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BOOK REVIEWS

MÜLLER, PETER. 2006. **The Equations of Oceanic Motions**. Cambridge University Press. ISBN 978-0-521-85513-6 (hardcover). x + 291 p. US \$85.

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“In spirit somewhere between a textbook and a reference book” is how Peter Müller describes his new book, *The Equations of Oceanic Motions*, and these words are not far from the mark. Readers consult textbooks for a reasonably full suite of material, with observations, theory, and methods being set into context by sketches of historical developments, present-day applications, and future prospects. Textbooks are expected to explain, and they succeed when they do so engagingly. At the other end of the spectrum, readers turn to reference books not for inspiration, but rather to get the raw facts, coupled with definitive literature citations. In these terms, Müller’s is neither textbook nor reference book.

The shelves of many a physical oceanographer have a place for such books, nestled between text and reference. The text side of the shelf will be quite full. Mine includes the relatively general writings of Gill (1982), Cushman-Roisin (1994), Pedlosky (1987), and Stern (1975), as well as more specialized books by Turner (1973) and others. But on the other side, my shelf is essentially bare: physical oceanography has few reference books. This point is relevant because Müller’s book is closer to a reference book than to a textbook. We find a signal of this on the cover, where he uses the word “equations,” not “theory,” not “dynamics.” As I hope to make clear in this review, the book’s title is well-chosen.

I’m a sucker for prefaces, and I liked this one a lot. Yes, it has the usual things: an explanation of how the book came to be, an overview of what the author hoped to accomplish, and so on. But it also has something that will make readers stop and think. I refer to Müller’s sensible words about an unfortunate tendency of theoreticians to argue for the accuracy of assumptions, instead of just explaining that x implies y , and leaving it for others to see whether x happens to be true, or true enough, in a given application. (He expresses this in much clearer terms than I have done, and I intend to quote him in my lectures from now on.)

Many readers will start with Chapter 1, and I urge them not to be put off by what they find there, an expanded table of contents that does little to encourage further reading. There is an attempt to establish overarching themes with a flowchart diagram, but it is not very successful. On the whole, the chapter is dry. The same

could be said of the introductory sections of some other chapters. However, the core of the text—the words related to the equations—is quite strong, and well worth a reader’s time.

Chapter 2 provides a good example of this strength. It discusses seawater thermodynamics, an important topic seldom covered well in textbooks, and one that is tricky enough to benefit from the author’s attention to detail. I think many readers will find this chapter to be quite helpful, even though they will have to go elsewhere to get empirical details. (Here, as in the rest of the book, there is an avoidance of observations and parameterizations.)

Following chapters deal with balance equations, molecular fluxes, and gravity. Then we reach Chapter 6, which deals with “The Basic Equations.” Given the title of this chapter, readers might expect it to provide an apex from which to see the broad sweep of material to follow. That is not the case, though. The following chapters might be better described as a list of useful essays than as an unfolding of organized principles. This attribute is illustrated by the chapter titles, namely: Dynamic Impact of the Equation of State; Free Wave Solutions on a Sphere; Asymptotic Expansions; Reynolds Decomposition; Boussinesq Approximation; Large-Scale Motions; Primitive Equations; Representation of Vertical Structure; Ekman Layers; Planetary Geostrophic Flows; Tidal Equations; Medium-Scale Motions; Quasi-Geostrophic Flows; Motions on the f -Plane; Small-Scale Motions; and Sound Waves. Do you see thematic development in this list? Me neither. Still, this is a book that will be consulted a bit at a time, and so the organization is not of great concern.

As for the general nature of the book, the title says it all. The equations are the book’s focus and its strength. There are remarkably few errors in the equations, perhaps because the author has been using this material in teaching. It is also worth noting that the book sticks to a clear and uniform notation, and documents it well in an exhaustive list of symbols.

I am sure many readers will appreciate the deep treatments given to some of the topics in this book. What I am not too sure of is what readers will *do* with the equations provided. The author’s choice to avoid empirical and practical matters will prevent the book from serving as a guide for everyday work. Nor is the book well-suited for citation in academic writing, given that much of the

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material has already been covered in sources that are more didactic and therefore more likely to be cited. The thin list of references (19 in total) stands in the way of this becoming a portal to the original literature, as a reference book might.

Still, I am happy that this “somewhere between” book is on my shelf, and I doubt I will be alone in that feeling. Readers might welcome a second edition (or a peer-reviewed wiki tree) that is more closely tied to the literature. Those seeking advice on working with the equations might be interested to know that Müller co-authored a book on ocean modeling (Müller and von Storch, 2004) that is, perhaps tellingly, not cited in the book under review.

REFERENCES

- Cushman-Roisin, B. 1994. Introduction to geophysical fluid dynamics. Prentice Hall.
Gill, A.E. 1982. Atmosphere-ocean dynamics. Academic Press.
Müller, P., and H. von Storch. 2004. Computer modeling in atmospheric and oceanic sciences. Building knowledge. Springer-Verlag.
Pedlosky, J. 1987. Geophysical fluid dynamics. Springer-Verlag.
Stern, M.E. 1975. Ocean circulation physics. Academic Press.
Turner, J.S. 1973. Buoyancy effects in fluids. Cambridge University Press.