stimulating account of the subject   The Strength of Nonstandard Analysis Imme van den Berg,Vitor Neves,2007-12-03 Nonstandard Analysis enhances mathematical reasoning by introducing new ways of expression and deduction Distinguishing between standard and nonstandard mathematical objects its inventor the eminent mathematician Abraham Robinson settled in 1961 the centuries old problem of how to use infinitesimals correctly in analysis Having also worked as an engineer he saw not only that his method greatly simplified mathematically proving and teaching but also served as a powerful tool in modelling analyzing and solving problems in the applied sciences among others by effective rescaling and by infinitesimal discretizations This book reflects the progress made in the forty years since the appearance of Robinson s revolutionary book Nonstandard Analysis in the foundations of mathematics and logic number theory statistics and probability in ordinary partial and stochastic differential equations and in education The contributions are clear and essentially self contained   *Nonstandard Analysis in Practice* Francine Diener,Marc Diener,2012-12-06 This book introduces the graduate mathematician and researcher to the effective use of nonstandard analysis NSA It provides a tutorial introduction to this modern theory of infinitesimals followed by nine examples of applications including complex analysis stochastic differential equations differential geometry topology probability integration and asymptotics It ends with remarks on teaching with

infinitesimals   Nonstandard Analysis Alain Robert,2003-01-01 This concise text is based on the axiomatic internal set theory approach Theoretical topics include idealization standardization and transfer real numbers and numerical functions continuity differentiability and integration Applications cover invariant means approximation of functions differential equations more Exercises hints and solutions Mathematics teaching at its best European Journal of Physics 1988 edition

   Introduction to Nonstandard Analysis Vladislav Ėlievich Li⬚a⬚nt⬚s⬚e,Taras Kudryk,1997 In Nonstandard Analysis briefly NSA there was solved the old problem of substantiation of differential and integral calculus with application of infinitesimals This problem seemed to be unsolvable from the times of Leibniz and Euler NSA has changed the face of the whole of Mathematics it is a new mathematical outlook It is necessary to emphasise that NSA does not object does not contradict to the Ordinary Mathematics briefly OM NSA extends supplements OM This means that all objects which exist in OM exist in NSA too and all statements which are true in OM retain to be true in NSA NSA often simplifies OM and makes it more transparent NSA states new mathematical theorems and problems In fact NSA is a work of the only scientist namely A Robinson 1961 His approach to NSA was constructive In this book we have chosen an axiomatic approach due to E Nelson 1977 which is less difficult to learn and apply Our exposition contrary to that of Nelson is not always strictly logical Our aim is only some popularization of NSA and not its foundations The text includes some own results of authors Good supplements to this book are D R Die Lut Dav Alb Cut   Analysis of Means in Some Non-standard Situations J. B. Dijkstra (mathématicien),1988   **Bulletin of the Belgian Mathematical Society, Simon Stevin** ,2006   **Siberian Mathematical Journal** ,1992   Calculus of Variations and Partial Differential Equations Stefan Hildebrandt,1988   **The Journal of Symbolic Logic** Alonzo Church,Cooper Harold Langford,1981 Includes lists of members   Dynamic Bifurcations Eric Benoit,1991 Dynamical Bifurcation Theory is concerned with the phenomena that occur in one parameter families of dynamical systems usually ordinary differential equations when the parameter is a slowly varying function of time During the last decade these phenomena were observed and studied by many mathematicians both pure and applied from eastern and western countries using classical and nonstandard analysis It is the purpose of this book to give an account of these developments The first paper by C Lobry is an introduction the reader will find here an explanation of the problems and some easy examples this paper also explains the role of each of the other paper within the volume and their relationship to one another CONTENTS C Lobry Dynamic Bifurcations T Erneux E L Reiss L J Holden M Georgiou Slow Passage through Bifurcation and Limit Points Asymptotic Theory and Applications M Canalis Durand Formal Expansion of van der Pol Equation Canard Solutions are Gevrey V Gautheron E Isambert Finitely Differentiable Ducks and Finite Expansions G Wallet Overstability in Arbitrary Dimension F Diener M Diener Maximal Delay A Fruchard Existence of Bifurcation Delay the Discrete Case C Baesens Noise Effect on Dynamic Bifurcations the Case of a Period doubling Cascade E Benoit Linear Dynamic Bifurcation with Noise A Delcroix A Tool for the Local Study of Slow fast Vector Fields the Zoom S N Samborski

Rivers from the Point ofView of the Qualitative Theory F Blais Asymptotic Expansions of Rivers I P van den Berg Macroscopic Rivers **Functional-analytic Methods for Partial Differential Equations** Hiroshi Fujita,Teruo Ikebe,S. T. Kuroda,1990 *Mathematica Japonicae* ,1997 **Mathematical Reviews** ,2004 **Memorandum from Institute of Economic Research, Faculty of Economics, University of Groningen** ,1974

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