[Review published in *SIAM Review*, Vol. 58, Issue 4, pp. 805–806.]

Computational Mathematical Modeling: An Integrated Approach Across Scales. *By Daniela Calvetti and Erkki Somersalo.* SIAM, Philadelphia, PA, 2013. $71.50. x+224 pp., softcover. ISBN 978-1-611972-47-4.

The book *Computational Mathematical Modeling: An Integrated Approach Across Scales* is divided into nine chapters, where the first four are devoted to deterministic models which actually boil down to solving ordinary differential equations. The remaining five chapters deal with mathematical models that include noise, i.e., random numbers as a stochastic element.

The material is presented in a writing style typical of mathematical textbooks, with many theorems and formal definitions that will probably be easy to grasp for math majors. Each topic is presented so as to convey the basic principles without going into too much detail. For example, Chapter 5 on random variables and distributions could easily fill an entire book. Hence, in general the surface of each topic is merely scratched and, after an introduction of the governing equations, examples are provided for possible solution strategies. Some readers will find the MATLAB exercises, which are scattered throughout the book, useful even though their solutions are only provided as code snippets, so the student will have to fill in the gaps. No introduction to MATLAB is provided. This comes as somewhat of a disappointment as the word "computational" in the book title suggests more than just a bunch of MATLAB snippets. In terms of modeling, the authors stay almost completely in the realm of pure mathematics and only rarely are examples given from other areas. For example, in Chapter 7 the stochastic simulation of chemical reactions is discussed though this, however—to the reviewer's knowledge—is not really used for calculating reaction kinetics in chemistry. Chemists use the Arrhenius equation for that. Markov processes and the standard predator-prey model used in biology are covered to some extent in Chapter 8.

Each chapter ends with a number of exercises which are almost all purely mathematical. Some of them involve writing MATLAB code. Considering that neither hints nor solutions are provided to the exercises, I have doubts that they will be of much use to the average student, because most of them are hard to carry out after having read only the preceding chapter. There is a useful subject index and a good bibliography at the end of the book. Each chapter additionally has its own bibliography, which is quite useful. However, the chapter bibliographies are not very extensive: most references cite other books and there are hardly any references to primary source papers.

All in all, this reviewer thinks that this book is a good read, is technically sound, and can be recommended for beginning to advanced graduate students who want to become acquainted with several basic ideas in mathematical modeling. The book will probably be most useful to math majors due to its presentation style. I doubt that the book will be of much use for students majoring in subjects other than math, despite what the back cover suggests, because very few applications from other fields are discussed. Students fluent in the MATLAB scripting language will find the corresponding exercises and examples helpful.

Martin O. Steinhauser
University of Basel