ming can now be applied in a uniform fashion to the study of deterministic, stochastic, and adaptive control processes. If we so desire, we can establish that various limits exist as the discrete process merges into a continuous one.

The digital computer can be used for mathematical experimentation, with the hope of discerning the structure of optimal policies from the solution of particular problems.

Let us finally note that the authors make no mention of a number of other techniques available for the study of constrained variational problems. Such alternative techniques include: function-space methods [3]; gradient techniques of the type used by Bryson and Kelley [4]; quasilinearization [5]; and techniques based on the Neyman-Pearson lemma [6].

Taking into account all that has been said, there is no question that this book is an important contribution to the theory of control processes: one that must be read by everyone working in that field. Its translation is a fitting tribute to a great mathematician and his distinguished colleagues.

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1. F. A. VALENTINE, "The problem of Lagrange with differential inequalities as added side conditions," *Contributions to the Calculus of Variations 1933–1937*, University of Chicago Press, Chicago, Ill., 1937, p. 407–448.
2. L. D. BERKOVITZ, "Variational methods in problems of control and programming," *J. Math. Anal. Appl.*, v. 3, 1961, p. 145–169.
3. J. P. LASALLE, "Time optimal control systems," *Proc. Nat. Acad. Sci.*, v. 45, 1959, p. 573–577.
4. G. LEITMANN (Editor), *Optimization Techniques*, Academic Press, New York, 1962.
5. R. BELLMAN, H. KAGIWADA & R. KALABA, "A computational procedure for optimal system design and utilization," *Proc. Nat. Acad. Sci.*, v. 48, 1962, p. 1524–1528.
6. R. BELLMAN, I. GLICKSBERG & O. GROSS, *Some Aspects of the Mathematical Theory of Control Processes*, The RAND Corporation, Report 313, 1958.

19[P, X].—YA. Z. TSYPKIN, *Sampling Systems Theory and its Application*, translated from the Russian by R. C. Hutchison and A. Allan, edited by I. Cochrane Pergamon Press, Oxford, 1964 (two volumes), xv + 375 p., 24 cm. Price $30.00.

The avowed intent of this book is to provide methods for analyzing pulse systems and their properties, using insofar as possible techniques that are already familiar in the analysis of continuous systems. Unfortunately, the book is, in my opinion, very unsuccessful in its attempts to meet its aim.

A book of this type should have its subject matter clearly divided into three sections: mathematical material (for example, the discrete Laplace transformation and its application to linear difference equations); systems concepts, such as principles of pulse modulation and digital feedback theory; and, if desired, component descriptions. However, the present book contains a confused mixture of all three. Chapter I, which is supposed to be an introduction to pulse systems, very soon dives into complicated circuit diagrams for the control of electrical machinery, electronic circuits, temperature, and some amazingly intricate mechanical systems, with a very unsatisfactory discussion of modulation theory. Chapter II, which is intended to provide the mathematical background for the sequel, is cluttered with a great number of trivial examples and inelegant theorems; moreover, hardly any

of the mathematics of modern adaptive and statistical control theory is introduced. The reader is much better served, in much shorter time, by a good book on Laplace transformations, as, for example, the treatise by Widder [1], or the first chapter of the book by Bellman and Cooke [2], or, in the engineering literature, the first chapter in the book by Truxal [3], and the book by Ragazzini and Franklin [4].

The same plodding approach to theory, through involved and unenlightening examples, is followed through very long chapters on open-loop and closed-loop systems, replete with formulas and valuable computations and curves which would be more useful in an edited version for a reference work on particular control systems. Even there, however, I would prefer the relevant parts of the book of Gibson and Tuteur [5].

In addition to presenting the reading public with this disorganized compilation of theory, practice, and practical results, the publishers have obtained a very bad translation, set in a fashion that can only be described as a sorry example of the printer's art. The translation reads like pure Russian with (mostly) English words in which articles are inserted or omitted capriciously, commas are used in keeping with the original Russian grammar, and, more seriously, the precise English word is often neglected in favor of an easier choice. Thus, we have "law" instead of "characteristics," "image" instead of "transform," "closed-system" instead of "closed-loop system," "trapezium" when "trapezoid" is meant, and so on. Coupled with the undulations of the lines and the very poor proof-reading, the clumsiness of the translation makes the text annoying to read.

In sum, the book is a very poor text, although it may have some value thanks to the curves, formulas, and descriptions of very complicated control systems that it contains. The reader interested in an introduction to the field would be much better advised to use Chapter 9 of Truxal's book, Ragazzini and Franklin's book, or the book of J. T. Tou [6]. These books, as well as the others cited above, also present a much more understandable discussion of the underlying mathematics and system concepts.

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1. D. V. WIDDER, *The Laplace Transform*, Princeton Univ. Press, Princeton, N. J., 1946.
2. R. BELLMAN & K. L. COOKE, *Differential-Difference Equations*, Academic Press, New York, 1963.
3. J. G. TRUXAL, *Automatic Feedback Control System Synthesis*, McGraw-Hill Book Co., New York, 1955.
4. J. R. RAGAZZINI & G. F. FRANKLIN, *Sampled Data Control Systems*, McGraw-Hill Book Co., New York, 1958.
5. J. E. GIBSON & F. B. TUTEUR, *Control System Components*, McGraw-Hill Book Co., New York, 1958.
6. J. T. TOU, *Optimum Design of Digital Control Systems*, Academic Press, New York, 1963.

20[V].—I. A. KIBEL′, *An Introduction to the Hydrodynamical Methods of Short Period Weather Forecasting*, Pergamon Press, Ltd., Oxford, England, distributed by The Macmillan Co., New York, 1963, xiii + 383 p., 23 cm. Price $14.50.

This book is a translation by the British Air Ministry from the original volume in Russian published at Moscow in 1957. As such, the material represents the state of short range numerical weather prediction at the end of its first decade. This was