listic trajectories, including error analysis and ballistic recovery from space. A longish chapter considers satellite orbits around the earth extending well out toward the moon's orbit as well as close in to the earth. This involves a discussion of the various types of perturbation, especially atmospheric drag, and those due to the earth's oblateness. One chapter is devoted to orbit change and orbit transfer in a central force field; all possible orbit maneuvers are included as well as an analysis of errors. Another considers the escape or capture maneuvers in a field produced by two central forces, again with an extended discussion of error analysis for the orbits.

Powered trajectories of all types are treated in the next three chapters; the one on low-thrust space flight being especially complete. Up to this point the discussion has been quantitative with the derivations of all pertinent equations very complete. The next chapter, on lunar flight, is less so, only the results of apparently long, tedious calculations being presented in graphical form. Actually most of the theory needed was presented in the chapter on perturbations in Volume 1. Similarly the last chapter on interplanetary flight, one of the longest in the book, assumes by now that the reader is able to perform the detailed calculations and presents most of the information on transfer orbits in graphical form.

Since this volume like the first one contains many typographical errors, indicating a poor job of proof reading, there may or may not be some doubt as to whether all of the figures are correctly drawn. Checking equations and sentences does not take as much time as replotting graphs so this reviewer only attempted the former, here and there. In the first 228 pages for instance, there are at least 40 errors and probably more. Consequently the reader should check everything as he goes and the publisher ought to issue lists of errata for both volumes as soon as possible.

Where the first volume contained mostly material which could be found elsewhere (although point of view and style were plainly those of the author), this volume is unique for there just is no other such exhaustive treatment of the problem of space flight. Since a third volume is promised, the three volumes should, if reprintings correct the numerous irritating errors, constitute the most complete theoretical presentation of the subject of space flight from the dynamical point of view as now understood.

Statistical Physics. By G. E. Uhlenbeck, N. Rosenzweig, A. J. F. Siegert, E. T. Jaynes, S. Fujita. Vol. 3 in 1962 Brandeis University Summer Institute Lectures in Theoretical Physics, edited by K. W. Ford. 252 pp. Benjamin, New York, 1963. Cloth $8.00, paper $4.95.

Reviewed by ***Nandor L. Balazs,*** *State University of New York at Stony Brook, Stony Brook, L. I., New York.*

Statistical mechanics as we now know it is very nearly a hundred years old. (Maxwell's paper on the Maxwell distribution was published in 1859; Boltzmann's paper on the same subject appeared in 1868, while his great memoir on the relation between entropy and probability dates from 1877.) Notwithstanding this, the discipline shows no sign of age and continues to exert great fascination. A sampling of the topics which are of current interest are brought together in this volume. During the last thirty years, a recurrent problem has been the existence and description of phase transition within the framework of statistical mechanics. The first paper by G. E. Uhlenbeck provides the clearest and *easiest* exposition of these matters. He first discusses the nature of the problem and some general theorems concerning phase transitions. Finally, he gives an exposition of the recent results based on the one-dimensional model invented by M. Kac, and further developed by Kac, Uhlenbeck, and Hemmer. This model exhibits phase transition, is physically quite realistic, and is mathematically so tractable that all thermodynamical and statistical properties can be explicitly computed. During recent years increasing attention is being paid to the use of functional integrations in statistical mechanics. Siegert describes the use of these techniques in the evaluation of partition functions. In particular he develops an approximation scheme for the Ising lattice problem and for the partition function of a fully ionized gas. Recently, Van Hove with his school and Prigogine with his school have developed general methods to deal with the statistical description of irreversibility. Fujita reviews the method of each school and the relationships between them. In particular, he discusses the assumptions which go into the derivation of the master equation and the initial conditions associated with it. Jaynes returns to one of the oldest problems of statistical mechanics, the relation between entropy and probability. Instead of utilizing the old Boltzmannian approach, using an ensemble, he prefers the notion of subjective probability and the use of the theory of statistical estimations. The energy spectrum of a nucleus is notoriously complicated. In 1956 E. P. Wigner conjectured that although the density of levels at a given energy will depend on the particular nucleus under consideration, the fluctuations in the precise position of the levels can be interpreted as if they were following definite and simple probabilistic laws. This idea led to the invention of a statistical mechanics, in which not the levels of a Hamiltonian are subject to probabilistic laws, but the Hamiltonians themselves. The mathematical treatment of these matters forms the content of Rosenzweig's lectures.

Each contribution is clear and explicit and serves as a good introduction; the literature references are well chosen. The printing is clear, and the book is well bound.

The Mathematical Theory of Viscous Incompressible Flow. By O. A. Ladyzhenskaya. Revised English ed. transl. from Russian by Richard A. Silverman. Vol. 2 of Mathematics and its Applications, edited by Jacob T. Schwartz. 184 pp. Gordon and Breach, New York, 1963. $9.50.

Reviewed by ***Jacques E. Romain,*** *Centre de Recherches Routières, Sterrebeek, Belgium.*

Although it may seem inappropriate to mention the translator before the author of a book, let a breach in usage be made in the present case. The translation is so clear and well written, and it is so rare a pleasure to come across a genuine counterexample to the Italian saying "Traduttore, traditore", that it is well worth mentioning.

The book is a highly mathematical

analysis of the existence and uniqueness theorems about the boundary-value problems for both the linearized and the general nonlinear Navier-Stokes equations. The author claims that "the reader is not required to know more than the elements of classical and functional analysis". However, this reviewer, perhaps because he is more a physicist than a mathematician, feels that a sizable mathematical background is necessary. After an introductory chapter devoted to some points of mathematical technique in Hilbert space and in a generalized space introduced by Sobolev, a very careful and thorough study is made of the boundary value problem in the various possible conditions: linearized or nonlinear, stationary or nonstationary, problems. The attention is directed to source-free media. A number of existence and uniqueness theorems, for various sets of assumptions, is displayed, but, to be sure, the question of the unique solvability, in the large, of the general three-dimensional boundary value problem for the nonstationary Navier-Stokes equations remains open. A chapter is devoted to the theory of hydrodynamical potentials.

The book initially appeared in 1961. This is a revised edition, enlarged with comments on recent contributions to the field. It may thus be considered a really up-to-date monograph.

Photoelasticity. Symp. Proc. (Chicago, Oct. 1961). M. M. Frocht, ed. 294 pp. Pergamon, London, 1963. Distr. in US by Macmillan, New York. $14.00.
Reviewed by ***Walter G. Mayer****, Michigan State University.*

The 1961 International Symposium on Photoelasticity in Chicago was the first such conference ever held in this country. The papers, before being presented during this meeting, were first reviewed and later edited for publication in this book. Since invitations to this symposium were restricted to "Western" countries, it can only be assumed that the book reflects worldwide research trends in photoelasticity and photoplasticity.

The main concern of the book is the description of industrial applications of new methods, the improvement of known techniques, and, to some extent, an evaluation of some fundamental aspects of photoelasticity. Stress analysis is emphasized very strongly, and various methods are described, which utilize birefringent coatings. Investigations are not confined to two-dimensional stresses, in fact, a major portion of the book deals with three-dimensional photoelasticity. There are some survey articles—but most of the papers are rather specialized and deal with specific applications.

The book seems to be intended mainly for the engineering and industrial market, although occasional excursions into fundamental problems may make parts of it attractive to readers interested in the more general aspects of photoelasticity.

Space Research III. Wolfgang Priester, ed. Symp. Proc. (Washington, D. C., May 1962). 1275 pp. North-Holland, Amsterdam, 1963. Distr. in US by Wiley, New York. $35.00.
Reviewed by ***Herman Yagoda****, Air Force Cambridge Research Laboratories, Bedford, Massachusetts.*

When confronted with a ponderous volume of 1275 pages containing 118 contributions by some 240 multilingual authors, the critic has indeed reason to be envious of the literati of the Sunday book review sections who can concentrate on the style, depth of thinking, and character portrayals of a contemporary novel dealing with human activities and emotions on our planet Earth. Space Research, Volume III, houses the final proceedings, all corrected, and hopefully augmented by data of improved statistical weight, given by the delegates who gathered in the State Department Auditorium in April 1962 to present and discuss physical observations of our space environment as telemetered by the latest satellites encircling the globe.

It was spring in Washington, the tulips, while no longer in their glory, could still be seen standing in their beds beneath the colorful azalea bushes. The white cherry blossoms were gone, their browning petals underfoot, but Hains Point with its longer-lived pink cherry blossoms was not far away. Under these idyllic conditions, it is conceivable that all delegates were not invariably present to