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Science Books of Unusual
Interest

PEACETIME USES OF OUTER SPACE

Edited by **SIMON RAMO**, Thompson Ramo-Woolridge, Inc. Available in August, 1961.

This remarkable volume brings together outstanding scientists, educators, politicians, and businessmen for an examination of the coming space age. Emphasizing the peacetime, non-military aspects of space technology, the book seeks to heighten public responsiveness to the full impact of science and technology in shaping our future. Contributors include: Leston Faneuf, J. H. Doolittle, Lloyd V. Berkner, Congressman Overton Brooks, Ralph J. Cordiner, Willard F. Libby, Vice Admiral John T. Hayward, Joseph Kaplan, Morris Neiburger, Brigadier General Don D. Flickinger, Leo Goldberg, Edward Teller, and Frederick R. Kappel.

THERMAL REGIMES OF COMBUSTION

By **L. A. VULIS**; translated from the Russian by **GLENN WILLIAMS**, Massachusetts Institute of Technology, and others for the project **SQUID**, Princeton, N. J. Available in July, 1961.

Of primary interest to chemical and mechanical engineers and to chemists and physicists interested in kinetics, this timely translation offers a detailed mathematical discussion of the consequences of applying simple thermal combustion theory and simplified (first order) kinetics to over-all combustion problems. This material is not available in comparable detail in any other English source.

PROCEEDINGS OF THE SIXTH SYMPOSIUM ON MAGNETISM AND MAGNETIC MATERIALS

Edited by **J. A. OSBORN**, Westinghouse Electric Corp. 408 pages, \$10.00.

A compilation of recent work in the field of magnetism and magnetic materials, this book contains a collection of technical papers presented at the annual symposium sponsored by the American Institute of Electrical Engineers and the American Institute of Physics. Topics include ordered spin systems, computer devices, metallic films, nuclear hyperfine fields, ferromagnetic resonance, high coercive materials, exchange interactions, fine particles, magnetization processes, anisotropy, domain walls, microwave devices, and oxides.

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measurements of the various shower components and also describes the recent Russian work on the new technique of observing the Čerenkov light from showers. The world-wide correlation of information organized during the International Geophysical Year between different experimenters using a variety of techniques to observe the same phenomenon, is described by E. P. Ney in an article on cosmic-ray results obtained during the IGY. He gives a valuable résumé of how balloon and satellite flights, the Argus experiments, and radio observations have led, in this united effort, to a spectacular increase in our knowledge of the nature of the radiation belts and of solar cosmic rays.

J. G. Beckerly gives an interesting account of nuclear methods in subsurface prospecting, largely by gamma-ray and neutron techniques, and draws attention to how difficult it is to extract useful information under actual field conditions, namely, faced with a borehole four inches across and perhaps a few miles deep. The labeling of organic compounds by recoil methods is the subject of A. P. Wolf's review; after a nuclear reaction the recoiling radioactive atom travels some distance and then frequently enters into organic combination, thus allowing organic compounds to be labeled with, for example, carbon-14 or tritium.

Finally there is one article on cellular radiobiology and two on vertebrate radiobiology. The first, by T. Alper, includes a discussion of dose-effect relationships, the influence of various types of radiation, the effects of treatment before, during, and after irradiation, biochemical investigations and speculations on the mechanisms involved. R. C. Thompson considers the consequences of the entry of radioisotopes into the body, for example, by ingestion or inhalation, and details the metabolic properties of specific internal emitters according to their chemical properties. J. B. Storer and D. Grahn examine in their review the late effects of radiation on man and experimental animals, such as life-shortening, congenital abnormalities, and genetic effects. These are problems which, regrettably, have become of increasing importance in recent years, and an up-to-date presentation of what is still a rather cloudy picture is always welcome.

Variational Principles in Dynamics and Quantum Theory (2nd ed.). By Wolfgang Yourgrau and Stanley Mandelstam. 180 pp. Pitman Publishing Corp., New York, 1960. \$5.75. Reviewed by J. Gillis, *The Weizmann Institute of Science*.

THIS very timely monograph contains a most interesting and illuminating account of variational principles, the ideas behind them, and their applications. The essentially theologico-philosophical basis of all such theories is made clear in an interesting historical prologue which takes us from the Ionians to Fermat. However, as the authors make clear, it is with the enunciation by Maupertuis in 1744 of his principle of

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EACH CHARACTER ON THIS PAGE WAS DRAWN INDIVIDUALLY IN ITS PROPER PLACE BY A BEAM OF ELECTRONS AND PHOTOGRAPHED IN 50 MICROSECONDS. A MAGNETIC TAPE GAVE THE COMMANDS. THE BEAM WAS TAUGHT HOW TO DRAW BY A PHOTOGRAPHIC DEVICE. FOR NEAT COLUMN EDGES THE COPYWRITER WAS TOLD TO EXPRESS WHATEVER NEEDED TO BE EXPRESSED IN LINES OF EXACTLY 47 CHARACTERS AND SPACES. A MERE TOUR DE FORCE, OF COURSE, BUT IT SERVES AS AN INTRODUCTION TO THE DACOM SYSTEM OF GETTING ALONG IN AN AGE THAT WANTS TO DANCE TO THE TUNE OF THE COMPUTING MACHINE.

WITH THE DACOM SYSTEM WE PUT THE TUNE INTO A BETTER TEMPO FOR HUMANS TO DANCE TO. COMPUTERS PLAY INHUMAN LYRICS TOO FAST. AMONG THE TRANSLATING DEVICES NOW AVAILABLE, A FEW OFFER PROSPECT OF ADEQUATE SPEED. BUT SPEED ALONE IS NOT THE WHOLE PROBLEM. THERE ALSO ARISES THE PROBLEM OF COPING WITH ALL THE PAPER GENERATED FROM THE TRANSLATING DEVICE.

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least action that the subject begins to acquire an interest for a modern scientist.

The fundamental approach of Maupertuis was still essentially teleological. "La Nature, dans la production de ses effets, agit toujours par les moyens les plus simples." It is also true that Proclus, the pagan neo-Platonist, said almost exactly the same thing nearly one and a half millennia earlier. Admittedly, Proclus had only the vaguest notion about how to work out the quantitative implications of the principle, but then Maupertuis hardly did better. On balancing the evidence one feels that Proclus was entitled to a mention in the historical introduction and perhaps he will get it in a subsequent edition.

The business part of the monograph starts in Chapter 5 with the equations of Lagrange and Hamilton. Hamilton's principle and related topics are further developed in Chapters 6 and 7. After elucidating the relation between the Lagrange equations and the Hamiltonian method, the authors make clear the important distinction between the principle of least action and what Hamilton called the law of varying action.

Other problems taken up in the book include the formulation of electrodynamics in Hamiltonian terms and the variational approach to quantum mechanics. There is a very interesting chapter on the principles of Feynman and Schwinger. These are so useful and important that one welcomes the careful exposition accorded them here.

There is an attempt in Chapter 13 to summarize the philosophical significance of variational principles. Whether or not one is to agree with the authors' views will depend chiefly on one's taste, since no facts can be disputed. But at least we must be grateful to them for using the question as a peg on which to hang a concise but thoughtful history of the theory of physical laws.

An Introduction to Astrodynamics. By Robert M. L. Baker, Jr., and Maud W. Makemson. 358 pp. Academic Press Inc., New York, 1960. \$7.50. Reviewed by T. Teichmann, General Atomic Division of General Dynamics Corporation.

THE increasing number of artificial satellites in orbit and the imminence of manned exploration of space have created a great need for comprehensive expositions of astronautics, particularly regarding the trajectories of space vehicles and their determination. Numerous papers have, of course, been written on various aspects of these topics, but this work is the first to present a reasonably comprehensive account as a systematic application of celestial mechanics. The problems of interest are in one sense simpler than the main problems of celestial mechanics, since the motion of interest is in all cases that of an infinitesimal body; on the other hand, this motion is ipso facto more sensitive to minor perturbations, and may also be subjected to internally generated propulsive forces, designed to