BOOK REVIEW — BUCHBESPRECHUNG

Z. HENNYEY:

Linear Electric Circuits

Pergamon Press, Oxford—London—New York—Paris, 1962
330 pp. 271 figures.

Some chapters on the network theory so rapidly developing nowadays are treated in a novel way in the book by Z. Hennyey on "Linear Electric Circuits". The work in substance is the unmodified English translation of the author's book "Theory of Linear Circuits" which was published in 1958 by Akadémiai Kiadó in Hungarian.

In Chapter I, after the definition of the circuit elements, the properties of closed network are dealt with. The network properties are treated in operational form.

Chapter II deals with the theory of two-terminal network. After describing in detail the Thévenin and Norton equivalents, the power matching and the equivalent impedances, the reactive two-terminal network is discussed. Then Foster's reactance theorem and Cauer's Ladder network are treated, after which the reactance transformation and the consideration of losses are touched upon.

The author dedicates Chapter III to the development of the four-terminal networks theory. He introduces characteristics of impedance, inverse hybrid, inverse ladder, ladder, hybrid and admittance and gives clever conversion tables for parameters. Here the concepts of insertion loss, wave parameters and bridge parameters considerations are discussed.

In Chapter IV the theory of three-terminal networks is dealt with and valves and transistors in terms of gyrator schemes are considered.

Chapter V deals with the theory of wave filters, and closes with the discussion on general band-pass filters.

In Chapter VI a brief theory of attenuators, inductive transformer, negative impedance transformer, line and RC equalizer is given.

Chapter VII summarizes fundamental ideas and rules of topology. This chapter extending to 35 pages is illustrated by several examples.

In the Appendix is placed the building-up of operational calculus in an unusual form. After presenting dimensions and units, the book closes with the ingenious treatment of elementary symmetrical forms, reciprocal summarizing and continued fractions.

The author makes references only the classical books Communication Networks I—II of Guillemin and Network Analysis and Feedback Amplifier Design of Bode. This means the abandonment of novel results of circuit theory which unfortunately puts its stamp on the entire book. It can be greatly felt, for instance, on the definition of positive real functions (p. 52), on the description of the restrictions to the matrix Z of the four-terminal network (p. 125), on the evaluation of passive nonreciprocal networks (e.g. those containing ferrite) (p. 124), on omission of network synthesis based on pole-zero arrangement or the treatment of operational calculus.

The book has been commonly published by Akadémiai Kiadó, Budapest and Pergamon Press, Oxford, in a very nice form.

It can be of interest for engineers, research workers, university lecturers who are already well-acquainted with the circuit theory.

K. GÉHER

DITKIN, V. A.—PRUDNIKOV, A. P.:

Operational calculus in two variables and its applications

Pergamon Press, Oxford—London—New York—Paris 1962 (167 pages, 4 figures, 10 tables, 62 references.) 50 s. net.

This book is an English translation of the original Russian volume: Operatsionnoye ischisleniye po dvum peremenny i ego prilozheniya, Fizmatgiz, Moscow, 1958. It was published as volume 24 in the International Series of Monographs on Pure and Applied Mathematics.

Chapter 1 gives the definition of the two dimensional Laplace transform in the following form:

$$F(p,q) = L_{p,q}\{f(x,y)\} = \int_0^\infty \int_0^\infty e^{-px-qy} f(x,y)\,dx\,dy$$

The authors then summarize the main theorems concerning the region of convergence, the properties of the Laplace integral, convolutions, inversion, and so on.

Chapter 2 contains an account of the operational calculus in two variables, based on the two-dimensional Laplace transform. The Laplace — Carson transform is defined as:

$$F(p,q) = pq \int_0^\infty \int_0^\infty e^{-px-qy} f(x,y)\,dx\,dy.$$

The basic rules and theorems of the common operational calculus are generalized for two variables such as: the similarity rule and the shift rule, the theorems for obtaining the images of integrals and derivatives, the multiplication rule. The following two sections contain the ideas of linear combinations of operational variables and theorems concerning functions of functions. After this the images of two variables are derived and the originals of some kinds of operational functions are determined. In one section the relations of Laguerre polynomials are examined.

Then the authors consider the application of operational calculus to the evaluation of integrals, while in the last section the two-dimensional Laplace — Carsone transform is applied to the solution of partial differential equations.

The second part of the book summarizes the fundamental operational relations and tabulates the transform pairs of rational, irrational, exponential, logarithmic, hyperbolic, cylindric, integral functions and gives formulae of some miscellaneous functions.

It may be stated that the book in question is a clear and concise, nevertheless sufficiently exhaustive, treatment of the two-dimensional Laplace transform and operational calculus. The topics in this fundamental work seem to be useful not only for the mathematicians but also for electrical and mechanical engineers.

F. CSÁK