the methyl group pointing towards the vapour phase, but if the interface is not in equilibrium with the bulk phases the fractions of molecules in each layer of the interface with the methyl group pointing towards the vapour phase may be assigned arbitrary values. In fact, an interface not in equilibrium with the bulk phases has an infinite number of degrees of freedom, and so all the formulae purported to relate to interfaces not in equilibrium with the bulk phases have no physical significance.

Fourthly, overmuch effort is devoted to the question of how surface tension depends on the curvature of the interface. It has been shown that the surface tension in a curved interface can differ appreciably from that in a plane interface only when the curvature is so great that surface tension cannot be measured at all. In the words of Willard Gibbs, "it will generally be easy to determine the surface tension in terms of the temperature and the chemical potentials of the several component species with considerable accuracy for plane surfaces, and extremely difficult or impossible to determine the fundamental equation more completely". These words are more informative than any number of algebraic relations.

The notation has been chosen with great care and thoroughness by Professor Everett. The printing is superb. I noticed only two typographical errors. I could not advise anyone to spend £5 on this book, but a book one fifth as long and at one fifth the price might have been a best seller.

E. A. GUGGENHEIM

SEMICONDUCTORS

Solid State Semiconductor Physics

By John P. McKelvey. (Harper's Physics Series.) Pp. xii + 512. (New York and London: Harper and Row, Publishers, 1966.) n.p.

THE transistor has become a very important product of the electronics industry. It is also the most ready symbol of the success of objectives research. Therefore, the theory underlying the operating principles of semiconductor devices has become a prominent part of any undergraduate or immediate postgraduate syllabus. The author of this book shares this feeling, and has prepared a fairly advanced course on semiconductor physics. It is also evident that his students have obviously not had previous grounding in some of the general theoretical background required for the understanding of semiconductor electronics. Thus, the first half is devoted to some general important aspects of the theory of solids. The resulting book is therefore a text-book, which treats in a very competent manner, at degree level, the theory of solids leading up to semiconductor theory.

It is perhaps a pity that it seems necessary to devote forty pages to space lattices and X-ray crystal analysis. These are followed by chapters on crystal dynamics, outlines of quantum mechanics and statistical mechanics, lattice vibrations, the free-electron theory and quantum theory of electrons in periodic lattices. These 256 pages form a text-book themselves. The second half is entirely devoted to semiconductors: uniform semiconductors, excess carriers and their properties, materials technology, p–n junction theory and finally about 100 pages on devices including p–n junction rectifiers, transistors, metal-semiconductor contacts, surfaces and various special devices.

The book is written at a uniformly competent level, and the arguments are set out clearly and the mathematical treatment is modern and very clear. Unfortunately, the book is very dry and lacks any kind of enthusiasm or feeling of physical understanding. It will be a good aid to all those who wish to prepare themselves for examinations in any of the subjects mentioned, but it will be of less use to those who wish to extend their understanding and intuitive feeling about the subject. It is not intended as a reference book.

The applied or more technological parts of the book are somewhat brief and out of date. For example, junctions are still mainly made by alloying techniques, and diffusion theory and other physical chemical subjects—which are quite important in semiconductor theory—are scarcely dealt with, and planar technology is not mentioned. There may also be, for some readers, insufficient attention to surfaces, the role of defects and other aspects associated with the difficulties encountered in practical semiconductor work.

The printing and production are excellent, the figures very clear, but the index barely adequate.

K. HOSELITZ

STOCHASTIC PROBLEMS

Non-Linear Transformations of Stochastic Processes

Edited by P. I. Kuznetsov, R. L. Stratonovich and V. I. Tikhonov. Translation edited by J. Wise and D. C. Cooper. Pp. xvi + 498. (Oxford, London and New York: Pergamon Press, Ltd., 1965.) 140s. net.

IN classical probability theory the study of stochastic processes has developed mainly along two lines; these are Markov processes, and second-order theory based on correlation functions and power spectra. The well-known theory of the second category is adequate for Gaussian processes and is ideally suited for dealing with the effects of linear transformations (that is, "filters"). However, when one encounters the realm of non-linear transformations and non-Markovian non-Gaussian processes there is very little in the way of standard theory. This book presents a collection of thirty-nine papers written mainly by the editors (together with occasional collaboration by I. G. Akopyan, I. N. Amiantov, P. S. Landa, Yu. M. Romanovskii and A. A. Tolkachev, and an interesting foreword by R. Fortet) which develop a more general approach to the problem of characterizing an arbitrary stochastic process. These papers were originally published in various Russian journals between 1953 and 1961, and vary in nature from basic theory to practical applications, the latter being concerned specifically with problems in communication and control engineering.

The papers are neatly grouped into five chapters. Chapter 1, of seven papers, describes the authors' basic theoretical work on "characterizing functions". The main idea underlying this approach is that an arbitrary process, $X(t)$, may be described by specifying all the cumulants of the multivariate distribution of $\{X(t_1), X(t_2), \ldots, X(t_n)\}$, for all sections of time points $t_1, t_2, \ldots, t_n$, and all values of n. (In the authors' notation, these cumulants are called "correlation functions".) The authors then discuss two alternative formulations based respectively on the use of moments and "quasi-moments" (essentially, the coefficients of an orthogonal expansion of a multivariate probability density function), and make the assumption that the importance of a characterizing function decreases with its "order", so that, in practical applications, one need consider only a finite set of these functions. Relations are then obtained between the characterizing functions of two processes, $X(t)$ and $Y(t)$, when $Y(t)$ is a non-linear transformation of $X(t)$. Chapter 2, consisting of eight papers, deals with the effect of noise on non-linear devices such as a "detector" stage in a radio receiver. Here the subject matter is much more practical than in the first chapter and most of the papers deal with analyses of specific circuits. Chapter 3, of twelve papers, is again practical, and describes the effect of self-oscillations induced by random noise in oscillators.

Chapter 4, with six papers, discusses a topic which the authors term "random function excursions". Here they