Numerical Solution of Ordinary Differential Equations
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DESCRIPTION

A concise introduction to numerical methods and the mathematical framework needed to understand their performance. *Numerical Solution of Ordinary Differential Equations* presents a complete and easy-to-follow introduction to classical topics in the numerical solution of ordinary differential equations. The book's approach not only explains the presented mathematics, but also helps readers understand how these numerical methods are used to solve real-world problems.

Unifying perspectives are provided throughout the text, bringing together and categorizing different types of problems in order to help readers comprehend the applications of ordinary differential equations. In addition, the authors' collective academic experience ensures a coherent and accessible discussion of key topics, including:

- Euler's method
- Taylor and Runge-Kutta methods
- General error analysis for multi-step methods
Stiff differential equations

Differential algebraic equations

Two-point boundary value problems

Volterra integral equations

Each chapter features problem sets that enable readers to test and build their knowledge of the presented methods, and a related Web site features MATLAB® programs that facilitate the exploration of numerical methods in greater depth. Detailed references outline additional literature on both analytical and numerical aspects of ordinary differential equations for further exploration of individual topics.

Numerical Solution of Ordinary Differential Equations is an excellent textbook for courses on the numerical solution of differential equations at the upper-undergraduate and beginning graduate levels. It also serves as a valuable reference for researchers in the fields of mathematics and engineering.

ABOUT THE AUTHOR

Kendall E. Atkinson, PhD, is Professor Emeritus in the Departments of Mathematics and Computer Science at the University of Iowa. He has authored books and journal articles in his areas of research interest, which include the numerical solution of integral equations and boundary integral equation methods. Weimin Han, PhD, is Professor in the Department of Mathematics at the University of Iowa, where he is also Director of the interdisciplinary PhD Program in Applied Mathematical and Computational Science. Dr. Han currently focuses his research on the numerical solution of partial differential equations. David E. Stewart, PhD, is Professor and Associate Chair in the Department of Mathematics at the University of Iowa, where he is also the departmental Director of Undergraduate Studies. Dr. Stewart's research interests include numerical analysis, computational models of mechanics, scientific computing, and optimization.
FEATURES

• Contains many up-to-date references to both analytical and numerical ODE literature

• Offers new unifying views on different problem classes

• Related website provides MATLAB® programs that allow the reader to explore numerical methods experimentally

• Related website also includes Graphical User Interfaces (GUIs) to make experimental exploration even easier

• Written by well-known authors who have proven to be effective communicators and outstanding researchers

• Offers complete and extensive topic coverage to allow instructors increased freedom for class structure. Also allows the interested student to pursue further topics of interest.

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