BOOK REVIEWS

Classical Electrodynamics. By John David Jackson. 641 pp. John Wiley & Sons, Inc., New York, 1962. $13.00. College edition $10.75. *Reviewed by L. C. Levitt, Boeing Scientific Research Labs.*

PROFESSOR Jackson has produced a sort of pedagogic masterpiece in this splendid new book, which is eminently suitable for instruction and reference alike. Thoroughly modern, lucid, and remarkably complete and self-contained, it deserves to become a popular classic, accessible even to capable undergraduate students.

In seventeen well-integrated chapters the reader is taken, at a steady easy pace, from Coulomb's law through self-fields and radiative reaction . . . with remarkably little of basic importance left out in between. The discussion is lively and physically motivated throughout, and the physics is everywhere kept in the forefront. Each chapter is supplied with a list of useful and instructive problems involving worthwhile extensions of the text material, and the reader's curiosity is challenged by well-chosen references, many of them to still-evolving applications of the subject.

Conventional "elementary" topics, from basic potential theory through the introduction of Maxwell's equations and applications to waveguides and cavity resonators, are given a clear and ample discussion, with an exposition of orthogonal expansions and Green's functions nicely interwoven. Highlights from among the more "advanced" topics include a treatment of diffraction emphasizing a vector form of Kirchoff theory, a clear and concise survey of magnetohydrodynamics and plasma physics, two chapters offering a self-contained treatment of special-relativity kinematics and dynamics and the relativistic formulation of electrodynamics, and very clear discussions of particle orbits, radiation by moving and colliding charges, Thomas precession stopping power, Cerenkov radiation, scattering by quasi-free charges, the method of virtual quanta, an extensive development of multipole fields, and a final chapter on radiation damping, self-fields, equations of motion of charges, and the absorption of radiation by bound systems. The book concludes with a useful appendix on units and dimensions.

Even a search for criticism would turn up little in this fine book. Had the author planned on a larger work, various topics could, naturally, have usefully been given more extensive treatment. With some sacrifice of completeness, topics such as special relativity and the theory of waveguides and cavity resonators, which are well treated in so many other places, could have been omitted in favor of the inclusion, say, of chapters on the electrodynamics of media with spatial dispersion, and on the scattering of radiation in bulk matter. Discussion of these matters with the clarity of treatment of the other topics would have been a welcome bonus indeed for the more advanced readers. Nevertheless, the author has done a superb job within his plan for the book, and it should join Landau and Lifshitz's *Electrodynamics of Continuous Media* to form the pre-eminent (and mutually complementing) pair of modern physical treatments of the subject. Professor Jackson has shown again, albeit here within the compass of a well-worked-out subject, the extent to which clear thinking and clear writing can transform the difficult into the easy, and the obscure into the beautifully lucid. One but wishes that such skill and care might be more evident in the muddily-written *research* literature of today!

Methods of Mathematical Physics. By R. Courant and D. Hilbert. Vol. 2, Partial Differential Equations, by R. Courant. 830 pp. Interscience Publishers, a division of John Wiley & Sons, Inc., New York, 1962. $17.50. *Reviewed by T. Teichmann, General Atomic Division, General Dynamics Corp.*

THE two volumes of *Methoden der Mathematischen Physik* by Courant and Hilbert have long been classics and their study indispensable to those interested in applications as well as those concerned with mathematical researches. Indeed, long before the English translation of Volume 1 appeared some nine years ago, its tone, and to a great extent its contents, had become a well-established part of the English-language literature in its field. The contents of Volume 2, despite their importance, have not, however, been similarly assimilated (though they have stimulated much mathematical research), and this translation and expansion therefore fills an important gap in the English literature.

With the exception of the omission of a chapter on the existence of solutions of elliptic equations, using variational methods, the book covers much the same ground as the earlier German version, but in a greatly extended and modernized way. The treatment is more general, abstract, and deeper, and relies heavily on functional analysis (including fixed-point theorems) in the existence proofs. Of necessity, some of this increased generality and depth is accompanied by references to the literature rather than by complete ex-