BOOK REVIEW – BUCHBESPRECHUNG

HENRY MULLISH: *Modern Programming: Fortran IV.* Blaisdell Publishing Company (A Division of Ginn and Company) Waltham, Massachusetts—Toronto—London, 1968.

The algorithmic language Fortran is one of the most widely used languages in our days. This is due not only to the fact that IBM produces a considerable part of the world's electronic computers and provides them with this language, but also that this algorithmic language is — besides its easy appropriation — very well adaptable to the formulation of scientific and technical problems, and applicable in other fields as well. Fortran looks back on a past of hardly more than a decade. Its first version has been issued in 1957 under the name Fortran I: then after step-by-step improvements the version Fortran IV discussed by the author has been developed.

The book introduces the reader into all fundamental aspects of Fortran IV. Its treatment is clear and easy to survey. It does not presuppose any preliminary practice in programming or in computer technics, nor the knowledge of any former versions of Fortran. So it may be easily appropriated by all who are interested.

The exercises distributed along the treatment in the book serve well the cause of the material's periodic survey. The detailed table of contents serves also the purpose that the reader should get a general view. Rather specific topics are left out on intention in order to make the fundamental properties of the language more understandable. The reader interested in some specific topics may turn a suitable handbook or manuals.

The book is divided into 44 chapters dealing with the arithmetical, logic, control, subprogram, input-output and specification statements. The thorough study of the book makes the reader capable to prepare programs indepedently.

T. KOVÁCS

GY. A. NAGY—M. SZILÁGYI *Introduction to Theory of Space Charge Optics.* Akadémiai Kiadó, 1968.

Space charge electron optics or, as shortly called by the authors, space charge optics is a separate and considerable part of electron optics dealing with solution of a wide range of specific, theoretically and practically interesting problems. It originates in technical problems connected with directing and guiding of charged particles (electrons, ions, protons, etc.) in a number of types of microwave tubes as well as in various physical and technical devices, developed after World War II. It has been clear from the very beginning that methods of space charge-free geometric electron optics, highly developed by that time, are not sufficient to solve all the problems which may crop up in space charge optics. From theoretical point of view the most conspicuous difference between them may be that trajectories of charged particles and laws governing them in space charge-free electron optics are deduced from linear equations, in space charge optics, however, we have to deal with nonlinear differential equations, with all consequences of it.

To deduce equations that are generally valid for a set of problems was not a difficult task at the initial stage of development of space charge optics, either, but applying the equations themselves to certain practical problems has been requiring immense efforts from the experts. This was the reason for what in space charge optics could simply and easily be solved that was solved relatively soon, already in its early period, but working out methods suitable to tackle graver problems has still required much time and intellectual energy.

The initial results were summed up by J. R. Pierce in his book "Theory and Design of Electron Beams", first issued in 1949, and republished in 1954, after a revision. Following this, for a long time no comprehensive

work on space charge optics appeared in the international literature. The first intensive works after Pierce's book were published by Soviet authors in the sixties. N. S. Zinchenko, in his book "Lectures on Electron Optics", has compiled selected studies from the world literature, without any pretension to unity. Subsequent to this some other works dealing with particular problems have been published, too, later on, however, a comprehensive and well systematized book "Electron Beams and Electron Guns" by J. V. Aliamovski has been issued to meet the demands of engineering of microwave tubes.

These have been preliminaries to the book "Introduction to Theory of Space Charge Optics", by Gy. A. Nagy and M. Szilágyi. The book of 423 pages is divided into 6 chapters. The first chapter provides an excellent theoretical foundation to discussing problems in space charge optics. The second deals with problems of space charge flow. The third is on electron guns. The fourth is devoted to space charge effects in long beams. The fifth embraces beam-forming problems by electrostatic fields. The sixth one, finally, includes beam-forming problems by magnetic, and electric and magnetic fields.

This book provides the best ever theoretical grounding of all the works published up to the present for discussing problems one might face in space charge optics, and gives so far the most comprehensive and most detailed discussion of problems related with beam-producing and beam shaping in microwave tubes and industrial beam devices. The authors have not only systematized the immense, wide-spread material, but have also solved themselves a number of problems. In their treatment they have had the object in view to present the final formulas in a form suitable for design, so as to make the book useful for practical specialists, too.

The book supplies a great want both in home and world literature. For that very reason its translated version would likely to be of broad international interest.

M. Romhányi

W. H. Huggins—D. R. Entwisle: *Introductory Systems and Design*. Blaisdell Publishing Company. (A Division of Ginn and Company) Waltham, Massachusetts—Toronto—London, 1968.

This book containing nearly seven hundred large pages gives in a very detailed manner fundamental concepts and notions to the general system theory serving mainly as an introduction at the beginning college level. The book differs from other technical books in many respects.

According to the authors' points of view, the main features of the book are the following: First, the emphasis of operator graphs, rather than traditional electric or mechanical circuit elements, in the formulation of system models. Second, the consistent application of three basic kinds of primitive operators such as: the scalar (i. e. the scalar multiplier operator), the limiter (i. e. the signal limiter operator) and the delayor (that is the dead-time operator). Third, the incorporation and use of modern algebraic methods. Fourth, consistent symbolic notations distinguishing between physical entities and their numerical values. Furthermore it can be mentioned that the conceptual organization of the book leads easily into the studies and programming of analog or digital computers. An interesting circumstance can be referred to: the book is printed in two colours, the text of the treatise with black letters, the many questions and answers, providing selftutoring instructions, with brown letters.

To get a short impression about the content of the book the best way seems to be in giving here the main titles of the nine chapters: 1. Signals, Operators, and Systems, 2. Signal Flow-Graphs, 3. Signal Relationships in Physical Systems, 4. Operator Graphs, 5. Weighting Patterns and Filters, 6. Signal Generators, 7. Sinusoidal Signals—Their Algebra and Measurement, 8. Frequency-Domain Representations, 9. Zeros and Poles.

According to the reviewer's opionion the formation of the book is somewhat too luxurious, the text and the problems are perhaps somewhat exaggerated and overcrowded. To help and facilitate the individual thinking process the diminuation of the explanations, interpretations and comments gives sometimes better possibilities and even better results. Finally, it must be mentioned that although the book pretends to be perhaps an introduction to a general system theory, the majority of examples is taken from the electrical circuit theory. A curious thing is that no references on other books or papers are given for further readings.

F. Csáki

Ziegler, H.: *Principles of Structural Stability*. Blaisdell Publishing Company (A Division of Ginn and Company) Waltham, Massachusetts, Toronto, London, 1968. 147 pages. 81 figures and 7 tables within the text.

The author who is professor of Mechanical, Civil and Electrical Engineering at the Swiss Federal Institute of Technology in Zürich, wrote his book as an introduction to the stability problems of relatively simple engi-

neering structures. Although the examples are mainly taken from the field of applied mechanics, the buckling of columns serving as basic example, at the same time the similarities and the connections between quite different problems may become obvious if the differential equations of the problems to be investigated are similar. Thus, it is evident that there is relatively little difference between the buckling of a column, the critical speed of a turbine shaft or the stability of an airplane, or an electric circuit or a control system although the latter problems are not investigated. The book, written mainly for civil engineers, may also be interesting in some respects for mechanical, electrical or control engineers.

The book seems to stress the more recent developments of stability theory. Written for engineers the conceptual aspects are emphasized instead of the mathematical refinements.

The book contains six chapters. The first chapter serves as an introduction. Here the elements of variational calculus as well as the generalized variables are presented. The Lagrange stability theorem serves as a basis, Lyapunov's first method is also mentioned, but nothing is said about the second, so-called direct method.

The second chapter discusses the problems of nongyroscopic conservative systems. Here Rayleigh's principle and the Ritz—Galerkin method are shown.

Chapter three is devoted to gyroscopic conservative systems.

In the fourth chapter dissipative systems are treated. The Routh—Hurwitz criteria are also mentioned.

The fifth chapter takes into consideration the so-called circulatory forces.

Finally, chapter six serves as an introduction to the time-dependent instationary systems. Here the Mathieu equation and Strutt's diagram are presented. The bibliography contains 87 entries. Index and contents are also given.

F. CSÁKI

STAFL, M.: *Electrodynamics of Electrical Machines.* Academia, Prague — Iliffe Books Ltd., London (English version edited by Toombs, G. A.) 1967

This book is a theoretical treatise of some electrodynamical problems arising in electrical machines. The author's objective was to show how physical problems can be solved through mathematical derivations. Some original results are also presented. The book is divided into four chapters.

The first chapter serves merely as an introduction to the well-known Maxwell-equations of the electrodynamics. Also the scalar potential function and the vector potential function are presented here. The main purpose of this chapter is to give a classification and division of the electrodynamics. The content of the book follows this dealing.

The second chapter is concerned with scalar potential problems. First the solid and hollow sphere, then the solid and hollow cylinder in magnetic field are investigated. Then the field distribution in a machine is treated. Finally, the current density distribution caused by the effect of electrodes is investigated for some simple and typical configurations.

In chapter three steady-state vector potential problems are solved. The field of a current filament, bifilar filaments, a wire of circular and rectangular cross-section as well as a thin band are dealt with. Thereafter the field distributions in ferromagnetic conductors of simple shape are shown. The other part of this chapter is devoted to the following problems: magnetic field of a filament near to an iron wall, in a cylindrical cavity, parallel to a cylinder, in a machine gap; the magnetic field of a current layer or one or several coils in a machine gap. The forces and moments acting on current filaments are also given. Thereafter, some problems pertaining to the practice are treated, such as the distribution of the magnetic field of conductors in an open slot, the magnetic field in a transformer window and the forces acting on the winding, the field of a circular electromagnet, the field of a turn.

The fourth chapter deals with quasi-stationary vector potential problems. First, the Eddy-current losses in a transformer winding are calculated. A conductive sphere in oscillating field, a conductive cylinder in transverse oscillating and rotating field as well as in longitudinal field are investigated. Also the problem of an alternating filament near a conductive plate is solved.

The appendix is a short summary of the mathematics used in the book, in which the Bessel-functions, spherical functions and hypergeometric series are treated in some details.

About eighty figures in the text, an index and contents facilitate the reviewing of the book. According to its highly theoretical character, the book serves mainly the requirements of development and research engineers as well as of graduate and post-graduate students.

F. CSÁKI