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★**The Princeton companion to applied mathematics.**
Edited by Nicolas J. Higham, Mark R. Dennis, Paul Glendinning, Paul A. Martin, Fadil Santosa and Jared Tanner.
Princeton University Press, Princeton, NJ, 2015. *xvii*+994 *pp. ISBN* 978-0-691-15039-0

Many readers will be acquainted with *The Princeton companion to mathematics* [Princeton Univ. Press, Princeton, NJ, 2008; MR2467561], previously reviewed by B. J. Birch et al. [Notices Amer. Math. Soc. **56** (2009), no. 10, 1276–1281; MR2572756] and by Terence Tao for Mathematical Reviews. Here is a text, *The Princeton companion to applied mathematics*, similar in spirit and equally as ambitious as *The Princeton companion to mathematics*, but with the obvious focus on the discipline of applied mathematics. We note that *The Princeton companion to applied mathematics* has been reviewed by Lloyd Trefethen in [SIAM Rev. **57** (2015), no. 3, 469–473; MR3408007]. We will follow Trefethen and denote *The Princeton companion to mathematics* by PCM, and *The Princeton companion to applied mathematics* by PCAM.

The structure of PCAM will be familiar to readers of PCM. The text is divided into eight parts and presents, among other things, an introduction to and a history of the subject, an array of applied mathematics concepts, areas of applied mathematics, areas of application, and a final perspective. In his review of PCAM, Trefethen elegantly compares and contrasts the content of the eight parts of PCAM with those of PCM. Just as with PCM, PCAM is masterfully edited, with all its articles well written by over 160 established applied mathematicians. This book impressively captures the breadth and depth of applied mathematics yet remains accessible to a large readership.

So, briefly, what is in PCAM? One of the first things is an admirable answer to the question, what is applied mathematics? Following this is an overview of the language, goals, and history of applied mathematics. This comprises Part I. What follows are approximately 170 articles covering many of the principal concepts, techniques, and problems of current applied mathematics. The book ends with Part VIII, providing some final perspectives and discussing topics such as reading and writing mathematics, teaching applied mathematics, and the influence of applied mathematics on policy.

Just as with PCM, there is a lot of cross-listing of the various articles in PCAM. For example, the article on partial differential equations in section IV.3 references the article on the wave equation in section III.31, the article on homogenization in section III.17, etc. In other words, the unity and interrelatedness of applied mathematics is present in much of PCAM. Furthermore, many of the articles in PCAM include a short list of references for further reading. This makes PCAM a nice place to start when first attempting to learn something about an unfamiliar area or concept in applied mathematics, and many of the articles in PCAM provide the reader with a valuable big picture perspective on the topics covered.

One question that occurred to me before reading PCAM was, to what extent is it necessary to be familiar with content from PCM to start PCAM? In PCAM the relation to PCM is discussed:

> We have tried to build on the PCM and avoid overlap with it. Thus we do not cover many of the basic mathematical concepts treated in parts I and II of the PCM, but rather assume the reader is familiar with them.

This seems to indicate that Parts I and II of PCM are prerequisites for reading PCAM. However, I think that while reading both PCM and PCAM is a fantastic idea, the two books can certainly be read independently of one another.

PCAM is a unique work full of beautiful and interesting mathematics. It is surely a valuable resource for exposing young mathematicians to possible areas of applied mathematics for research and further study. Without a doubt PCAM is an important contribution to the mathematical literature. I think that anyone with an interest in mathematics will experience great pleasure by reading PCAM. Reading PCAM is not always easy but any effort put in is well worth it. On the other hand, it is easy, perhaps advisable, to read the book in a highly nonlinear fashion, skipping over one thing here or there and returning at a later point. I'm sure that finding the optimal path through PCAM is an exercise best left to the reader.   *Jason M. Graham*