problem, including an analysis of the torques which are likely to act on a body in space. This is followed by a brief discussion of attitude sensing, mainly by dynamical devices, although various physical effects are also briefly mentioned. Finally, the attitude control problem as such is described.

The selection of topics in this volume is certainly a very good one. It strikes a nice balance by presenting the state of the art and incipient developments, rather than veering off too much into the future.

Les Séries et leur Application à la Résolution de divers Problèmes pratiques d'Analyse mathématique, Volume 2. By C. Meynart. 116 pp. Eyrolles, Paris, 1960. 29.20 NF. *Reviewed by J. Gillis, The Weizmann Institute of Science.*

A SEQUEL to Volume 1 of the same work, this book is mainly devoted to an exposition of elementary methods for solving differential equations by series. In addition, there are some examples of the use of series for calculating various integrals. The whole is on a very elementary level with a careful avoidance of all complications. Differential equations nearly all have constant coefficients, and the idea of a singular point is never mentioned. It is hard to believe that this book answers all the questions of the engineers, but it does convey a considerable amount of elementary information in words of very few syllables. The chapter on big computing machines is quite breathtakingly out of date. There are some useful tables and some very interesting and practical diagrams.

The Passage Problem for a Stationary Markov Chain. Vol. 1 of Statistical Research Monographs. By J. H. B. Kemperman. 127 pp. The U. of Chicago Press, Chicago, Ill., 1961. $5.00. *Reviewed by George Weiss, University of Maryland.*

THE Markov process has long been used in physics to study the behavior of systems with large numbers of particles, since the Markov process is the simplest probabilistic process which mimics deterministic mechanics in which initial conditions completely determine the future state of the system. Probably the first explicit use of Markov processes in physics was the Ehrenfest model. Since the early studies of this model there have been many others carried out on the same or similar models; more recently there has been a good deal of interest in Markov systems as applied to chemical kinetics. In all of these problems the calculation of the statistical properties of first passage times is of central importance.

Kemperman's book contains a good survey of recent work on the first passage time problem for Markov chains. This type of problem appears in many guises in mathematical statistics, and there are many recent results, particularly on the asymptotic properties of the first passage time, which might be of considerable interest in physical applications. Unfortunately it will be difficult for the physicist to get the information from this book since it is written for the statistician with a good acquaintance with the literature.

In the first few chapters, Kemperman deals with fundamental parameters characterizing Markov chains and first passage times. The formalism is then applied in some detail to the Ehrenfest model. The following chapters consider the proof and consequences of Wald's identity in sequential analysis (which allows calculation of asymptotic absorption probabilities for random walks with absorbing barriers), some recent work on combinatorial problems, and brief applications to queuing theory and collective risk theory (the theory of the insurance firm). Since the work is limited to Markov chains, no mention is made of recent interesting work of Kac on occupation times for particles in Brownian motion.

An Introduction to the Theory of Vibrating Systems. By W. G. Bickley and A. Talbot. 238 pp. Oxford U. Press, New York, 1961. $4.80. *Reviewed by T. Teichmann, General Atomic Division, General Dynamics Corporation.*

WHILE the mathematical techniques required to deal with vibrational phenomena are independent of their physical origin, the governing equations are not, and this has led to the tendency to treat vibrations of different types on an individual basis depending on their origin. Rayleigh's work, of course, is a notable exception, and recently there have been others, though at a relatively advanced level. This book aims at a unified presentation at the undergraduate level, which is most desirable both from the esthetic and conceptual points of view.

The treatment given is distinguished by a number of useful and unusual features—at least at this level. These include a strong accent on energy methods and approximate techniques (Rayleigh's method). In the latter case the theory is presented rather heuristically but this is compensated by the extended treatment of examples throughout the text. The analogy between electrical and mechanical systems is brought out, without being unnecessarily belabored, while on the other hand the question of reflected waves in continuous systems is given the careful treatment it warrants but does not always receive. The mathematics is also carried further than usual in the discussion of the orthogonality of normal modes, and in the comments on nonlinear vibrations. A defect, in the opinion of this reviewer, is the unnecessary and inappropriate introduction (and frequent use) of the term "pulsatance" for angular frequency!

Examples are woven through the text, and exercises presented at the end of each chapter (with answers). The mathematics, which is elementary to start with, becomes more sophisticated as the book progresses, and the topics and manner of discussion should prove interesting even to the familiar reader, and certainly useful to the student.