book by Scharff is based on the notes of his lecture course at the Niels Bohr Institute at Copenhagen. (Scharff died in 1961 at the age of 34. The present book is an English translation, with additions, of a text published in 1963.) The book is fairly straightforward and aims to give an understanding of the physical, rather than the formal, aspects of the theory. The motion of wave packets is treated in some detail in order to bring out the relation between quantum and classical mechanics. The basic principles are developed via the Schrödinger equation and applied to stationary states and time-dependent phenomena. There is a thorough treatment of a particle in a central field, and a final chapter on systems of several particles.

Although the book is quite a slim volume, it covers a surprising amount of ground. This is achieved by an absence of padding and a concentration on essentials. I do not regard it as superior to some of the established texts, such as that by Dicke and Wittke or the slightly more advanced one by Mandl, but can recommend it as a useful and workmanlike book.

The book by Ziock is also based on a lecture course—one given to undergraduates in physics and graduates in electrical engineering and astronomy at the University of Virginia. It is a rather personal presentation of the subject. Although most of the basic ideas are covered, some important topics are omitted. For example, the author has a chapter on stationary perturbation theory and another on scattering, but the Born approximation is not mentioned. Again, there is a chapter on time-dependent perturbation theory which stops short of deriving, or even mentioning, Fermi's golden rule for transition rates.

Ziock has a breezy style which extends to numerous asides in the form of footnotes. Some of these seem rather pointless. For example, "Of course, the hermitian conjugate of a non-hermitian matrix is also a non-hermitian matrix. The 'non-hermitian hermitian conjugate' is only a linguistic curiosity, not a mathematical one."

In spite of some attractive features—there are many instructive problems—and the detailed treatment of certain topics such as the hyperfine structure of hydrogen, I cannot recommend Ziock's book very highly. I think its somewhat arbitrary choice of topics limits its usefulness for the average student—also, its price seems rather steep for a book of 270 pages. G. L. SQUIRES

FIELD THEORY

Introduction to Quantum Field Theory

By Paul Roman. Pp. xviii + 634. (Wiley: New York and London, July 1969.) 158*s*.

THIS book falls quite naturally into two almost equal parts, one dealing with Lagrangian field theory and the other with more axiomatic approaches, S-matrix theory and other modern trends. While this gives one a good overall view of the field, the penalty is the omission of such branches as standard quantum electrodynamics. The author has designed the book primarily as a text for advanced research students in theoretical physics, stressing mainly the basic ideas of the theory and the general methods used for computation. More practical readers may be worried about the deliberate lack of worked examples, especially those calculated to the bitter end, but "since our basic concern is the structure of field theory, we do not go into these details" (of calculating a cross-section from the S-matrix).

The more unusual features of the first part include the use of Schwinger's action principle to derive the rules for canonical field quantization, and also the great emphasis placed on Schwinger's functional equations for propagators and vertex functions. The Bethe-Salpeter equation for the four-point function is derived rather more intuitively.

The second part opens with a critique of Lagrangian field theory, before launching into the axiomatic formulations of Lehmann, Symanzik and Zimmerman and of Wightman. Most of the theorems associated with the latter approach, including Haag's theorem, are successfully described and illustrated without giving the lengthy mathematical proofs. A study is then made of the general properties of scattering amplitudes, such as crossing, unitarity and analyticity, but much more space is devoted to the two- and three-point functions than to the four-point. The chapter on form factors ends with discussions of the conserved vector current and partially conserved axial current hypotheses and the Goldberger–Treiman relation. Another outstanding result of modern theory, namely, the Adler–Weisberger relation, is considered in a short chapter on current algebras. In contrast to a monograph, the treatment of these new approaches is of necessity brief, but the work can still provide an introduction to the uninitiated or serve to show the relationship to more established branches of the subject.

COLIN WILKIN

PLASTIC STRUCTURES

Plastic Design of Frames

By Sir John Baker and Jacques Heyman. Vol. 1: Fundamentals. Pp. vii + 228. (Cambridge University Press: London, July 1969.) 55*s*.

A NUMBER of texts have been written which describe the results of the relatively recent researches which have led to the formulation of the plastic theory of structural analysis. In my opinion, however, nobody has previously set down the fundamentals in so clear and concise a form or in such a readable manner as the authors of this textbook.

The authors have chosen, in this first volume, to deal with the fundamental basis of simple plastic analysis; reserving for a later volume topics which are either of a more advanced nature or are not of prime importance.

Consideration is first given to the bending moment which a member constructed of a ductile material can support, and which leads to the formation of a plastic hinge in the member when the applied bending moment is equal to the fully plastic moment of the member. Subsequently, the effects of shear and axial force on the capacity of the member to withstand bending are discussed. Later, the theory is extended by discussion of the virtual work equation, the derivation of upper and lower bounds on the plastic collapse load of a structure and consideration of the various theorems which are fundamental to the concept of plastic analysis.

Having developed the theory, its application is well illustrated by reference to a wide range of structural forms which include beams, rectangular and pitched roof portal frames, beam grillages, arches and simple space frames. The method of combination of mechanisms, in which the various independent plastic collapse mechanisms of a structure may be combined to determine the true collapse mode for a particular structure and loading system, is fully described and illustrated by reference to multi-storey, multi-bay frames and pitched roof frames.

The value of the book is enhanced by the inclusion of 140 well chosen examples for which the answers are provided. These examples, in common with the rest of the book, use the SI (metric) system of units.

This book is well suited to the needs of undergraduate students studying plastic analysis as part of a general structural engineering course. It can also be recommended to the structural designer who wishes to employ plastic methods of design. Of particular appeal to the designer are those sections of the book which draw attention to the