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MATHEMATICAL MODELLING FOR INDUSTRIAL PROCESSES

Collection Lectures Notes in Operations Research and Mathematical Systems
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The nineteenth volume of the collection comprises a number of articles published by Lassi Hyärien from 1967 to 1969, devoted to the designing of computation systems meant for the supervision and control of industrial processes.

The author starts from the idea that the purpose of mathematical modelling, when studying industrial processes by means of controllable variables, is to help us to understand the development of the given process, its location in the environment average. Consequently, the author refers only to the mathematical modelling, i.e. to the models made up solely by mathematical and logical relations.

While in the first part the author surveys notions, definitions and classifications, and sets forth intuitive examples related to the modelling theory, to the optimization of the process with the aid of the models, in the second part, the book synthesizes very well some of the statistical methods widely used today in the two methods of study of the phenomena, processes and systems: the modelling and the experimentation.

The first classification, concerning the process models adopts a more interesting point of view, attached to the fact that the process is under development or is to be implemented. The author himself recognises that this classification is ultimately a coarse one.

The other classifications are more exactly orientated towards the problems and we have to remark, at the same time, the author's consistency as regards the use of the notations throughout the work.

The introduction to the chapters related to the design of the experiment, to the covariance analysis, to the main components and to the regression, has been done by the author with a view to making clear the part of statistics and of probability theory, as well as the contribution of these disciplines, alongside with mathematical programming, to mathematical modelling.

An industrial process analyst should be familiar both with mathematical programming and statistics, and this book emphasizes it in the way the notions are presented.

While with the design of the experiment an analysis is made in view of detecting changes in the response of the process, owing to changes in the controllable variables, with the analysis of covariance and of main components we identify, respectively we simplify, the model adjusting it to the experimental data observed and collected, and finally with the regression analysis we can even choose the model; besides, this analysis is a third way of "adjusting" the model to the experimental data.

As a conclusion, we consider that this synthesis is an opportunity for ordering the accummulated knowledge regarding the mathematical modelling, but it may be recommended also to those who desire to become aquainted with this new field of process (system), analysis, certain notions of statistics and of probability theory being, however, required.

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