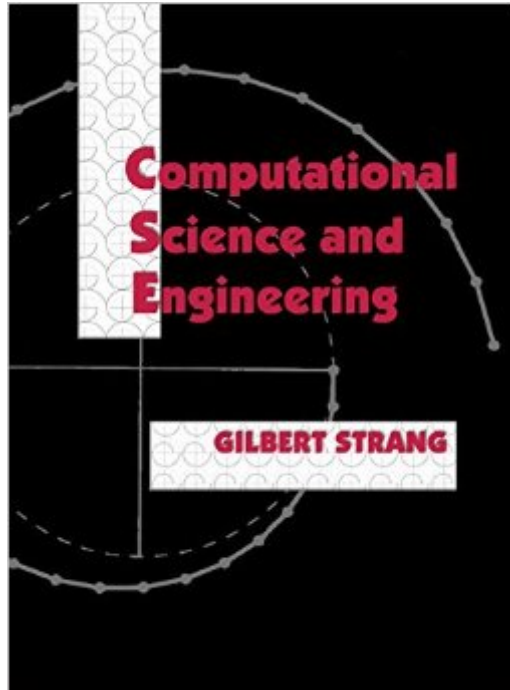The book was found

Computational Science And Engineering

Synopsis

This book presents the full range of computational science and engineering -- the equations, numerical methods, and algorithms with MATLABÂ® codes. The author has taught this material to thousands of engineers and scientists. The book is solution-based and not formula-based: it covers applied linear algebra and fast solvers, differential equations with finite differences and finite elements, Fourier analysis, optimization, and more. Contents Chapter 1: Applied Linear Algebra; Chapter 2: A Framework for Applied Mathematics; Chapter 3: Boundary Value Problems; Chapter 4: Fourier Series and Integrals; Chapter 5: Analytic Functions; Chapter 6: Initial Value Problems; Chapter 7: Solving Large Systems; Chapter 8: Optimization and Minimum Principles.

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Customer Reviews

The following is the review I published in The UMAP Journal (Summer, 2009, Vol 30, no. 2) pp. 175-178.My second review for this journal [1986] was of Gilbert Strang's Introduction to Applied Mathematics (hereafter IAM). I have never been too happy with that review, where I said that it is a "wonderful book." True enough; but more appropriately, it is an important book, as is the book reviewed here, Computational Science and Engineering (hereafter CSE).CSE is--and is not--a second edition of IAM. Apparently, it is the resultof more than 20 years of Strang teaching his favorite course at MIT,presumably out of IAM. Since CSE does not contain everything in IAMand also contains topics not in IAM, it is a different text. CSE containsStrang's further ruminations on the nature of applied mathematics, andI view it as the superior text, but some individuals might prefer

IAM. Tosome extent, either book represents Strang's philosophy of teaching applied mathematics--that we need a new approach--but this conviction is much more explicit in CSE.In particular, Strang believes that we should focus on both modeling andcomputation. Many books are about one or the other, and he feels that applied mathematics is both. Furthermore, Strang believes that applied problems tend to have a common structure, and Chapter 2 is devoted to illustrating this principle through a wide variety of problems.In my review of IAM, I tried to give an idea of the range of topics without enumerating the contents. CSE has the same difficulty: Enumerating the topics is tedious, but the titles of the chapters are informative (though listing them does not do justice to the sheer range of content):1. Applied Linear Algebra2.

How does one write a review on a computational science book, an academic area that to many is obtuse? Well, first, as a non-engineer or computational scientist, that I even understood enough to write a review speaks volumes to the clarity of this text. It does require a fundamental understanding of linear algebra and calculus. However, even in that regard, I imagine one could easily review the fundamentals either through Prof Strang's recent text (Differential Equations and Linear Algebra) or elsewhere. This book is a useful, actually essential, companion to his online OCW 18.085 course. It presents the facts around how continuous equations of calculus are discretised with linear algebra. It highlights how linear algebra, due to the fact of linearity, allows many non-linear and real world problems to be described and approximate solutions derived. However, the major element that makes this text different is the approach Prof. Strang adopts in his linking of linear algebra to the real problems he examines. It is a combination of passion for the subject area, an engaging and prosaic style of writing, and an approach at the frontier of teaching what in the past have been disparate and (in my experience) rather dull subject areas. This book perfectly illustrates the reality that linear algebra and the techniques it offers science is on the frontier of computation and real world analysis. This reality opens a vacuum for what is both a grounding and springboard text. However, the text also clearly takes the concepts raised to a depth mathematically that would satisfy all but the most trenchant purist. The problem sets are useful in developing concepts and are more than the often-found trickiness in other texts.

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