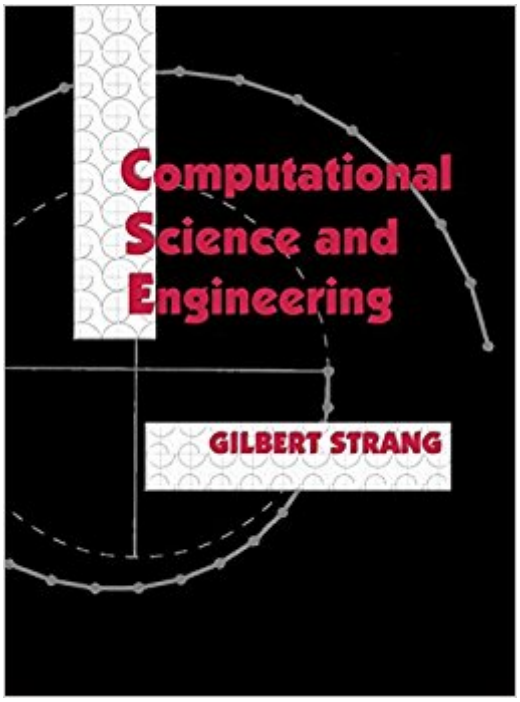
Computational Science And Engineering



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.

Book Information

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Customer Reviews

Gil Strang has given the discipline of computational science and engineering its first testament in this new and comprehensive book. It surely extends Gil’s long tradition of practical, wide-ranging, and insightful books that are invaluable for students, teachers, and researchers alike. If you could have only one book on a desert island, this might be it. --William Briggs, Professor of Mathematics at University of Colorado at Denver, and SIAM Vice-President for Education.

Encompasses the full range of computational science and engineering from modeling to solution, whether analytic or numerical. Gilbert Strang has taught this material to thousands of engineers and scientists.Â Supporting resources, including video lectures, are provided by the author at

www-math.mit.edu/cse.

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. They are accompanied by guiding comments, in places and solutions are available online, to allow more depth. I also note that the text represents many years experience of teaching and reflective analysis. One cannot conclude a review without also noting the quality of Prof Strang's academic credentials. Even a casual look at his CV illustrates that he is a luminary in that field. I also note that his 'academic ancestry' (doctoral supervisors) include mathematicians like Gauss, Hilbert and others around 8 steps back. This book has made me want to pursue the area further and, I hope, that alone would help people contemplate this as a course text or a highly useful addition to the serious student of applied mathematics library.

While I've only used this text for a couple of weeks, I find that it supports the MIT 18.085 video lectures nicely (which is it's purpose). It has been over 30 years since I had calculus and linear algebra, so this text makes for a good review and then some. The exercises with MATLAB (Octave in my case) is giving me great exposure to computational methods used by universities today. (I had previously been a Mathcad and C# user). The topics do move rapidly.

Purchased book to help me follow the online MIT 18-085 lecture series by Strang. Am only five lectures into the series and have found the book to be helpful. Would like to locate a solutions manual for the problems so I can check my work. Purchased book "used" from HPB-Dallas for $54. The book I received was new unused!

Great book, great professor. His lectures on MIT Open Courseware and this book got me an A+ in Applied Mathematics.

Even though I love Prof. Strang for making his lectures available for people like me and even though I liked his linear algebra book, I can not say that this book is excellent. I think that he puts too many topics in one book without giving enough details or depth on any of them. The book is more like a collection of lecture notes rather than a book. If you like to study linear algebra, use his linear algebra book. If you study finite difference method for PDEs, Hoffman’s is a much better choice. For numerical linear algebra, there is the book by Trefethen.So, my suggestion for you is as follows. Pick up the book from a library. And go straight to a topic that you are somewhat familiar with. And try to see if Prof. Strang does an excellent job on that topic. I did that for a few of them, and I found that the book is not sufficient explaining those topics.By the way, for CG method neither the book nor the video lectures are very useful. You will need the article by Jonathan Richard Shewchuk. You can find it online. This is the best for CG.

This book is a must in bring all the main notions of scientific and engineering computation and establishing the links between them in a very comprehensive manner. Unmissable book for who is interested in the topic.

As always, W. Gilbert Strang is a master at explaining difficult conceptsHe covers all relevant material including a quick overview of the basic introductory linear algebra that would be (and possiblyshould be) a prerequisite for the material.The lecture series available at the open course ware site at site of mit fits in perfectly with the book.For some one who likes to study on ones own, the book and the available lecture series are perfect.

This book tries to mash so much between the covers that Strang fails to start from the fundamentals and work systematically towards the solution/theorem. Each section reads much more like a

concise list of things you shouldn’t forget if you’ve already learned the topic, rather than trying to explain it to someone who is new to the material. It reads much like a professor’s lecture notes that they would write to themselves to just remind them what to say, rather than the long explanation they would put on the blackboard so their students (who have never seen the material before) would understand. So it might be a good refresher book, but don’t get it expecting to learn solely from this textbook.