D. N. Chorafas

LA SIMULATION MATHEMATIQUE ET SES APPLICATIONS

(Mathematical Simulation and Its Applications)

Dunod, Paris, 1966

This 346-page book is the French translation of a work written by the well-known author D.N. Chorafas, professor at the Superior School for Engineering and Architects, Catholic University of America.

The technique of simulation has, in the last few years, undergone particularly important developments, especially on account of the use of electronic computers.

The aim of this book is to present, explain and discuss some basic aspects of mathematical systems which have lately been used to an ever increasing degree by engineers and research workers.

The book contains six parts, totalling 17 chapters.

The first part deals with basic notions such as the introduction to mathematical abstractions, the definition of the domain studied regarding simulation and, finally, the study of some cases of simulation. Applications are thus studied in the electric industry, various methods of simulation being shown, and graphic representations, flow charts, diagrams and tables being resorted to. The same methods are also used to study simulation in steel works and in nuclear physics.

The second part studies some mathematical aspects of simulation. The manner in which mathematical models are elaborated is shown, as well as the dynamics of the mathematical models and the manner in which the equations are formed. A special chapter deals with the checking and solving of equations. Notions are given on the solution of equations by the Monte-Carlo method, on the solution of integrals and integral equations. In connection with them some notions are given regarding random and pseudo-random numbers.

A chapter deals with the generation of data. Notions are thus given regarding interpolation and its techniques, the computation of derivatives and the use of interpolation in technological problems.

The third part of the book deals with the estimation of industrial systems. It begins by simulating administrative systems such as, for instance, the European Common Market. A model for civilian air traffic is also studied.

A chapter deals with very long term forecasts regarding, for instance, the dispersion of electronic equipment in various countries.

Experimenting in industrial matters is also studied.

The PERT method for programme control is studied in a separate chapter.

The fourth part of the work deals with applications regarding some stochastic processes. Special chapters are devoted to simulation by means of Markov chains, simulation of activity in a workshop and simulation of military problems.

The fifth part of the book refers to some problems regarding the motor cars. The simulation of motor car traffic is studied as well as the implications of traffic lights on traffic, some considerations being made on the planning of road networks.

The last part of the work deals with problems of hydrologic applications. Basic data on hydrologic simulation are given in a chapter, followed by details regarding the elaboration of the control equations and of models.

The last chapter of the book deals with a simulator of power distribution. Notions are given regarding the simulation of an electric power transportation network; the manner in which the equations yielding the exact solutions can be obtained and the way in which a simulator can be used for solving the problem, are shown.

It can be stated that prof. Chorafas' present work has the merit of giving an entire series of data regarding models and particularly economic models accessible to a wide circle of readers. However, this work cannot be considered as a complete monography on the technique of modelling. Important chapters regarding the theory of similitudes or the languages of simulation are lacking, although the latter technique is nowadays broadely used.

The work **"Mathematical Simulation and Its Applications"** is at any rate an excellent introduction to the subject. It does not involve great mathematical difficulties, so that it can be useful to a broad sphere of persons — economists and even technicians — interested in the technique of simulation, particularly from the viewpoint of its applications.

Prof. EDMOND NICOLAU