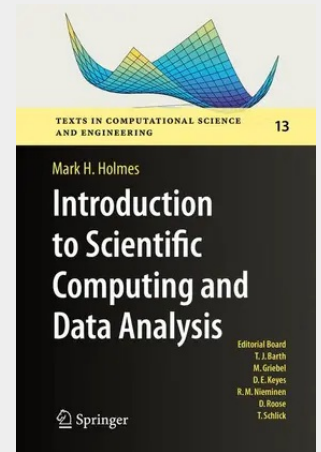


Introduction to Scientific Computing and Data Analysis

This textbook provides an introduction to numerical computing and its applications in science and engineering. The topics covered include those usually found in an introductory course, as well as those that arise in data analysis. This includes optimization and regression based methods using a singular value decomposition. The emphasis is on problem solving, and there are numerous exercises throughout the text concerning applications in engineering and science. The essential role of the mathematical theory underlying the methods is also considered, both for understanding how the method works, as well as how the error in the computation depends on the method being used. The MATLAB codes used to produce most of the figures and data tables in the text are available on the author's website and SpringerLink.

This textbook provides an introduction to numerical computing, and includes an extensive examination of the challenges that arise when trying to derive and implement methods that a computer can resolve accurately. The topics covered include those usually found in an introductory course, as well as those that arise in data analysis. This includes optimization and regression based methods using a singular value decomposition. The emphasis is on problem solving, and there are numerous exercises throughout the text concerning applications in science and engineering. The essential role of the mathematical theory underlying the methods is also considered, both for understanding how the method works, as well as how the error in the computation depends on the method being used. The MATLAB codes used to produce most of the figures and data tables in the text are available on the author's website and SpringerLink. Mark Holmes is a Professor at Rensselaer Polytechnic Institute. He is an applied mathematician, and his current research interests include electron transport in the upper atmosphere (the Aurora Borealis), and basal ganglia dynamics arising with Parkinson's disease. Professor Holmes has three published books in Springer's Texts in Applied Mathematics series: Introduction to Perturbation Methods, Introduction to the Foundations of Applied Mathematics, and Introduction to Numerical Methods in Differential Equations.



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