plane waves, $A(X,T) = r(q)e^{i(qX+\Omega(q)T)}$, as well as many other exotic solutions (such as "target" and "spiral" patterns analyzed in [6], but never cited here). The author shows that the plane waves lose stability (Benjamin–Feir instability) and that in some cases the dynamics can be very complex, leading to several types of spatio-temporal chaos. Indeed, near some of these complex bifurcations the famed Kuramoto–Sivashinsky equation arises. Chapter 13 of the book delves into stationary two-dimensional patterns and provides the nonlinear selection mechanisms for hexagons, squares, and rolls. In the last chapter on space-time dynamics, Misbah provides a list of mechanisms for wavelength selection. This "problem" is an artifact of looking at pattern formation on an infinite domain. In finite domains, the wavelengths are determined by the *discrete* eigenvalues of the linearized operator. The last chapter of the book is a short conclusion listing some questions that cannot be answered by amplitude equations.

In summary, the book provides a survey of some of the classical methods used to study nonlinear dynamics near the onset of instability. I'd say that the approach is a little bit dusty and the problems attacked are also a bit dated. Nevertheless, the book covers a lot of ground and is quite accessible; if you haven't seen this type of analysis before and don't have time to read more comprehensive texts, then it will make a nice addition to your library.

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Methods of Mathematical Modelling: Continuous Systems and Differential Equations. *By Thomas Witelski and Mark Bowen*. Springer, Cham, 2015. $39.99. xviii+305 pp., softcover. ISBN 978-3-319-23041-2.

In my junior year of college, I took a course called "Mathematical Modeling." As I recall, the book assigned for the course had the following format: Here's a model, here's another model, here's another model. Once each model was introduced, some of the mathematics necessary for understanding it was introduced. To me, each model seemed too simple, and we moved on to the next one just as I thought the former might become interesting. After two-plus years of a theorem/proof-based pure mathematics curriculum, this was my introduction to applied mathematics, and I was not impressed. Via another route, I became an applied mathematician anyway.

I am sure that I am being unfair and that I lacked the scientific maturity to see the value of an elegantly simple model. I also held the naive view that by tweaking parameters, any model could be made to reproduce whatever behavior one wanted. However, I include my biased recollection to highlight the conundrum of teaching introductory mathematical modeling. Constructing an illuminating mathematical model almost always requires scientific knowledge far beyond that of a student in such a course. Students are likely to be impressed by a given model, but might think, rightly, that they would still not be able to build such a model themselves.

The authors of this book, intended as a text for advanced undergraduate or beginning graduate students, mostly avoid this trap. As evidenced by the book's title, their aim, instead, is to introduce a number of tools that are broadly useful in constructing and analyzing mathematical models. In the first part, they introduce the tools for model construction; in the second, methods for analyzing them; and in the third, they present three more detailed case studies derived from fluid mechanics. Along the way they introduce a number of famous equations, models, and concepts. A passing familiarity with these should be useful to the student above and beyond the practical methods introduced in the book.

Before Part 1, the authors include a preface that succinctly explains the modeling process, the goals of mathematical modeling, and various levels of mathematical models. It is as effective a statement of the mathematical modeling worldview as I have seen anywhere. Were I to teach a class from this book, I would assign the students to reread this section several times over the course. It contains a lot of the answers to my snotty undergraduate complaints. On the first reading, I don't think students will fully appreciate everything written here, but they will get more out of it after going through the modeling process themselves.

The authors pack twelve chapters into a short 250 pages. Each topic is introduced and explained using a few well-chosen examples before moving on to the next topic. For students wanting more than a short sketch, each chapter ends with a section entitled "Further Directions" containing references for further reading, mainly to textbooks, and many topics are further explored in the exercises following each chapter. Most of the material is standard, but the sections on similarity solutions, perturbation methods, and reduced models would be harder to find in another book at this level.

The book is broad and contains both subjects I know well (e.g., phase-plane analysis, transport equations, weakly nonlinear oscillators) and some I didn't know at all (e.g., optimal control theory and slender body theory). This allowed me to view the book from the perspectives of both an instructor and a student. The material I knew already is presented thoroughly and clearly, and I was able to learn a lot from the sections of less familiar material.

This book gives a whirlwind tour through deterministic mathematical modeling, stopping for a few pages on ODEs, PDEs, the variational formulation of classical mechanics, and fluid mechanics, with a more extended interlude on perturbation methods. This could form a very useful summing-up course for advanced undergraduates, or a way to give beginning graduate students a broad overview of the material they are likely to see in their first few years. Whereas the standard course aims for depth, I see a lot of value in a course that says "Here are some of the things that you'll need to learn in the next few years" and lets a beginning student know about the existence of various domains of applied mathematics that might not otherwise come up in other classes with a more narrow focus.

I would be very happy to teach a course based on Parts 1 and 2 of this book, but would be less comfortable, as a nonexpert in fluid mechanics, teaching Part 3. This section describes in detail three fluid models derived using the thin-film approximation. Here is where the importance of specific domain knowledge to the modeling process becomes most apparent. At several points, the authors arrive at a point from which to proceed they must state a fact from fluid mechanics that would be nonobvious to an outsider. This is an important lesson in itself, but it makes for slightly difficult reading. As a topic for the last two weeks of a course, I think such a deep dive makes a lot of sense, but instructors whose expertise lies elsewhere might have to construct their own advanced examples.

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The Power of Networks: Six Principles that Connect Our Lives. *By Christopher G. Brinton and Mung Chiang.* Princeton University Press, Princeton, NJ, 2016. $35.00. xii+310 pp., hardcover. ISBN 9781400884070.

Network science as a discipline has, in some sense, existed since 1735 when Leonhard Euler wrote a paper presenting a solution