THE SPLITTING EXTRAPOLATION METHOD

A New Technique in Numerical Solution of Multidimensional Problems

C. B. Liem
T. Lü
T. M. Shih

Splitting Extrapolation Method

Richard Bailey

Splitting Extrapolation Method:

    The Splitting Extrapolation Method C. B. Liem,Tao L⎕,T. M. Shih,1995 The splitting extrapolation method is a newly developed technique for solving multidimensional mathematical problems It overcomes the difficulties arising from Richardson s extrapolation when applied to these problems and obtains higher accuracy solutions with lower cost and a high degree of parallelism The method is particularly suitable for solving large scale scientific and engineering problems This book presents applications of the method to multidimensional integration integral equations and partial differential equations It also gives an introduction to combination methods which are relevant to splitting extrapolation The book is intended for those who may exploit these methods and it requires only a basic knowledge of numerical analysis <u>Iterative Splitting Methods for Differential Equations</u> Juergen Geiser,2011-06-01 Iterative Splitting Methods for Differential Equations explains how to solve evolution equations via novel iterative based splitting methods that efficiently use computational and memory resources It focuses on systems of parabolic and hyperbolic equations including convection diffusion reaction equations heat equations and wave equations In the theoretical part of the book the author discusses the main theorems and results of the stability and consistency analysis for ordinary differential equations He then presents extensions of the iterative splitting methods to partial differential equations and spatial and time dependent differential equations The practical part of the text applies the methods to benchmark and real life problems such as waste disposal elastics wave propagation and complex flow phenomena The book also examines the benefits of equation decomposition It concludes with a discussion on several useful software packages including r3t and FIDOS Covering a wide range of theoretical and practical issues in multiphysics and multiscale problems this book explores the benefits of using iterative splitting schemes to solve physical problems It illustrates how iterative operator splitting methods are excellent decomposition methods for obtaining higher order accuracy

    Global Extrapolation of a First Order Splitting Method Jan G. Verwer,H. B. de Vries,1983 *Parallel Multilevel Methods* Gerhard Zumbusch,2012-12-06 Numerical simulation promises new insight in science and engineering In ad dition to the traditional ways to perform research in science that is laboratory experiments and theoretical work a third way is being established numerical simulation It is based on both mathematical models and experiments con ducted on a computer The discipline of scientific computing combines all aspects of numerical simulation The typical approach in scientific computing includes modelling numerics and simulation see Figure l Quite a lot of phenomena in science and engineering can be modelled by partial differential equations PDEs In order to produce accurate results complex models and high resolution simulations are needed While it is easy to increase the precision of a simulation the computational cost of doing so is often prohibitive Highly efficient simulation methods are needed to overcome this problem This includes three building blocks for computational efficiency discretisation solver and computer Adaptive mesh refinement high order and sparse grid methods lead to discretisations of partial differential equations with a low number of degrees of freedom Multilevel iterative solvers

decrease the amount of work per degree of freedom for the solution of discretised equation systems Massively parallel computers increase the computational power available for a single simulation **Domain Decomposition Methods in Sciences and Engineering** R. Glowinski,1997-04-30 Domain Decomposition Methods are receiving significant attention in scientific and engineering computing They provide a broad class of effective numerical methods for the solution of large scale mathematical physical problems from sciences and engineering This book contains invited and contributed papers from the 8th Domain Decomposition Methods Conference The topics addressed range from basic theoretical research to industrial applications basic algorithms multilevel methods parallel computing transport wave and flow problems Applications include problems from fluid and structural mechanics electromagnetics and petroleum engineering **Scale Space and Variational Methods in Computer Vision** Xue-Cheng Tai,Knut Morken,Marius Lysaker,Knut-Andreas Lie,2009-05-24 This book contains 71 original scienti c articles that address state of the art researchrelatedto scale space and variationalmethods for image processing and computer vision Topics covered in the book range from mathematical analysis of both established and new models fast numerical methods image analysis segmentation registration surface and shape construction and processing to real applications in medical imaging and computer vision The ideas of scale spaceandvariationalmethodsrelatedtopartialdi erentialequationsarecentral concepts The papers re ect the newest developments in these elds and also point to the latest literature All the papers were submitted to the Second International Conference on Scale Space and Variational Methods in Computer Vision which took place in Voss Norway during June 1 5 2009 The papers underwent a peer review process similar to that of high level journals in the eld We thank the authors the Scienti c Committee the Program Committee and the reviewers for their hard work and helpful collaboration Their contribution has been crucial for the e cient processing of this book and for the success of the conference **Applied Mathematics Reviews, Volume 1** George A Anastassiou,2000-06-09 Applied mathematics connects the mathematical theory to the reality by solving real world problems and shows the power of the science of mathematics greatly improving our lives Therefore it plays a very active and central role in the scientific world This volume contains 14 high quality survey articles incorporating original results and describing the main research activities of contemporary applied mathematics written by top people in the field The articles have been written in review style so that the researcher can have a quick and thorough view of what is happening in the main subfields of applied mathematics *Large-Scale Scientific Computing* Ivan Lirkov,Svetozar Margenov,2008-03-28 This book constitutes the thoroughly refereed post conference proceedings of the 6th International Conference on Large Scale Scientific Computations LSSC 2007 held in Sozopol Bulgaria in June 2007 The 81 revised full papers presented together with 5 invited papers were carefully reviewed and selected for inclusion in the book The papers are organized in topical sections on robust multilevel and hierarchical preconditioning methods monte carlo tools applications distributed computing operator splittings their application and realization recent advances in methods and

applications for large scale computations and optimization of coupled engineering problems control systems environmental modelling computational grid and large scale problems application of metaheuristics to large scale problems and contributed talks   Global Extrapolation with a Parallel Splitting Method Xue-Cheng Tai,1992   Prestack Split-step Fourier Depth Migration Algorithms and Parallel Implementations on Cray T3E Mehmet Celaleddin Tanis,1998   **Journal of Computational Mathematics** ,1998   **Science in China** ,1997   **Expanded Abstracts with Biographies** ,2004   **A Spectral Method for Fluid Flow in a Cylinder with Application to Rotating Convection** Darrell Michael Mitsuo Kidani,1997   **SIAM Journal on Scientific and Statistical Computing** Society for Industrial and Applied Mathematics,1985   **Mathematical Reviews** ,2003   Tsinghua Science and Technology ,2003   **Computational Molecular Dynamics: Challenges, Methods, Ideas** Peter Deuflhard,1999 On May 21 24 1997 the Second International Symposium on Algorithms for Macromolecular Modelling was held at the Konrad Zuse Zentrum in Berlin The event brought together computational scientists in fields like biochemistry biophysics physical chemistry or statistical physics and numerical analysts as well as computer scientists working on the advancement of algorithms for a total of over 120 participants from 19 countries In the course of the symposium the speakers agreed to produce a representative volume that combines survey articles and original papers all refereed to give an impression of the present state of the art of Molecular Dynamics The 29 articles of the book reflect the main topics of the Berlin meeting which were i Conformational Dynamics ii Thermodynamic Modelling iii Advanced Time Stepping Algorithms iv Quantum Classical Simulations and Fast Force Field and v Fast Force Field Evaluation   **Journal** Chemical Society (Great Britain),1982   Multigrid Methods V Wolfgang Hackbusch,1998-10-20 This volume contains a selection from the papers presented at the Fifth European Multigrid Conference held in Stuttgart October 1996 All contributions were carefully refereed The conference was organized by the Institute for Computer Applications ICA of the University of Stuttgart in cooperation with the GAMM Committee for Scientific Computing SFB 359 and 404 and the reserach network WiR Ba W The list of topics contained lectures on Multigrid Methods robustness adaptivity wavelets parallelization application in computational fluid dynamics porous media flow optimisation and computational mechanics A considerable part of the talks focused on algebraic multigrid methods

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