

the various chapters of mathematics.

The author does not attempt to go into technical details that would spoil the book for the layman. Instead, she brings out the grandeur of Hilbert's work by quoting what his contemporaries have thought of it. It is not necessary for the reader to understand every word of such appraisal in order to be deeply impressed by the originality, depth and endeavor in Hilbert's world of mathematics. The physicist who applies many of the concepts and methods shaped by Hilbert, such as Hilbert space, integral equations, direct variational methods and the axiomatic method, will find that his mathematical outlook is widened by a careful reading of this biography, and the lay lover of mathematics will find himself enriched by it.

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Thermodynamics and Statistical Mechanics

By L. M. Grossman

323 pp. McGraw-Hill, New York, 1969.
\$13.50

Texts combining thermodynamics and statistical mechanics are numerous enough to form by themselves a respectably populated ensemble. There is an increasing tendency for the characteristics of each new member of the ensemble to approach those of the mean, as organization and examples from earlier texts are taken over and reworked. This interdependence is not necessarily bad. It allows successive authors to draw on the inspiration of their predecessors. New texts may hopefully become, if not more original, then at least more finely textured, more readable, and more closely fitted to the particular group of students for whom they are intended. Unfortunately, such progress is not universal.

Lawrence Grossman (Nuclear Engineering, University of California, Berkeley) directs his concise first-year graduate text, *Thermodynamics and Statistical Mechanics*, at a variety of non-specialists—engineers, chemists, and physicists—who require a working (as opposed to research) knowledge of the subject. The first quarter of the book is devoted to classical thermodynamics (Carathéodory approach—previous exposure to the Carnot-Clausius approach is assumed). Part 2 opens with a 25-page “course” in quantum mechanics (of marginal value to the noninitiate) and goes on to treat the density matrix and equilibrium ensemble theory. Part 3 discusses some standard diverse applications: perfect and imperfect gases, crystalline solids, and so on. Non-equilibrium processes are not touched upon.

Faced with the difficult dilemma of whether to emphasize methods or physics, the author has chosen the former. The examples in part 3 are chosen to illustrate application of the principles expounded in parts 1 and 2 rather than for their intrinsic physical interest. While this down-to-earth, how-to-do-it orientation has some merit, its effectiveness is often undercut by the style; while not pretending to rigor, the exposition of principles often tends to offputting formality. “If the state of an assembly can be influenced only by varying at least one of the generalized displacement coordinates $x_k = x_{k+1}$, we say that the boundary is an adiabatic wall” (x_{k+1} is the temperature).

The result of attempting to serve the needs of such a diversity of students is likely to be that the needs of none are served particularly well. Perhaps this is not a disastrous compromise for the nonspecialist; however, this reviewer prefers the more physical and less formally comprehensive format of a text like Fred Reif's, *Fundamentals of Statistical and Thermal Physics*.

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Physique des Lignes de Haute Fréquence et D'Ultra-Haute Fréquence

By P. Grivet

456 pp. Masson, Saint-Germain, Paris, 1969. \$12.00

Microwaves

By A. J. Baden Fuller

289 pp. Pergamon, New York, 1969.
Cloth \$7.50, paper \$5.50

The subjects of the two books, listed above, are close enough to be reviewed jointly. Grivet's book treats the physics of transmission lines at high frequencies; that of Baden Fuller starts with a chapter on transmission lines. By pointing out the differences between the two treatments, the reader may get an idea of the contents of these two books.

Both are aimed at the students of advanced electrical engineering and both can be used with profit by the physicist interested in microwave phenomena and their applications. The difference lies essentially in the personalities of their authors; whereas the first book is written by a physicist, professor at the Sorbonne, with excellent mathematical background, the second is the product of an electrical engineer, teaching at the University of Leicester. The remark about the mathematical background does not mean that Fuller's book is devoid of mathematics, but it is less detailed and avoids in many cases the derivations of the equations. Grivet's

book contains much more mathematical material, despite the author's remarks on the prevalence of deductive methods in France and recommendation for a “harmonious and fecund association” of the semi-empirical methods with mathematical rigor.

Grivet's book starts with a very nice and concise history of the transmission line. He points out that, since its beginnings, this “banal industrial object” attracted the attention of some of the best physicists of the last hundred years. The turning point in their understanding occurred in 1893, when Heaviside created a “bridge between the theory of circuits and the theory of waves.”

An attractive feature of the book is the reduction to four primary parameters of the numerous properties of conductors, including superconductors. He also shows how the concept of frequency spectrum allows in many cases to further reduce the analysis to two secondary parameters: the propagation constant and the characteristic impedance. The analysis extends to traveling waves, as well as to pulse propagation. Presumably the second volume will present the analysis of stationary waves.

Fuller's book is considerably shorter and much more oriented to the engineering student. This approach has its advantages too; eight chapters out of twelve have problems appended to them. Solutions to the problems are sometimes indicated by giving a few numerical answers; complete explanations of a few selected problems are given at the end of the book. There is considerably more emphasis on practical devices and measurements than in Grivet's book.

The two books thus appear to be complementary. Those interested in the physics of high-frequency phenomena (with sufficient knowledge of French) would have to turn to the book by Grivet. If microwaves are merely a tool for physics research, Fuller's book offers interesting material.

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Solid State Surface Science, Vol. 1

Mino Green, ed.

Marcel Dekker, New York, 1969. \$18.50

The physics and chemistry of solid surfaces have made considerable progress within the last few years despite the scarcity of well established theoretical foundations and the abundance of data obtained on poorly defined and impure surfaces.

As a result, some theories do not have proper experimental foundations and