

New books

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I. M. KOGAN

Applied Information Theory

Studies in Cybernetics 14.

Translation of: Прикладная теория информации, Radio i Svyaz, Moscow 1979.

Gordon and Beach Science Publishers, New York—London—Paris—Montreux—Tokyo—Melbourne 1988.

ix + 466 pages; \$ 195,—.

Information theoretic concepts developed in Information theory reach far beyond its scope and seem to have the power of objective natural laws. The aim of the reviewed book is to show commonality and unity, which are inherent (due to these concepts) to some entirely different phenomena occurring in various fields of human activity; the range of applications as gathered and presented in nine chapters of the book is really respectable.

After throwing a few light upon basic concepts at heuristical level the author starts firstly to overlook some “classical” technical applications from this point of view. One of the earliest — the field of radar is briefly sketched in Chapter 2. Then automatic control (or large complex systems) and measuring techniques in Chapter 3, planning of experiments and system engineering in Chapter 4, and visual systems in Chapter 5 follow. Using the information-theoretic methods it is possible to solve many introduced problems, which solutions has not yet been found by other theoretical manners, or to reveal new aspects of the phenomena that where not observed earlier, or at least to elucidate the already known views in different way. Nevertheless, as mentioned in the book “the more general and the more universal the character of the obtained data, the less the information contained in them”, and this is also the case of the most general methods of Applied Information theory.

Chapter 6 deals with information methods in biology, mainly with bioinformation (i.e. telepathy, clairvoyance, hypnosis and other forms of Extra Sensory Perception). Although the author could not avoid an emotial and subjective look at these phenomena, which is proper perhaps to every interested investigator in the field, and his approach has many vulnerable sides, the presented facts excel at being sober (except of the discussion about mechanisms of the processes) and in many cases also convictive.

Art and art criticism are analysed in Chapter 7; aesthetic perception, linguistic, musicology, and interrelations between art and science in detail. But the quantification used here in order to describe “artistic text” or “musical messages” in the corresponding “channels” may seem to more artistically oriented people to be not, mildly speaking, adequate to the subject.

Reading Practical and Methodological conclusions (Chapters 8 and 9, respectively) one expects short formulated and intelligible theses. In the book under these headings further applications of Information theory are hidden (multiplex cross-correlation systems, and optimising and designing systems). All the same, the following Conclusions possesses all properties of telling essay and crowns the work.

One important remark at the end. Having possibility to choose between the original edition and this one, take the first. In the reviewed edition is namely the typing of mathematical formulas clumsy and often incorrect (cf. pages 69, 88, 151, 176, 193, etc.). Also the items of bibliography are surprisingly not in ascendent order. But the most regrettable fact repose in no difference between the bearing text and passages typed originally in small script (and intended not to be read in first plan). This does not leave negligible influence on readability of the book.

František Matúš

H. J. ENGELBERT, W. SCHMIDT, Eds.

Stochastic Differential Systems

Proceedings of the IFIP-WG 7/1 Working Conference, Eisenach, GDR,
April 6—13, 1986

Lecture Notes in Control and Information Sciences 96.

Springer-Verlag, Berlin—Heidelberg—New York—London—Paris—Tokyo 1986.

XII + 381 pages; DM 96,—.

The Fifth IFIP Working Conference on Stochastic Differential Systems took place in Eisenach (GDR), April 6—13, 1986. It was intended to continue the traditional line of foregoing conferences in Kyoto (1976), Vilnius (1978), Visegrad (1980) and Marseille-Luminy (1984). The 6th IFIP-WG 7/1 conference following in this line the one in Eisenach has been held in September 1988 in Jablonna (Poland) and its Proceedings are to appear in the same series (Lecture Notes in Control and Information Sciences). The topic is traditionally present research in the field of stochastic differential systems with particular emphasis on infinite-dimensional stochastic systems, stochastic ordinary and partial differential equations and the numerical method for them, stochastic control and filtering. The volume under review contains 39 lectures which are arranged in four parts. These are

- 1) Infinite-Dimensional Stochastic Systems and Random Fields. Stochastic Partial Differential Equations
- 2) Stochastic Equations and Diffusions. Approximations of Diffusions
- 3) Stochastic Control Theory
- 4) Special Problems in Martingale Theory and Stochastic Calculus.

In reviewer's opinion, the traditional IFIP-WG 7/1 conferences proved to be interesting and stimulating meetings of experts at stochastic differential systems. Also the volume under review contains a lot of interesting and important contributions, many of which were written by well-known authors.

To demonstrate this we can choose several examples: D. A. Dawson and J. Gärtner deal with long-time fluctuations of weakly interacting diffusions. They investigate dynamical phase transitions and related problems for a Curie-Weiss model with continuous spin. The contribution by G. Kallianpur and H. Karezlioglu is an introduction to the white noise calculus for the filtering of the two-parameter processes having a Markov property with respect to left and/or lower half-planes. L. Arnold and W. Kliemann study large deviations of linear stochastic differential equations. A lot of subtle, but practically relevant asymptotic results are given. Large deviations are also treated in the contribution by W. Smolenski, R. Sztencel and J. Zabczyk for the case of semilinear stochastic evolution equations and by G. Jetschke for a stochastic reaction-diffusion equation.

A number of interesting papers are devoted to control problems: Let us mention at least the one by U. G. Hausmann on the optimal control of diffusions with partial observation and non-Gaussian initial condition and the contribution by P. Mandl entitled "Limit theorems of probability theory and optimality in linear controlled systems with quadratic cost". From the special problems in martingale theory and stochastic calculus let us notice the work by D. Nualart and E. Pardoux on stochastic calculus associated with Skorokhod's integral.

Of course, the book under review contains much more nice and interesting contributions than those rather randomly chosen ones above.

Bohdan Maslowski