Mohammed Al-Smadi

Numerical Solutions of Integro-Differential Equations Using RKHSM
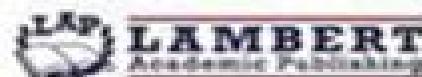
Numerical Solutions Integro Differential Equations Using

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Numerical Solutions Integro Differential Equations Using:

Topics in Integral and Integro-Differential Equations Harendra Singh,Hemen Dutta,Marcelo M. Cavalcanti,2021-03-15 This book includes different topics associated with integral and integro differential equations and their relevance and significance in various scientific areas of study and research Integral and integro differential equations are capable of modelling many situations from science and engineering Readers should find several useful and advanced methods for solving various types of integral and integro differential equations in this book The book is useful for graduate students Ph D students researchers and educators interested in mathematical modelling applied mathematics applied sciences engineering etc Key Features New and advanced methods for solving integral and integro differential equations Contains comparison of various methods for accuracy Demonstrates the applicability of integral and integro differential equations in other scientific areas Examines qualitative as well as quantitative properties of solutions of various types of integral and integro differential equations   Mathematical Methods in Dynamical Systems S. Chakraverty,Subrat Kumar Jena,2023-05-19 The art of applying mathematics to real world dynamical problems such as structural dynamics fluid dynamics wave dynamics robot dynamics etc can be extremely challenging Various aspects of mathematical modelling that may include deterministic or uncertain fuzzy interval or stochastic scenarios along with integer or fractional order are vital to understanding these dynamical systems Mathematical Methods in Dynamical Systems offers problem solving techniques and includes different analytical semi analytical numerical and machine intelligence methods for finding exact and or approximate solutions of governing equations arising in dynamical systems It provides a singular source of computationally efficient methods to investigate these systems and includes coverage of various industrial applications in a simple yet comprehensive way

Fractional Differential Equations Praveen Agarwal,Carlo Cattani,Shaher Momani,2024-04-29 Fractional Differential Equations Theoretical Aspects and Applications presents the latest mathematical and conceptual developments in the field of Fractional Calculus and explores the scope of applications in research science and computational modelling Fractional derivatives arise as a generalization of integer order derivatives and have a long history their origin can be found in the work of G W Leibniz and L Euler Shortly after being introduced the new theory turned out to be very attractive for many famous mathematicians and scientists including P S Laplace B Riemann J Liouville N H Abel and J B J Fourier due to the numerous possibilities it offered for applications Fractional Calculus the field of mathematics dealing with operators of differentiation and integration of arbitrary real or even complex order extends many of the modelling capabilities of conventional calculus and integer order differential equations and finds its application in various scientific areas such as physics mechanics engineering economics finance biology and chemistry among others However many aspects from the theoretical and practical point of view have still to be developed in relation with models based on fractional operators Efficient analytical and numerical methods have been developed but still need particular attention Fractional Differential Equations Theoretical

Aspects and Applications delves into these methods and applied computational modelling techniques including analysis of equations involving fractional derivatives fractional derivatives and the wave equation analysis of FDE on groups direct and inverse problems functional inequalities and computational methods for FDEs in physics and engineering Other modelling techniques and applications explored by the authors include general fractional derivatives involving the special functions in analysis fractional derivatives with respect to another function in analysis new fractional operators in real world applications fractional order dynamical systems hidden attractors in complex systems nonlinear dynamics and chaos in engineering applications quantum chaos and self excited attractors Provides the most recent and up to date developments in the theory and scientific applications Fractional Differential Equations Includes transportable computer source codes for readers in MATLAB with code descriptions as it relates to the mathematical modelling and applications Provides readers with a comprehensive foundational reference for this key topic in computational modeling which is a mathematical underpinning for most areas of scientific and engineering research   *Library of Congress Subject Headings* Library of Congress,2012

   Numerical Solutions of Integro-Differential Equations Using Rkhsm Al-Smadi Mohammed,2015-11-26 Numerical analysis In this work we make a discussion for the theory of reproducing Kernel Hilbert spaces associated with positive definite kernels and we illustrate their applications for a class of integro differential equations We begin with the material that is contained in Aronszajnis classic paper on the theory of reproducing Kernel Hilbert spaces In fact we focus on their properties generation of new spaces and relationships between their kernels and some theorems on extensions of functions and kernels Moreover we study the Sobolev space which is one of the most useful reproducing Kernel Hilbert spaces construct a novel reproducing kernel space and give the way to express reproducing Kernel functions Meanwhile we employed a reproducing Kernel function and its conjugate operator to construct the complete orthonormal basis This work investigates the solutions of a general form of first second and fourth order integro differential equations using the reproducing Kernel Hilbert space method   *Integral and Integro-Differential Equations* Santanu Saha Ray,Srikanta Behera,2026-12-04 This book provides a comprehensive study of numerical techniques for solving integral and integro differential equations using wavelet based approximation methods It combines both theoretical insights and practical applications focusing on integer and fractional order equations including those with weakly singular kernels Starting with key definitions and theorems from integral equations and fractional calculus the book establishes a clear mathematical framework It then introduces wavelet based schemes for approximating solutions with a particular focus on convergence stability and error analysis Each chapter is enriched with numerical examples graphs and tables that demonstrate the accuracy and computational efficiency of the proposed methods Features Employs wavelet approximation methods to solve a wide range of integral and integro differential equations Expands the scope of applicable equations by covering both classical and fractional order models Illustrates the effectiveness of wavelet methods in handling weakly singular kernels through worked out examples Provides

rigorous theoretical validation for the accuracy and reliability of each method This book is intended for postgraduate students researchers and professionals in mathematics engineering and applied sciences who seek modern computational techniques for solving integral and integro differential equations **The Application and Numerical Solution of Integral Equations** R.S. Anderssen,F.R. de Hoog,M.A. Lukas,1980-03-31 This publication reports the proceedings of a one day seminar on The Application and Numerical Solution of Integral Equations held at the Australian National University on Wednesday November 29 1978 It was organized by the Computing Research Group Australian National University and the Division of Mathematics and Statistics CSIRO Due to unforeseen circumstances Dr M L Dow was unable to participate At short notice Professor D Elliott reviewed Cauchy singular integral equations but a paper on same is not included in these proceedings The interested reader is referred to the recent translation of V V Ivanov The Theory of Approximate Methods and their Application to the Numerical Solution of Singular Integral Equations Noordhoff International Publishers Leyden 1976 An attempt was made to structure the program to the extent that the emphasis was on the numerical solution of integral equations for which known applications exist along with explanations of how and why integral equation formalisms arise In addition the programme reflected the broad classification of most integral equations as either singular or non singular as either Fredholm or Volterra and as either first or second kind The Journal of Integral Equations and Applications ,2010 **International Aerospace Abstracts** ,1990 *Dissertation Abstracts International* ,2004 *The Numerical Solution of Integro-differential Equations with Retardation* Kenneth L. Cooke,University of Southern California,National Institutes of Health (U.S.),1972 **Mathematics of Computation** ,1983 Original articles on all aspects of numerical mathematics book reviews mathematical tables and technical notes Covers advances in numerical analysis application of computer methods high speed calculating and other aids to computation **Subject Catalog** Library of Congress,1982 **BETECH 85** C. A. Brebbia,John Noye,1985 Modern Numerical Methods for Ordinary Differential Equations G. Hall,James Murray Watt,1976 *Summaries of Doctoral Dissertations* Northwestern University (Evanston, Ill.). Graduate School,1943 **Radio Engineering & Electronic Physics** ,1973 **Library Publication** ,1980 Hokkaido Mathematical Journal ,2006 **Proceedings of the Royal Society of London** Royal Society (Great Britain),1983

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