

THE NUMERICAL SOLUTION OF  
TWO-POINT  
BOUNDARY PROBLEMS  
IN ORDINARY DIFFERENTIAL  
EQUATIONS

BY

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1957

# Numerical Solution Of Two Point Boundary

**Yale University. Department of  
Computer Science, Leslie Greengard, V.  
Rokhlin**



## **Numerical Solution Of Two Point Boundary:**

**Numerical Solution of Two Point Boundary Value Problems** Herbert B. Keller, 1976-01-01 Lectures on a unified theory of and practical procedures for the numerical solution of very general classes of linear and nonlinear two point boundary value problems      **Numerical Methods for Two-Point Boundary-Value Problems** Herbert B.

Keller, 2018-11-14 Elementary yet rigorous this concise treatment explores practical numerical methods for solving very general two point boundary value problems The approach is directed toward students with a knowledge of advanced calculus and basic numerical analysis as well as some background in ordinary differential equations and linear algebra After an introductory chapter that covers some of the basic prerequisites the text studies three techniques in detail initial value or shooting methods finite difference methods and integral equations methods Sturm Liouville eigenvalue problems are treated with all three techniques and shooting is applied to generalized or nonlinear eigenvalue problems Several other areas of numerical analysis are introduced throughout the study The treatment concludes with more than 100 problems that augment and clarify the text and several research papers appear in the Appendixes      Two-point Boundary Value Problems: Shooting Methods Sanford M. Roberts, Jerome S. Shipman, 1972

**The Numerical Solution of Two-point Boundary Problems in Ordinary Differential Equations** Leslie Fox, 1957      **On the Numerical Solution of Two-point Boundary Value Problems** Yale University. Department of Computer Science, Leslie Greengard, V. Rokhlin, 1989 Abstract In this paper we present a new numerical method for the solution of linear two point boundary value problems of ordinary differential equations After reducing the differential equation to a second kind integral equation we discretize the latter via a high order Nyström scheme A somewhat involved analytical apparatus is then constructed which allows for the solution of the discrete system using  $O(N^p)$  operations where  $N$  is the number of nodes on the interval and  $p$  is the desired order of convergence Thus the advantages of the integral equation formulation small condition number insensitivity to boundary layers insensitivity to end point singularities etc are retained while achieving a computational efficiency previously available only to finite difference or finite element methods      **Numerical Solution of Two Point Boundary Value Problems** Herbert B. Keller, 1984

**On the Numerical Solution of Two-point Boundary Value Problems II.** P. Starr, YALE UNIV NEW HAVEN CT Dept. of COMPUTER SCIENCE., 1990 In a recent paper Greengard and Rokhlin introduce a numerical technique for the rapid solution of integral equations resulting from linear two point boundary value problems for second order ordinary differential equations In this paper we extend the method to systems of ordinary differential equations After reducing the system of differential equations to a system of second kind integral equations we discretize the latter via a high order Nystrom scheme A somewhat involved analytical apparatus is then constructed which allows for the solution of the discrete system using  $O(N^p n^3)$  operations with  $N$  the number of nodes on the interval  $p$  the desired order of convergence and  $n$  the number of equations in the system Thus the advantages of the integral equation

formulation small condition number insensitivity to boundary layers insensitivity to end point singularities etc are retained while achieving a computational efficiency previously available only to finite difference or finite element methods We in addition present a Newton method for solving boundary value problems for nonlinear first order systems in which each Newton iterate is the solution of a second kind integral equation the analytical and numerical advantages of integral equations are thus obtained for nonlinear boundary value problems

*Numerical Solution of Two-point Boundary-value Problems* Andrew Benjamin White, California Institute of Technology. Division of Engineering and Applied Science, 1974

On the Numerical Solution of Two-point Boundary Value Problems II. Yale University. Department of Computer Science, Harold P. Starr, 1990 Thus the advantages of the integral equation formulation small condition number insensitivity to boundary layers insensitivity to end point singularities etc are retained while achieving a computational efficiency previously available only to finite difference or finite element methods We in addition present a Newton method for solving boundary value problems for nonlinear first order systems in which each Newton iterate is the solution of a second kind integral equation the analytical and numerical advantages of integral equations are thus obtained for nonlinear boundary value problems

**Numerical Solution of Two-point-boundary-value Problems** F. A. N. Oliveira, 1967 *A Simple Method for the Numerical Solution of Two-point Boundary-value Problems* Peter Davies Hyde, 1968 Numerical Solution of Two-point Boundary-value Problems Andrew Benjamin White (Jr.), 1993

**The Numerical Solution of Two Point Boundary Value Problems in Ordinary Differential Equations** Kate Woodham, 1984

**Numerical Solutions of Boundary Value Problems for Ordinary Differential Equations** A.K. Aziz, 2014-05-10

Numerical Solutions of Boundary Value Problems for Ordinary Differential Equations covers the proceedings of the 1974 Symposium by the same title held at the University of Maryland Baltimore Country Campus This symposium aims to bring together a number of numerical analysis involved in research in both theoretical and practical aspects of this field This text is organized into three parts encompassing 15 chapters Part I reviews the initial and boundary value problems Part II explores a large number of important results of both theoretical and practical nature of the field including discussions of the smooth and local interpolant with small  $K$ th derivative the occurrence and solution of boundary value reaction systems the posteriori error estimates and boundary problem solvers for first order systems based on deferred corrections Part III highlights the practical applications of the boundary value problems specifically a high order finite difference method for the solution of two point boundary value problems on a uniform mesh This book will prove useful to mathematicians engineers and physicists

**The Numerical Solution of Two-point Boundary Problem in Ordinary Differential Equations** L. Fox, 1957 *The Factorization Method for the Numerical Solution of Two Point Boundary Value Problems for Linear ODE's* Ivo Babuška, Václav Majer, 1986 The theoretical analysis and computational implementation of factorization based methods for the numerical solution of linear boundary value problems for ordinary differential equations are presented The methods are optimal with

respect to certain clearly defined criteria Numerical examples show the effectiveness of a general code based on the factorization method Direct methods are characterized by the solution of global linear algebraic systems for the discrete solution In this sense multi shooting may be regarded as a hybrid method between the two classes A sophisticated recent example of multi shooting is the BOUNDPAC package Indirect solution methods are characterized by the association of the boundary value problem with certain auxiliary initial value problems IVP The auxiliary IVP s are generally solved unidirectionally forward but a subclass of initial value based methods are based on bi directional double sweep strategies

**NUMERICAL SOLUTION OF TWO-POINT BOUNDARY PROBLEMS IN ORDINARY DIFFERENTIAL EQUATION**,1957      **The Numerical Solution of Two-point Boundary Problems in Differential Equations**,1957      **Numerical Methods for Two Point Boundary-Value Problems** Keller,1968-06-01      **Modern Control System Theory** M. Gopal,1993 About the book The book provides an integrated treatment of continuous time and discrete time systems for two courses at postgraduate level or one course at undergraduate and one course at postgraduate level It covers mainly two areas of modern control theory namely system theory and multivariable and optimal control The coverage of the former is quite exhaustive while that of latter is adequate with significant provision of the necessary topics that enables a research student to comprehend various technical papers The stress is on interdisciplinary nature of the subject Practical control problems from various engineering disciplines have been drawn to illustrate the potential concepts Most of the theoretical results have been presented in a manner suitable for digital computer programming along with the necessary algorithms for numerical computations

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