

# REACTOR PHYSICISTS

## THEORETICAL

For research in reactor systems design, shielding, kinetics, safety; and basic studies in such areas as neutron thermalization.

Ph.D. in Physics and/or Nuclear Engineering or M.S. with experience preferred.

## EXPERIMENTAL

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Ph.D. in Physics and/or Nuclear Engineering or M.S. with experience preferred.

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**Conduction of Heat in Solids (2nd ed.).** By H. S. Carslaw and J. C. Jaeger. 510 pp. Oxford Univ. Press, New York, 1959. \$13.45. *Reviewed by Herman Feshbach, Massachusetts Institute of Technology.*

THIS second edition of a book which appeared first in 1946 was prepared by J. C. Jaeger. The major change from the earlier book is the addition of a chapter on melting and freezing. For the physicist, the most interesting chapter is the first one, in which the various kinds of thermal phenomena which can occur are formulated as boundary-value problems or as integral equations, both linear and nonlinear.

The rest of the book is devoted, for the most part, to the mathematics of their solution in various geometries. Detailed solutions are provided for a large variety of problems. A new chapter on the integral transforms (complex Fourier and Mellin) and a new chapter on numerical methods are included in this edition.

**Rarefied Gas Dynamics.** Internat'l. Symp. Proc. (Berkeley, Calif., 1960). L. Talbot, ed. Supplement 1 of *Advances in Applied Mechanics*, edited by H. L. Dryden, Th. Von Kármán, G. Kuerti. 748 pp. Academic Press Inc., New York, 1961. \$19.00. *Reviewed by Henry Wise, Stanford Research Institute.*

THE papers presented at this Symposium provide a fine measure of the spectrum of problems of concern to the "rarefied-gas dynamicist". The non-equilibrium, noncontinuum properties of chemically reactive fluids have come to the foreground, in part as the result of the questions asked by our advancing technology related to the exploration of the upper atmosphere. For quite some time the physical chemist has been acquiring the principles of fluid dynamics. The day has come when the fluid dynamicist needs to draw upon the knowledge of such far-flung scientific endeavors as solid-state physics, surface chemistry, chemical kinetics, spectroscopy, quantum mechanics, and plasma physics.

Because of this wide range of topics of interest, the book represents more an assembly of individual papers rather than a coherent, integrated text unified both in subject material and terminology. Obviously this publication is more of a signpost than a hitching post in this rapidly evolving field of science.

The 41 contributed papers are divided into six sections dealing with: (1) molecular beams and surface interactions, (2) free-molecule flow, (3) fundamentals of kinetic theory and fluid mechanics, (4) application of kinetic theory, (5) low-density gas dynamics, and (6) ionized gases. Of special prominence are the investigations of the interaction of gases with solids and of the relaxation phenomena in rarefied-gas flow.

It is regrettable that the discussions which took place during the Symposium were not included in the text. Still, the book offers to the specialist interested in gas dynamics a fine review of the state of the art at the



A DEFINITIVE WORK . . .

# APPLIED MATHEMATICS

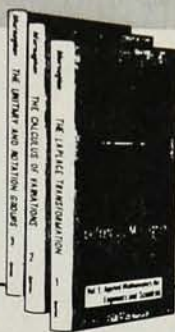
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time of the meeting. It is apparent that the progress in this field is slow when one realizes that such a problem as the Knudsen accommodation coefficient is still a matter of research and discussion. This fact points to the lack of fundamental information available at this time. Perhaps the needs of the applied scientists will give further impetus to the more basic research effort in the various disciplines upon which gas dynamics must feed.

**Hypersonic Flow Research.** Frederick R. Riddell, ed. Vol. 7 of Progress in Astronautics and Rocketry, edited by Martin Summerfield. 758 pp. Academic Press Inc., New York, 1962. \$10.50. Reviewed by R. E. Street, University of Washington.

**T**HIS volume is a compilation of papers presented at a conference on hypersonics held at the Massachusetts Institute of Technology in August 1961 and sponsored jointly by the Air Force Office of Scientific Research and the American Rocket Society. Instead of trying to cover all of the multitudinous aspects of hypersonic flows, the papers are concerned only with low Reynolds-number effects, chemical-kinetic effects, inviscid flows, and a fairly complete coverage of current experimental techniques. The type of paper presented is of primary interest to the engineer who is attempting to understand the flow phenomena involved when vehicles re-enter the atmosphere of the earth from orbits or extraterrestrial trajectories.

An introduction by Wood and Pallone summarizes all of the papers in the volume and this brief review can hardly summarize the summary. The papers on viscous effects at low Reynolds number include three on blunt-body flows by Oguchi, by Van Dyke, and by Levinsky and Yoshihara, with a fourth on the Rayleigh problem for a dissociated gas by Moore and Rae. A good general introduction to chemical kinetics is presented by Bauer, followed by two more papers on chemical effects by Wray and by Vaglio-Laurin and Bloom. There are two papers on radiation effects by Treanor and by Teare, Georgiev, and Allen. The inviscid theory of flows about slender wings and blunt bodies is surveyed and extended in a series of papers by Cole and Brainerd, by Freeman, Melnik, and Scheuing, and by Yakura. Finally, a group of nine papers deals with all aspects of experimental methods, including shock tubes, shock tunnels, hot-shot tunnels, arc tunnels, and free-flight. These cover the better-known facilities in the United States and in England for testing at high Mach number, high enthalpy, and low-density conditions by well-known workers in the field.

The papers were well selected and consequently give a true picture of the state of the art, of current attempts to extend our knowledge, and of new results as well. The balance between theory and experiment is good. There are several fairly obvious misprints, and pages 144 and 145 have been interchanged. Also, the changes in notation from paper to paper are disconcerting, and the mathematics is not always clear. How-