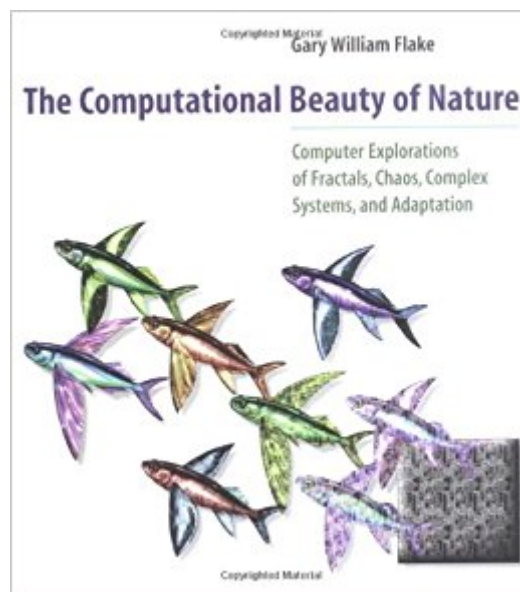




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The Computational Beauty Of Nature: Computer Explorations Of Fractals, Chaos, Complex Systems, And Adaptation



Synopsis

"Simulation," writes Gary Flake in his preface, "becomes a form of experimentation in a universe of theories. The primary purpose of this book is to celebrate this fact." In this book, Gary William Flake develops in depth the simple idea that recurrent rules can produce rich and complicated behaviors. Distinguishing "agents" (e.g., molecules, cells, animals, and species) from their interactions (e.g., chemical reactions, immune system responses, sexual reproduction, and evolution), Flake argues that it is the computational properties of interactions that account for much of what we think of as "beautiful" and "interesting." From this basic thesis, Flake explores what he considers to be today's four most interesting computational topics: fractals, chaos, complex systems, and adaptation. Each of the book's parts can be read independently, enabling even the casual reader to understand and work with the basic equations and programs. Yet the parts are bound together by the theme of the computer as a laboratory and a metaphor for understanding the universe. The inspired reader will experiment further with the ideas presented to create fractal landscapes, chaotic systems, artificial life forms, genetic algorithms, and artificial neural networks.

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Customer Reviews

This book is a delight. (Barak Pearlmutter, University of New Mexico) This delightful book illustrates beautifully the paradigm shift in physics from writing equations and solving them to computer modeling and experimentation. (Greg Chaitin, author of *The Limits of Mathematics*)

Gary William Flake is a Scientist at the NEC Research Institute in Princeton, New Jersey.

What a wonderful book! It's hard to finish because every few pages makes me want to code something in processing. I'm a good portion through the fractals section, which was what made me decide to get the book.

IMHO this book should be part of every US high school or undergraduate Science/Math curriculum, and would be worth twice the price. The author's enthusiasm is infectious, his writing style very clear, and his material well cited. He also maintains a website with free software downloads that illustrate the many mind expanding (w/o drugs! :-) concepts discussed. Although thanks to magazines like Wired (minus its aggressive leftist politics and more aggressive BB censoring) the sciences have become "cooler." Nevertheless, there is still A LOT of work to do, and damage to be undone, from academically inferior and unenthusiastic so called math/science "teachers" in US schools. I don't usually rate books five stars, but I am rating this one a big FIVE stars.

I recently became interested a lot in Nature. Especially, being someone in the field of Computer Science, the computational aspect. And this book is by far one of my favourite among all the "How Nature Works" kind of books I've read. This Computational Beauty of Nature (CBofN) covered a lot of topics. Ranged from brief introduction to Computation Theory, Fractals, Chaos, Complexity, Adaptation. (See the Table of Content for more details). All topics are written in surprisingly clear and very understandable manner. With as little Math as possible. (From my opinion, these topics cannot be completely understood without Mathematics -- The Language of Nature). Therefore, it is also accessible to layperson. This book does not, however, go so deep into each subject. (You won't expect it to do that with its less-than 500 pages, don't you? :-) Instead, it does give nice backgrounds, fundamental knowledge, and important ideas for each. So, if you are interesting in any of the subjects presented here, you can go on to the more specialized books on your own. One of the nicest feature of this book, which can hardly be found in other text, is that it does show how things work together, where and why. For example, natural phenomena like adaptation, evolution, computation, and some other things else related to each other. How can one view this from that perspective, and vice versa. etc. One other nice feature of this book is, you can really play with almost all concepts using a number of computer programs. All the programs are downloadable (with source code, under GNU license) from the book's homepage. So, you can reproduce almost

all the figures from the book. However, for one thing, the homepage address given in the book, in the edition/printing I have is incorrect. Maybe MIT Press had changed the structure of their website or something.....you can still search for it using your favourite web-search engine. About the website, all the good things are there as well, including errata. (Of course, Perfect things are very rare in Nature... So, books with some errors are ok. The thing that matter is the authors know it/admit it and tell the readers or not). Conclusion: If you want to understand "How Nature Works" from the computational point of view. If you interested in Chaos theory, Fractals and Complexity. Then, make no mistake, you can't go wrong with this one. (And, get the hardcover edition, because you will read it, read it, read it again, and keep refering to it. So the paperback edition probably can't endure that :-). I want to give it more stars if I only could. This book will always get the highest rating possible from me wherever and whenever I review it. Nature herself is so beautiful. So, it's time to get to know her, to learn about her and to understand her! And this book just did it, in such a way that can hardly be better!

I saw this book recommended by another author and have found it very intriguing. The subject is aesthetically pleasing in its own right.

This book covers a lot of topics but it hits the interesting points in enough detail to be satisfying. It's a great way to find new topics to explore.

A beautiful book on complex systems. Clearly written with simulation code made freely available.

Granted you can find most of this info elsewhere but still this is a great read. Well written, a nice collection of material, and downloadable source code. I found it to be a very inspiring book.

I made a mistake in selecting my shipping address and the item was sent out to the wrong address. Another vendor I went through on refused to work with me under this scenario, refunded the cost of the item (minus shipping) and said I had to buy it all over again. This was not the case here. The vendor was responsive, and reshipped the product free of charge. When the book arrived it was in great condition. The book itself is great. It assumes very little of readers initial knowledge and does a great job of addressing some complex topics. It is quite in depth and gives you what you need to implement some exciting algorithms. I highly recommend to anyone interested in fractals or complexity theory.

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