

on a journey through the areas of numerical analysis that physicists are likely to encounter in their everyday lives, including ordinary and partial differential equations, integration, Fourier analysis, interpolation and approximation, and so on.

In every area, the basic and some advanced tools are developed. No special mathematical skills are required, as the author derives the numerical methods, starting methodically from zero (Taylor's expansion, for example) and not skipping any intermediate steps until the desired result is obtained. Having the method in hand, DeVries develops the appropriate piece of computer code, again step by step, with useful accompanying comments about good programming. (I wish my computer-science teacher had followed a similar approach, as this would have saved me and my collaborators quite some time and hassle.) For those who want to experience the small pieces of program, the codes are included on a floppy disk that comes with the book and runs on IBM PC-compatible microcomputers. The book is written in a lively and witty style, which young readers will enjoy. (One doesn't find section headers like "Look, Ma, No Derivatives" or "Fools Rush In . . ." in the typical German *Handbuch*.)

In summary, Paul DeVries's book should be titled *A FIRST COURSE in Computational Physics*, as it provides a useful starter kit containing the tools needed for computational physics. (The advanced kit is already available as William H. Press and coauthors' *Numerical Recipes*, Cambridge, 1986). But it is a starter only; a follow-up, in my opinion, is still needed in order to convey what computational physics is all about: the simulation of physical problems on a computer. For this, of course, we already have Koonin's book or, on a more intermediate level, *Theoretical Physics on the PC* by Erich Schmid and coauthors, (Springer, 1987).

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Classical Electromagnetic Theory

Jack Vanderlinde
Wiley, New York, 1993.
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This book, according to the author's preface, is designed to make a "reasonable transition" between "elementary" texts like David J. Griffiths *Introduction to Electrodynamics* (Prentice-Hall, 1989) and graduate-level texts like J. D. Jackson's *Classical Electrodynamics* (Wiley, 1975). Although its level of presentation does indeed place it somewhere between those two texts, I am not sure there is really a gap that needs bridging. In most undergraduate curriculums, "elementary" means a one-semester course at something like the level of Edward M. Purcell's *Electricity and Magnetism* (McGraw-Hill, 1985); this will be followed by one or two semesters at the level of Griffiths, and the student's next encounter with the subject is in a year's graduate course. Students I know who have followed this pattern have had no particular difficulty, and given the many other demands on undergraduate physics curricula I doubt that many programs can afford the luxury of the additional two semesters for which Vanderlinde's book is intended.

That hesitation aside, the book has two interesting features that set it apart from other advanced undergraduate texts. First, its opening chapters, intended as review, include an attractively parallel treatment of electric and magnetic fields: Chapter 1 discusses fields and potentials and their relations to their sources for both electric and magnetic contexts, with the conceptual similarities between the Biot-Savart law and Coulomb's law being implicitly stressed; chapter 2 continues the parallel in its unified treatment of electric and magnetic multipole expansions. Second, tensor notation—in particular, the permutation symbol and the Einstein summation convention—is used throughout the text to streamline cumbersome vector operations in addition to its more traditional use with the stress tensor and the covariant formulation of relativity. An extensive appendix lays the groundwork. (Throughout the book, vectors are indicated by arrows rather than boldface, giving the text an unnecessarily cluttered appearance.)

In other respects, the content overlaps strongly with that of Griffiths, although roughly one-third of the book is devoted to added or extended topics. Among the latter are a fuller treatment of Laplace and Poisson equation solutions, including conformal mapping and Green's functions; sections on the magnetic scalar potential and magnetic circuits; an expanded treatment of the electrostatics and magnetostatics of linear media; and a chapter on waveguides, including cylindrical guides, cavities and optical fibers. Numerical techniques are mentioned in only one brief sub-

section. The overall approach is formal, relatively austere and would probably not work well for a first course beyond Purcell; instructors of more advanced students might well consider Vanderlinde's book.

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Photodissociation Dynamics

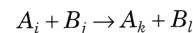
Reinhard Schinke
Cambridge U. P., New York,
1993. 417 pp. \$89.95 hc
ISBN 0-521-38368-4

A half-collision is simpler than a whole collision. This is a major motivation for fundamental studies of photodissociation dynamics. Nonetheless, the field of half-collisions provides grand challenges to theoretical models of chemical dynamics. The volume under review shows why.

The word that comes closest to describing the overall tone of *Photodissociation Dynamics* is "intimate": the attempt by a theoretical chemical physicist to describe the most intimate details of the interactions of atoms and molecules and the ways in which those interactions control their resulting dynamical behavior in half-collisions. Although Reinhard Schinke is a theorist, the book's mix of theory and experimental results is also intimate, and Schinke has resisted admirably the temptation to insert details of theory for their own sake.

The field of molecular photodissociation has been somewhat of a late bloomer; its full beauty has emerged only upon the flowering of sophisticated laser techniques in the laboratory and powerful approaches for modeling the dynamics on computers. As a consequence, Schinke's emphasis is on recent work: Of the volume's 750 references, more than 80% date from 1980 or later.

A major thrust of modern molecular collision theory has been away from viewing a bimolecular collision as



where i, j, k and l label quantum states, and toward viewing the collision as



where $*$ denotes an elusive interaction complex, activated complex, transition state or resonance, and α specifies its quantum state. Transition probabilities can then be written as