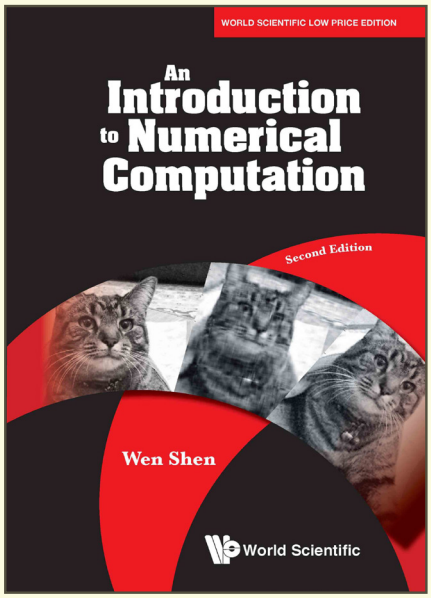
An Introduction to Numerical Computation 2nd Edition



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ABOUT THE BOOK

This book serves as a set of lecture notes for a senior undergraduate level course on the introduction to numerical computation, which was developed through 4 semesters of teaching the course over 10 years. The book requires minimum background knowledge from the students, including only a three-semester of calculus, and a bit on matrices.

The book covers many of the introductory topics for a first course in numerical computation, which fits in the short time frame of a semester course. Topics range from polynomial approximations and interpolation, to numerical methods for ODEs and PDEs. Emphasis was made more on algorithm development, basic mathematical ideas behind the algorithms, and the implementation in Matlab.

The book is supplemented by two sets of videos, available through the author's YouTube channel. Homework problem sets are provided for each chapter, and complete answer sets are available for instructors upon request.

The second edition contains a set of selected advanced topics, written in a self-contained manner, suitable for self-learning or as additional material for an honored version of the course. Videos are also available for these added topics.

READERSHIP

Junior or senior undergraduate students interested in numerical computation and analysis, majoring in mathematics, computer science, physics, engineering, etc.

CONTENTS

- Computer Arithmetic
- Polynomial Interpolation
- Piecewise Polynomial Interpolation: Splines
- Numerical Integration
- Numerical Solutions of Non-linear Equations

- Direct Methods for Systems of Linear Equations
- Fixed Point Iterative Solvers for Linear and Non-linear Systems
- The Method of Least Squares
- Numerical Solutions of ODEs
- Numerical Methods for Two-Point Boundary Value Problems
- Finite Difference Methods for Some Partial Differential Equations
- A Few Other Important Algorithms

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