geometry " occupies pp. 40-56 of Part I. It contains n-dimensional generalisations of some of the earlier results, and other material, including problems 99-109. These are not discussed in Part II but, as elsewhere in the book, adequate references are given. Finally, there is a bibliography of 202 items (of which the last 86, forming a separate alphabetical sequence, were added by the translator) and an index.

The book, which is one of the publishers' Athena Series, can be recommended for the impression it gives of the power of elementary geometrical reasoning.

D. MONK

BELLMAN, RICHARD, *Perturbation Techniques in Mathematics, Physics and Engineering* (Holt, Rinehart and Winston, London, 1964), 118 pp., 30s.

The text is divided into three sections whose titles " Classical Perturbation Techniques ", " Periodic Solutions of Nonlinear Differential Equations and Renormalisation Techniques ", and " The Liouville-WKB Approximation and Asymptotic Series ", give some indication of the range of topics discussed. The style is annoyingly " chatty " and oratorial, and one cannot help but feel that here is a series of lectures bound into a book. As is permissible in a course of lectures to a known audience, but is not permissible in a book, the sections are of uneven depth, some of the simpler work being over-explained at the expense of some of the more difficult! The text will certainly be of interest to the applied scientists for whom it was written, but I fear that many will find it a difficult text, even with the knowledge of " an intermediate course in calculus and the rudiments of the theory of ordinary differential equations " assumed by the author. The reader is invited to try a " plethora † of problems "; too many of these are of a pure mathematical nature. There are extensive references to the background material of the book. The typography is excellent.

J. W. SEARL

LINNIK, YURI V., *Decomposition of Probability Distributions* (Edinburgh and London, Oliver and Boyd, 1964), xii+242 pp., 84s.

It has been common knowledge over the past few years that a considerable amount of work had been done by the Russian school on what has been called the " arithmetic of probability distributions ": i.e. topics such as the factorisation of characteristic functions into the product of two (or more) non-trivial characteristic functions, or equivalently the representation of a distribution function as the convolution of two others. Nevertheless probably all but the already-committed specialist have been deterred by the combination of language difficulties and the somewhat inaccessible character of the relevant journals from investigating this, for only relatively short accounts have been given in English. Now, however, the present book by Linnik, who has himself been responsible for much of the work in the field, has made the task much easier.

The first six chapters (approximately half the book) begin by setting down the basic requirements from real and complex variable theory, giving in some detail the essentials of less familiar topics, then summarise many of the properties of characteristic functions, and finally give the almost classical theorems of Cramér and Raikov on the decomposition of the Normal and Poisson laws respectively. While its contents are available elsewhere, this part of the book is in fact very useful.

The remainder of the book describes recent developments, in the direction suggested

† Any unhealthy repletion or excess! S.O.E.D.

by the Cramér and Raikov results, and much (though not all) of it is concerned with just one problem; the characterisation of the class of characteristic functions admitting only infinitely divisible factors.

The book is not easy to read, but this seems unavoidable in view of the nature of the subject matter and the classical analytic methods of attack which appear to be necessary; one proof, for example, occupies all 39 pages of Chapter 8. This having been said, however, I found the book interesting and well written.

It is, of course, a translation of one published in Russian in 1960. It is possible, as always, to detect traces of its non-English origin, but in this case they are extremely rare; the translator and the editor (who has also added various clarificatory footnotes) deserve considerable praise. The typography and physical format in general are also of a high standard. R. M. LOYNES

IKENBERRY, E., *Quantum Mechanics for Mathematicians and Physicists* (Oxford University Press, 1962), xii+269 pp., 64s.

This book is one of many textbooks on quantum mechanics which have appeared during the last few years. It sets out to provide the basis for a one-year introductory course, suitable both for mathematicians and physicists. In the American context in which the book was written such a course would be given to first-year graduate students; here it would form part of an honours degree syllabus.

Dr Ikenberry's course is fairly conventional both in scope and presentation. It begins with three chapters on the origins of quantum theory in the problems of atomic physics and electromagnetic radiation, and follows a well-trodden path up to a final chapter on the Dirac theory of the electron. It is quite a short book for one which covers so much ground, and it must be pointed out that this coverage is achieved by leaving the reader to fill in much of the detail by reading other more expanded texts and original papers as well as by working through about 350 illustrative exercises. Thus, unlike some of its more substantial contemporaries, it is not a text which is complete in itself.

For the most part Dr Ikenberry's presentation of the subject seems to this reviewer to be both clear and unexceptionable. However, the last chapter does not quite maintain the general standard. Here the author discusses the interpretation of the Dirac wave function and, in particular, the so-called " Zitterbewegung " in much the same way as Dirac himself did. He seems unaware that, as long ago as 1949, such puzzling features of relativistic quantum mechanics were clarified by Newton and Wigner in a paper which surely merits at least a reference in any up-to-date textbook.

These exceptions apart, the book is a useful and reliable addition to the available texts on the subject. P. W. HIGGS

EDELEN, D. G. B. *The Structure of Field Space* (University of California Press; Great Britain: Cambridge University Press, 1962), xiii+239 pp., 84s.

The subtitle of this book " An Axiomatic Formulation of Field Physics " is misleading, for its contact with physics is minimal. Part One, " The Axiomatic Structure of Fields ", discusses systems of field equations derived from a general Lagrangian function of a set of fields, including a symmetric affine connection, defined over a four-dimensional connected Hausdorff space. Part Two, " The Variant Field Theory Analysis of the Classical Fields ", particularises the Lagrangian in order to obtain equations for the gravitational and electromagnetic fields, either alone or coupled to a classical fluid.

The author's outlook is dominated by Einstein's view of physics as geometry, which led him to spend his later years in a fruitless search for a " unified field theory ".