is one, or there is widely thought to be one—in human affairs it is often difficult to distinguish a hard fact from a fancy widely or persuasively expounded. It is a pity that this volume adds little to our knowledge of the matter. The presentation is better than Donald Cox's recent pot-boiler, *America's New Policy Makers: The Scientists Rise to Power*, because Lapp gets more of his facts right, but few are new and the lack of references does not help anyone to check on them.

Five of the 11 chapters tell again the story of the atom bomb, the Franck report, the fights over atomic legislation and the hydrogen bomb, the Oppenheimer hearings, and the disputes about nuclear fallout and test bans. The remaining chapters contain a potpourri of reportage and comment on the research and development (R&D) boom in universities and industry, the space race, the political activities of scientists during the last two presidential campaigns, and the organization and disorganization of science policy making in the Executive and the Congress.

Lapp forecasts national (meaning, apparently, federal) R&D expenditures of $35 billion a year by 1980, of which he would assign $10 billion to arms and arms control, $7 billion to basic research, and $18 billion to vast programs in the domain of civilian welfare and technology. He advocates the formation of a nonprofit institute staffed by scientists to advise Congress on R&D matters, and favors the concentration of federal basic research programs in a Department of Science.

The book is unfortunately marred by *ex cathedra* pronouncements that bridge gaps in the author's knowledge or sympathies. Thus, it is grossly unfair to say that the National Science Foundation "has not been a howling success by any means" and offer in evidence only its "inability to deal with large-scale projects such as Project Mohole," projects which have never been central to NSF's purpose and which receive only a fraction of its budget. And there is the astoundingly mistaken observation that university presidents prefer federal research grants to broader institutional awards. The remark that "PSAC members are extremely stuffy about discussing their committee deliberations" does not really help us to understand the reasons for such recalcitrance and what may be right and wrong about it.

It requires painstaking attention to identify all the hits and the misses in the buckshot Lapp has fired at much-used targets.

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University Mathematical Monographs

Integration, Measure, and Probability. H. R. Pitt. Hafner, New York, 1963. viii + 110 pp. Illus. $4.

This very pleasant book gives a concise (106 pp.), rigorous, and readable presentation of everything that a student of probability theory should know. One could call the book a miniature version of the standard Loéve treatise had it not differed radically in outlook and emphasis.

Anyone who writes a textbook on probability theory is confronted at the beginning with a dilemma: how much of measure theory should be included. If not enough is considered, then most of the theorems cannot be given in full generality; if too much is treated, then the theorems of principally analytical character become overburdened by seemingly superfluous material. These difficulties have been admirably described by J. L. Doob in the introduction to his *Stochastic Processes*.

Furthermore, it has long been recognized that the classical Kolmogorov structure is too general, and one would prefer to deal with a rather restricted but more "individual" framework. In fact, in elementary texts, once everything is mapped on the real line, the underlying abstract probability space is forgotten (occasionally, acknowledgment of its presence is made with a friendly nod); in advanced texts one usually does the same thing without admitting it.

The author of this book made his choice by introducing measure theory as applicable to probability theory, and then presenting probability theory as seen by measure theory. However, he departed from the original Kolmogorov scheme in favor of recent approaches towards topological probability spaces. The result is an unorthodox, highly individual, and very valuable text.

Accordingly, the book is divided into two parts: part 1 (44 pp.) deals with measure theory and integration and part 2 (62 pp.) is devoted to probability theory and elements of stochastic processes. Since the presentation and approach are not those commonly seen in textbooks, more detailed description of the contents may be useful.

The author chooses rings as his basic concepts and calls Borel sets the elements of a minimal σ-ring. The Lebesgue integral is introduced (via simple functions), and a measurable function is defined as the limit a.e. of simple functions (measurable sets are then defined by their indicators, so measurable sets differ from Borel sets by null sets). The Radon-Nikodym theorem and the Fubini theorem are proved, and the last chapter of part 1 gives a full account of the Lebesgue-Stieltjes integral and discusses in detail distribution functions, convolution integrals, characteristic functions, and corresponding basic convergence theorems.

Part 2 contains two chapters, "Random variables and probability" and "Limit processes in probability." The author takes as his basic space a space X (with probability measure defined on it) in which random variables take their values. However, random variables are identified (through identity mapping on X) with their probability distributions (measures of sets of their values), and the concept of a measurable function usually employed in this connection is not needed here. (The author even refers to random integers or random real numbers when X is a set of integers or a real line). The author then explains in detail (with worked out examples) how difficulties of this point of view can be overcome in the case of several random variables, and functions of random variables. The rest of the chapter treats moments, conditional expectations, and multivariate distributions and lists properties of typical distributions. The last chapter gives detailed treatment of weak laws of large numbers, central limit theorem, and convergence of series of random variables and includes a short outline of stochastic processes (Brownian motion, Poisson process, and the like). The point of view adopted in this book is particularly convenient for the Daniel-Kolmogorov extension theorem (theorem 25, page 94) on construction of probability measure in function spaces. However, the author did not refer to his interesting version of this theorem, quoted by J. E. Moyal in the *Journal of the Royal Statistical Society* **B:11**, 162 (1949).

It is really remarkable how the author has succeeded in presenting a wealth of material in so few pages but in a highly readable manner. The book is well organized and is written in lively style. For these reasons, it is highly recommended to serious students of probability theory, and to those mathematicians who desire a brief introduction to this field.

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New Books

Mathematics, Physical Sciences, and Engineering

Advances in Cryogenic Engineering. vol. 10. Proceedings, Cryogenic Engineering Conference, Sections A to L (Philadelphia), August 1964. K. D. Timmerhaus, Ed. Plenum Press, New York, 1965. 525 pp. Illus. $17.50. Sixty-two papers.

Advances in Theoretical Physics. vol. 1. Keith A. Brueckner, Ed. Academic Press, New York, 1965. 335 pp. Illus. $12. Six papers: "The theory and application of the Padé approximant method" by George A. Baker, Jr.; "Theory of the giant dipole resonance" by W. Brenig; "The optical model" by Alexander L. Fetter and Kenneth M. Watson; "Hydromagnetic equilibrium and stability" by John M. Greene and John L. Johnson; "The heavy ion transfer reaction" by K. R. Greider; and "Elastic scattering of electrons by atoms" by Marvin H. Mittleman.

Atomic Theory of Gas Dynamics. John W. Bond, Jr., Kenneth M. Watson, and Jasper A. Welch, Jr. Addison-Wesley, Reading, Mass., 1965. 528 pp. Illus. $16.75. Addison-Wesley Series in Aerospace Science; H. W. Emmons and S. S. Penner, Consulting Editors.

Atoms, Molecules, and Chemical Change. Russell H. Johnsen and Ernest Grunwald. Prentice-Hall, Englewood Cliffs, N.J., ed. 2, 1965. 368 pp. Ilus. $7.50.

Chemical Protection Against Ionizing Radiation. Zénon M. Bacq. Thomas, Springfield, Ill., 1965. 344 pp. Illus. $14. American Lectures in Living Chemistry, edited by I. Newton Kugelmass.

Classical Dynamics of Particles and Systems. Jerry B. Marion. Academic Press, New York, 1965. 592 pp. Illus. $11.50.

Concepts from Tensor Analysis and Differential Geometry. Tracy Y. Thomas. Academic Press, New York, ed. 2, 1965. 186 pp. Illus. $7.50. Mathematics in Science and Engineering, vol. 1, edited by Richard Bellman.

Dictionary of Engineering Mechanics: Russian-English. Including the disciplines of aeromechanics, elasticity, fluid mechanics, plasticity, rigid body mechanics, theory of structures, vibrations. Charles O. Heller. Elsevier, New York, 1965. 87 pp. $5.

Differential and Integral Calculus. Edmund Landau. Translated from the German edition (1934) by Melvin Hausner and Martin Davis. Chelsea, New York, ed. 3, 1965. 380 pp. Illus. $6.

Electrophilic Substitution in Benzenoid Compounds. R. O. C. Norman and R. Taylor. Elsevier, New York, 1965. 353 pp. Illus. Paper, $12.75. Reaction Mechanisms in Organic Chemistry Series, edited by C. Eaborn.

Elementary Mathematics for Scientists and Engineers. M. D. Hatton. Pergamon, New York, 1965. 408 pp. Illus. Paper, 21s. A volume in the Commonwealth and International Library.

Elementary Particle and High Energy Physics. Lectures given at the Cargèse Summer School of Theoretical Physics, 1963. M. Levy and Ph. Meyer, Eds. Gordon and Breach, New York, 1965. 370 pp. Illus. Paper, $7.95; cloth, $14.50. Six lectures: "Strong interactions at very high energy" by L. Van Hove; "Complex angular momentum theory of particles with spin" by J. M. Charap; "Phenomenological analysis of the new resonances" and "Spin effects in the Regge pole approach to high energy collisions" by M. Jacobs; "Symétrie Untaire-Modèle de l'Ocet" by M. Gourdin; Quantum theory of gauge fields" by J. Schwinger, and "Phenomenological study of weak interactions—Selected topics" by Ph. Meyer.

Engineering Physical Metallurgy. Y. Lakhtin. Translated from the Russian edition by Nicholas Weinstein. Gordon and Breach, New York; Noordhoff, Groningen, Netherlands, 1965. 471 pp. Illus. $14.50. Russian Monographs and Texts on Advanced Mathematics and Physics, vol. 22.

Fiber Composite Materials. Papers presented at a seminar, October 1964. Spencer H. Bush, Coordinator. American Soc. for Metals, Metal Park, Ohio, 1965. 255 pp. Illus. $12.50. Ten papers: "An introductory review" by W. R. Hibbard, Jr.; "Factors influencing the strength of whiskers" by S. S. Brenner; "Mechanics of composite strengthening" by B. Walter Rosen; "Potential of unidirectionally solidified eutectic alloys as reinforced composites" by Richard W. Hertzberg; "A mathematical model for mechanical behavior of interfaces in composite materials" by L. J. Ebert and J. D. Gadd; "Deformation and fracture modes in fiber-reinforced metals" by N. M. Parikh; "Design and performance of fibers and composites" by E. Scala; "Destructive and nondestructive testing methods" by S. P. Prosen; "Potential of oxide-fiber reinforced metals" by W. H. Sutton and J. Chorné; and "Metal fiber reinforced ceramics" by J. D. Walton, Jr., and W. J. Corbett.

A First Course in Partial Differential Equations: With Complex Variables and Transform Methods. H. F. Weinberger. Blaisdell (Ginn), New York, 1965. 458 pp. Illus. $12.50. Blaisdell Book in Pure and Applied Mathematics; George Springer and George F. Carrier, Consulting Editors.

Flame Structure. R. M. Fristrom and A. A. Westenberg. McGraw-Hill, New York, 1965. 438 pp. Illus. $17.50. McGraw-Hill Series in Advanced Chemistry.

Foundations of Relative Homological Algebra. Samuel Eilenberg and J. C. Moore. American Mathematical Soc., Providence, R.I., 1965. 39 pp. Illus. Paper, $1.50. Memoir, American Mathematical Society.

Foundations of Solid Mechanics. Y. C. Fung. Prentice-Hall, Englewood Cliffs, N.J., 1965. 539 pp. Illus. $18. Prentice-Hall International Series in Dynamics, edited by Y. C. Fung.

Galois Theory and Cohomology of Commutative Rings. S. U. Chase, D. K. Harrison, and Alex Rosenberg. American Mathematical Soc., Providence, R.I., 1965. 83 pp. Illus. Paper, $1.50. Memoir, American Mathematical Society.

General Chemistry. N. Glinka. Translated from the Russian edition by David Sobolev. Gordon and Breach, New York; Noordhoff, Groningen, Netherlands, 1965. 694 pp. Illus. $17.50.

General Chemistry: Inorganic and Organic. Garth L. Lee and Harris O. Van Orden. Saunders, Philadelphia, ed. 2, 1965. 689 pp. Illus. $8.

General Relativity and Cosmology. G. C. McVittie. Univ. of Illinois Press, Urbana, ed. 2, 1965. 253 pp. Illus. $6.95.

Generalizations of a Theorem of Carathéodory. John R. Reay. American Mathematical Soc., Providence, R.I., 1965. 49 pp. Illus. Paper, $1.50. Memoir, American Mathematical Society.

High-Temperature Compounds of Rare Earth Metals With Nonmetals. Grigorii Valentinovich Samsonov. Translated from the Russian edition (Moscow, 1964). Consultants Bureau, New York, 1965. 294 pp. Illus. $17.50.

International Advances in Cryogenic Engineering. vol. 10. Proceedings, Cryogenic Engineering Conference, Sections M to U (Philadelphia), August 1964. K. D. Timmerhaus, Ed. Plenum Press, New York, 1965. 439 pp. Illus. $17.50. Forty-two papers.

Introduction to Crystallography: A Programmed Course in Three Dimensions. Books 1 to 3. Book 1, *Packing: The Crystal as an Assembly of Spheres* (226 pp.); Book 2, *Unit Cell and Space Lattices* (198 pp.); Book 3, *Miller Indices: Representation of Planes and Directions* (296 pp.). Bruce Chalmers, James G. Holland, Kenneth A. Jackson, and R. Brady Williamson. Appleton-Century-Crofts (Meredith), New York, 1965. Illus. $27.50 (complete set will include six books).

Introduction to the Foundations of Mathematics. Raymond L. Wilder. Wiley, New York, ed. 2, 1965. 345 pp. Illus. $8.

Introduction to the Principles of Mechanics. Walter Hauser. Addison-Wesley, Reading, Mass., 1965. 527 pp. Illus. $11.75. Addison-Wesley Series in Physics.

Lectures in Theoretical Physics. vol. 7B, *Elementary Particles*. Lectures delivered at the Summer Institute for Theoretical Physics (Boulder, Colo.), 1964. Wesley E. Brittin and Leona Marshall, Eds. Univ. of Colorado Press, Boulder, 1965. 480 pp. Illus. Paper, $7. Twenty-two papers contributed by F. Ayer, A. O. Barut, Laurie Brown, Richard H. Capps, P. Carruthers, Yam Tsi Chin, H. C. Corben, Joseph Dreitlein, Loyal Durand, Gerson Goldhaber, Sulamith Goldhaber, Toichiro Kinoshita, A. D. Krisch, Benjamin W. Lee, L. Marshall, Arthur W. Martin, Sydney Meshkov, Thomas Oliphant, V. Perez-Mendez, L. David Roper, Franco Selleri, W. Selove, and M. L. Stevenson.