particular distinctive regional stands (for example, "larch forests of Central Yakutia"). For each region there is presented valuable local detail on the history of forest exploitation and the extent, age, quality, and yearly increment of the forests, and such questions as the connection between age of felling and the process of natural regrowth are discussed. Although due attention is paid to ecological conditions, the orientation is generally toward the economic appraisal of particular stands. The text is liberally interspersed with meaningful statistical tables and photographs, and the end-pocket contains 11 original maps, based on recent data, showing the growing periods of the various species, quality grades, reserves, the state of forest survey, and the extent of reforestation.

The translation is, in general, satisfactory and runs smoothly, in spite of occasional ambiguities such as the rendering of the Russian *kedr* as "cedar," but it would have been well worthwhile to provide this version with certain extra "editing" services—in particular an index, considering that the book is likely to be a prime source of reference on the subject for some time to come.

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Automatic Control in Space Flight

Peaceful Uses of Automation in Outer Space (Plenum, New York, 1966. 601 pp., illus. $22.50), edited by John A. Aseltine, is the proceedings of the First IFAC (International Federation of Automatic Control) Symposium on Automatic Control in the Peaceful Uses of Space, held in Norway in 1965. All but two of the 44 papers in this volume can generally be classified in two allied fields: space flight mechanics, and guidance and control. In the first category, papers are included which deal with thrusting and nonthrusting phases of translational motion, rotational dynamics, and optimal flight-control policy. Papers in the second category concern the conceptual design, techniques, functional configuration, performance, operating characteristics, and equipment descriptions of guidance and control systems. The two papers whose subjects range outside of these two related fields are descriptions of the reactor power control for a nuclear rocket and low-power circuit designs using metal oxide transistors.

This collection of papers will be a valuable reference for designers of guidance and control systems. A considerable quantity of data on the design of components and systems is presented. These data include performance and operating characteristics for sensors, attitude-control torquing devices, and computers. A wide variety of equipment—star, lunar, and planetary trackers, infrared earth horizon scanners, sun sensors, optical and Doppler radars, a cryogenic gyro, a solar pressure reference, reaction wheels and jets, magnetic and fluid dampers and torquers, and gravity gradient stabilizers and dampers, as well as special- and general-purpose digital computers and data processors—is described. The state of development of this equipment can be identified with the space vehicles in which the components and systems were installed and tested. Past, present, and future space vehicles cited in this connection are Vanguard, Explorer, Tiros, Vostok I, Mercury, Telstar, Mariner, Alouette, Relay, Syncom, OGO, Surveyor, Saturn V, and Apollo. A noteworthy feature of this volume is the brief discussion which follows most of the papers and contains, in many cases, important clarifications as well as additional data.

In the last decade or so, an increasing number of international symposiums on aerospace technology have been held in Europe. With respect to the origin and contents of the papers presented at these meetings, several patterns have evolved. First of all, the greatest number of papers is usually presented by authors from the United States, with the Soviet Union sending the next largest contingent to present papers. This pattern is not at all surprising. However, another trend is that the Soviet contributions at international meetings tend to be theoretical, whereas the American papers stress the development and testing of working systems. This pattern was borne out at this IFAC meeting: 14 of the 15 Russian papers were in the field of space-flight mechanics, and 18 of the 21 American papers treated tested guidance or control techniques. For a meeting whose theme was the peaceful uses of space, it would have been of real interest to the international community of aerospace engineers and scientists to learn more about Russian flight-tested equipment design and performance.

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Hydrology by Computer

Simulation Techniques for Design of Water-Resource Systems (Harvard University Press, Cambridge, Mass., 1966. 230 pp., illus. $7.50), by Maynard M. Hufschmidt and Myron B. Fiering, is a summary report on a study conducted for the Corps of Engineers and is an extension of the concepts presented in *Design of Water-Resource Systems* by the Harvard Water Program Group. As such, its subject is not as broad as the title implies, for the only technique discussed is that of the Harvard Group —the use of principal component analysis of correlation data for historical records to generate synthetic hydrologic sequences which maintain the statistical properties of the historical data. No mention is made of other techniques for hydrologic modeling, either stochastic or parametric, nor of problems inherent in this particular method, such as the built-in time-sampling error.

The reader is led step by step through the construction of a conceptual model for simulation of two river-basin systems, the Lehigh Basin in Pennsylvania, and the Delaware Basin, of which the Lehigh is a sub-basin. Each necessary component in the model is described, and the simplifying assumptions used are stated, with some discussion of possible refinements. The programming of the conceptual models for digital-computer simulation is outlined in some detail, with several flow diagrams. Although the programs described are for particular basin configurations, what is presented is of general interest to anyone interested in hydrologic simulation. The desire for generalization is discussed, with the aim being to design as general a program as possible.

Surface flow only is considered, with no consideration of bank storage in reservoir design or operation. Because of the current state of the art, estimates of both recreation costs and

benefits are single estimates applied across the board to all sites. Problems of water quality are ignored because of insufficient information concerning the relation of water quality to hydrology. Various rates and methods are used to study sensitivity of the design to the discount factor. Results are compared with the final Corps of Engineers design for the basins to show that a very few simulation runs resulted in a design comparable to that derived by standard methods. The relation of flood damages to policy decisions is commented on only in passing, and no new alternatives are considered.

The concluding remarks concerning mechanical details will be of much interest to all who are interested in undertaking simulation studies. Despite the many simplifying assumptions, 80 percent of the memory capacity of the IBM 7094 was used in coding alone. Estimates of computer-run time are given. The interplay of programmer and analyst is described, and the desirability of combining the two skills in one individual is stressed.

As computers become larger and faster, simulation studies will be more common in water-resources design. For those who are on the periphery of the field, or who are involved in simulation for the first time, this book will be helpful. For those teachers who wish to expose their classes to the latest concepts in water-resource system design it will be a good supplementary text.

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A Quick Introduction

The task of a book with a title such as that of **Electronics for Experimenters in Chemistry, Physics and Biology** by Leon F. Phillips (Wiley, New York, 1966. 280 pp., illus. Paper, $3.95) is to provide a balanced account of electronics which is both detailed enough to help the reader see the inner workings of electronics and fast-moving enough so that he does not get lost in these details. The proper balance depends on the outlook and background of the reader, so there is plenty of room for books in this field. Phillips' book is, in his words, "a more or less pocket-sized account," and in reading it I was constantly surprised at how much progress was made on each page and in each section. Many important results are quickly derived by simple calculus, and many good comments of a practical nature are made throughout the book. The order of presentation of topics is not surprising, starting with simple network theory and properties of vacuum tubes and transistors, and progressing through amplifiers, feedback, and noise to a final chapter in which some complex systems are described. There are sections on construction techniques and trouble-shooting which will be valuable to many graduate students. I wish, however, that the author had explicitly mentioned reduction of electric shock hazard when discussing construction techniques.

The fast pace probably precludes learning electronics from this book alone, or even in conjunction with a normal set of lectures of a few hours a week, but there are lists of references which provide the student with a starting place in the literature, and the book should be valuable as a guide in a self-study program.

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New Books

Mathematics, Physical Sciences, and Engineering

Advanced Inorganic Chemistry: A Comprehensive Text. F. Albert Cotton and Geoffrey Wilkinson. Interscience (Wiley), New York, ed. 2, 1966. 1148 pp. Illus. $14.50.

Advances in Electrochemistry and Electrochemical Engineering. vol. 4, *Electrochemistry.* Paul Delahay, Ed. Interscience (Wiley), New York, 1966. 401 pp. Illus. $16. Five papers.

Advances in Electron Metallography. vol. 6. Proceedings of a symposium (Lafayette, Ind.), June 1965. American Soc. for Testing and Materials, Philadelphia, 1966. 137 pp. Illus. Paper, $7; members, $4.90. Ten papers.

Advances in Nuclear Science and Technology. vol. 3. Paul Greebler and Ernest J. Henley, Ed. Academic Press, New York, 1966. 414 pp. Illus. $17.50. Six papers.

Advances in Organometallic Chemistry. vol. 4. F. G. A. Stone and Robert West, Eds. Academic Press, New York, 1966. 432 pp. Illus. $16.50. Six papers.

Algèbres de Lie semi-simples complexes. Jean-Pierre Serre. Benjamin, New York, 1966. Unpaged. Illus. Paper, $3.95; cloth, $8.

Annual Review of Physical Chemistry. vol. 17. H. Eyring, Ed. Annual Reviews, Palo Alto, Calif., 1966. 597 pp. Illus. $8.50. There are 18 papers.

Artificial Intelligence Through Simulated Evolution. Lawrence J. Fogel, Alvin J. Owens, and Michael J. Walsh. Wiley, New York, 1966. 184 pp. Illus. $9.95.

Atlas of Landforms. James L. Scovel, J. C. McCormack, Emmett J. O'Brien, and R. B. Chapman. Wiley, New York, 1966. 168 pp. Illus. Paper, $9.95.

Atomic Collisions: The Theory of Electron-Atom Collisions. Academy of Sciences of the Latvian SSR Institute of Physics, Transactions XIII. V. Ya. Veldre, R. Ya. Damburg, and R. K. Peterkop, Eds. Translated by M. V. Kurepa. M.I.T. Press, Cambridge, Mass., 1966. 142 pp. Illus. $7.50. There are 17 papers.

Beginning Geology. H. H. Read and Janet Watson. Macmillan, London; St. Martin's Press, New York, 1966. 256 pp. Illus. $6.

Beta Decay. C. S. Wu and S. A. Moszkowski. Interscience (Wiley), New York, 1966. 410 pp. Illus. $16. Interscience Monographs and Texts in Physics and Astronomy.

Chain Reactions: An Introduction. F. S. Dainton. Methuen, London; Wiley, New York, ed. 2, 1966. 240 pp. Illus. $5.50.

The Chemistry of the Metallic Elements. David Steele. Pergamon, New York, 1966. 152 pp. Paper, $3.45.

The Chemistry of Metallides. Ivan Ivanovich Kornilov. Translation based on the Russian edition (Moscow, 1964) by J. W. Loweberg. Consultants Bureau, New York, 1966. 168 pp. Illus. Paper, $22.50.

Conformations of Macromolecules. T. M. Birshtein and O. B. Ptitsyn. Translated from the Russian edition by Serge N. Timasheff and Marina J. Timasheff. Interscience (Wiley), New York, 1966. 364 pp. Illus. $14.50. High Polymers Series, vol. 22.

Crystal Symmetry and Physical Properties. S. Bhagavantam. Academic Press, New York, 1966. 240 pp. Illus. $9.50.

Deposition of Thin Films by Sputtering, Symposium (Rochester, N.Y.), June 1966. Consolidated Vacuum Corp., Rochester, N.Y., 1966. 103 pp. Illus. Paper, $4. There are 11 papers.

Design and Construction of Electronic Equipment. George Shiers. Prentice-Hall, Englewood Cliffs, N.J., 1966. 378 pp. Illus. $14. Prentice-Hall Series in Electronic Technology.

The Electromagnetodynamics of Fluids. W. F. Hughes and F. J. Young. Wiley, New York, 1966. 662 pp. Illus. $17.50.

Electron Diffraction: The Nature of Defects in Crystals. Abstracts of papers presented at an international conference (Melbourne, Australia), August 1965. Sponsored by Australian Academy of Science, International Union of Crystallography, and International Union of Pure and Applied Physics. Published for the Australian Academy of Science by Pergamon, New York, 1966. Unpaged. Illus. $14. There are 127 papers.

Electronic Engineering. Charles L. Alley and Kenneth W. Atwood. Wiley, New York, ed. 2, 1966. 757 pp. Illus. $12.50.

The Electronic Theory of Heavily Doped Semiconductors. V. L. Bonch-Bruyevich. Translated from the Russian edition (Moscow, 1965) by Scripta Technica. Robert S. Knox, Translation Ed. Elsevier, New York, 1966. 141 pp. Illus. $7.50.

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