material that is included is valuable and well presented.

The book is written for "the beginner," but precisely what kind of beginner is, to say the least, not clear. If, for example, the book is intended to be useful for the beginning user of electron microscopes, then it would be of little value. Indeed, many beginning users would be completely lost in mathematics before the end of the second chapter, and furthermore, they would find that the very short chapter on applications would be virtually useless. Perhaps the beginner that Hawkes mentions is the beginning student who hopes to emulate Hawkes himself, and this student would indeed find this to be a useful book. Such a student would be unperturbed by the lack of practical information such as relevant dimensions, or specimen-preparation techniques, and would not be in the least concerned that the unit of pressure used throughout is the Pascal rather than the Torr, and would find that the very clear treatment of the properties of electron lenses would be of great help in his further reading. Indeed, it is because of this clear exposition that I would recommend the book not only to the beginner, but also to those advanced users of electron microscopes who would like to renew their acquaintance with the fundamentals of the machine and its limitations.

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Fourier Transforms and their Physical Applications

D. C. Champeney
256 pp. Academic, New York, 1973. £5.20

Mathematics is the exact language that physical scientists use to correlate and interpret their experimental findings and to express their theories. Fourier series, for example, are used to describe periodic functions, presenting them as infinite sums of oscillations at frequencies that are harmonics (discrete spectrum) of the fundamental. The less familiar Fourier transform can express an arbitrary aperiodic function as an infinite integral over a continuous range of frequencies. First used in the treatment of single-pulse phenomena by the electrical engineer, the Fourier transform (and the related operations of convolution and correlation) now find application in optics, acoustics, scattering and diffraction of x rays, neutrons and electrons, and aperiodic effects in electrical circuits. Wider familiarity with this powerful mathematical tool will certainly broaden its field of application. D. C.

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Champeney's purpose is to teach the language of the Fourier transform and to give practice in its use.

The plan of the book is to present in Part I the formal mathematical development of the transform and the operations performed by it, and then in Part II to show how a wide variety of physical phenomena can be effectively and efficiently treated by the use of the techniques generated in Part I. But rather than work through the book chapter by chapter, Champeney suggests that Parts I and II be read simultaneously: "One-dimensional transforms and spectra might be covered first in chapters 1, 2 and 4, providing a sufficient mathematical grounding for much of the material on linear systems, harmonic oscillators, and electrical circuits and filters in chapters 7, 8 and 9." I feel this is sound pedagogical advice; the reader will thereby realize quite early the power and elegance of the Fourier transform in its application to practical problems.

The treatment in Part I is sometimes more heuristic than rigorous, with some details of mathematical development left up to the reader by the phrase "It can be shown that . . . ." A very useful table of over fifty functions and their transforms, together with graphs of both, is preceded by a brief set of do-it-yourself instructions, which will provide useful practice for the reader. After all, the only way to learn mathematical methods is to practice them. Part II presents in a very readable style examples of the many properties and processes that can be treated by the methods presented in Part I, including the theory of retrieval of information from background noise, holography, and scattering and diffraction in general. The emphasis is on results; a number of mathematical details is relegated to the appendices. These are followed by a bibliography containing references to the pure mathematics of the Fourier transform and to a number of specialized applications. I recommend the monograph enthusiastically to graduate students and research workers in the physical sciences.

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Physics and Computers: Problems, Simulation and Data Analysis

Robert Ehrlich
279 pp. Houghton Mifflin, Boston, 1973. $4.95

Physics and Computers provides an excellent introduction to the role of com-