

formalism chapter describing mean field theories, Langevin equations, and renormalization group calculations, complete with exercises.

This book overall is eminently pleasing to read. The level is appropriate for graduate students in condensed matter, though the organization of the text is geared to self-study. The pace seems to me to be appropriate, and though I have not actually field-tested it, I have reports that graduate students quite like it.

I find somewhat wanting only the description of numerics. Perhaps the author felt a deeper discussion of numerics would have been a distraction from the main ideas. However, given that the subject matter concerns systems that, by definition, have highly anomalous statistics requiring serious care, the book is not entirely self-contained in this regard. The chapter on computer models does describe the models in such a way that any reader already competent at setting up and analyzing simple condensed matter models will easily know what to do. It also includes appendices with code snippets for avalanche and evolution models (written—*gasp!*—in FORTRAN). However, the more computationally naive reader may have a bit of a harder time.

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Classical Electrodynamics

▶ Walter Greiner
Springer-Verlag, New York, 1998.
555 pp. \$49.95 pb
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It is not clear just where Walter Greiner's *Classical Electrodynamics* would fit into a typical US physics curriculum. In mathematical sophistication, the book (which first appeared in German in 1991) is roughly comparable to Jack Vanderlinde's *Classical Electromagnetic Theory* (Wiley, 1993) and somewhere between David Griffiths's *Introduction to Electrodynamics* (Prentice-Hall, 1999) and John David Jackson's *Classical Electrodynamics* (Wiley, 1999).

The level of physics in the book is somewhat harder to characterize. For my money, all three of the other books just mentioned are more successful in conveying a contemporary understanding of classical electrodynamics. Vanderlinde, in particular, stresses the fundamental connection between electric and magnetic fields from the outset, whereas Greiner chooses to introduce the magnetic field by way of the

torque exerted by one magnetic dipole on another. Greiner's is also the only book of these four that is devoid of any discussion of radiation reaction.

Like the other volumes in Greiner's comprehensive series on theoretical physics, this one is full of worked examples, but unlike the other volumes, it does not have a table of contents for these examples. (It should be noted that there are no other problems in the book, so readers must look elsewhere to test their understanding.) The most useful of the worked problems present the nuts and bolts of calculations, as in exercises 1.8 and 1.9, in which the electrostatic potential of a uniformly charged rod is translated into elliptic coordinates and then used to find the capacitance of an ellipsoid of revolution. Where fundamental physics is at stake, though, as in example 13.8 on magnetic monopoles, the presentation is apt to be garbled. (Neither Greiner nor Vanderlinde mentions the alteration of the Lorentz force law, without which the fields have no physical meaning, in the presence of magnetic monopoles. Their discussions of invariance under duality transformations are therefore incomplete.)

In fact, the text too often reads as though one of the original German editions (which one?) had been fed into a computer program designed to churn out a word-for-word English translation. On those pages dense with equations, the results are mostly comprehensible. But in too many places the prose runs from the merely quaint ("the method of smallest squares," page 99) to the ambiguously neologistic ("unifrequent," page 395) to the truly cryptic ("The discovery of an amazingly simple law . . . has justly been praised as a relieving feast," page 517). The book's readability is further compromised by a lack of attention to notational consistency: The Laplacian is (archaically) written as " Δ " through most of the text (even though this symbol is also used to denote a difference of two quantities), but at the beginning of chapter 2, it appears ephemerally as " ∇^2 ." By equation 2.6, it reverts to " Δ ," only to reappear as " ∇^2 " in equation 2.16. This change of costume occurs again between equations 20.18 and 20.19. The diagrams, too, are apt to be unclear. Thus, for example, it was only by consulting the equations in the text above it that I could figure out which way the y-axis is supposed to be pointing in figure 8.20. Figure 3.12 offers me a depiction of a model of the ^{234}U nucleus, but not a clue as to the meaning of the various shadings in the drawing. The skimpy index and an assortment of typographical errors contribute further to my sense that the redaction was a bit careless.

The biographical notes with which Greiner graces his books are intriguing (although it's disconcerting to read that Nikola Tesla, born in 1856, emigrated to the US in 1844). In this volume, he has added a chapter "About the History of Electrodynamics." Given its modest price, this volume contains more than enough worthwhile material to earn a place in any physics library. Regrettably, it is not yet free enough of bugs to justify my recommendation for use as a text or for self-study.

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Asymptotic Theory of Separated Flows

▶ Vladimir V. Sychev, Anatoly I. Ruban, Victor V. Sychev and Georgi L. Korolev
Translated by Elena V. Maroko
Cambridge U. P., New York, 1998.
334 pp. \$49.95 hc
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The Reynolds number, which is a measure of the ratio of inertial to viscous forces, is arguably the most important parameter in fluid mechanics. The two major subfields of fluid mechanics, aerodynamics and hydrodynamics, are primarily concerned with flows at large values of this parameter. While these flows might be expected to behave inviscidly, viscous effects invariably play an important (but often subtle) role in determining their overall behavior.

Significant progress was made when Ludwig Prandtl introduced his concept of a boundary layer in 1904. Prandtl's idea was that, while viscous effects can frequently be neglected in the main body of these flows, they invariably become important in thin viscous (or boundary) layers at the bounding surfaces (usually the surfaces of a solid body) of the flow. These layers frequently separate from the surfaces and thereby produce global changes in the overall flow field.

Asymptotic Theory of Separated Flows, by Vladimir V. Sychev, Anatoly I. Ruban, Victor V. Sychev, and Georgi L. Korolev, is an in-depth theoretical treatment of this separation phenomenon for the relatively narrow class of two-dimensional incompressible laminar flows. It is an English translation of an earlier Russian edition, and its four Russian authors have all made significant contributions to the subject. In fact, one of my relatively minor criticisms is that the book places too much emphasis on the authors' contributions and, with the exception of the last chapter, provides only summary