Proceedings on the Symposium on Generalized Networks. Edited by JEROME FOX. Polytechnic Press, Brooklyn, New York, 1967. 789 pp. $18.00.

The Symposium on Generalized Networks was held on 12–14 April 1966 under the sponsorship of the Microwave Research Institute of the Polytechnic Institute of Brooklyn. While a majority of the papers included in these proceedings are concerned with electrical networks, there is a number on the application of network techniques to other fields, such as physiology and optics. The scope of the symposium might be indicated by the following list of the session titles: (1) The Scope of Generalized Networks; (2) Network Methods in Radiation Problems; (3) Lossy Uniform and Nonuniform Lines; (4) Synthesis of Uniform Transmission Line Networks; (5) Analysis of Low Frequency Networks; (6) Lumped Network Synthesis; (7) Network Methods in Physiology; (8) Network Methods in Physics; (9) Nonlinear and Random Networks; and (10) Network Techniques in Optics.

Of the thirty-eight papers, seven are likely to be of special interest to the readers of this journal. A brief résumé of each of these appears below. Most of them contain a good deal of review material, thus, providing rather easy and interesting reading for the nonspecialist. Many of them substantially overlap papers that the same authors have published elsewhere. By and large, they provide a good introduction to their respective subjects.

D. Gabor, Holography and Communication. Professor Gabor's paper reviews the basic principle of holography and some of its more recent developments. He points out that an important application of holography to communication problems may be the almost ideal noiselike coding that can be achieved with diffusely illuminated holograms. Comparable transformations are almost impossible to achieve by ordinary circuitry. This random coding, in particular, might provide an attractive solution to bandwidth reduction in picture transmission.

S. Deutsch, Mammalian Neuron Networks from a Pattern-Recognition Viewpoint. The author suggests a possible mechanism for pattern recognition in mammalian visual cortex. He suggests that "short straight lines" are detected by a process of "correlative scanning" followed by thresholding. The correlation takes place between the input pattern and a weighting function representing summation and inhibition that occur at the input of a "short-line extractor neuron." The scanning process is attributed to involuntary eye movements. The recognition of over-all patterns is attributed to the processing of the outputs of these "short-line extractor neurons" by memory neurons in a procedure equivalent to matrix multiplications. Some simple patterns are analyzed according to the proposed mechanism.

E. E. Loebner, The Role played by Time Dispersion of Optic Nerve Transmission in Neural Processing of Image Data. This paper reviews some work in the modeling of neurons and neural networks. In particular, the author describes an electronic model of the frog's retina constructed by Herscher and Kelly and based on design suggested by the author. Finally, Loebnor suggests that the variation in signal delay in the course of transmission in the optic nerve serves an essential information processing function. The precise role of this dispersion in transmission rate is conjectured.

J. L. Flanagan, Networks for Representing Speech and Hearing Mechanisms. The author shows in some detail how the human vocal tract can be modeled by electrical networks. Such networks can be used to synthesize speech. When such synthesizers are used at the receiving end of a speech transmission system, only control information needs to be transmitted, thus realizing a radical reduction in bandwidth requirements.

A. Vander Lugt, The Use of Operational Notations in Optical Systems. The author shows how each element in a typical optical system can be represented by a block diagram, and introduces an operational notation which facilitates the analysis of complex optical systems.

E. N. Leith and C. J. Palermo, Some Filtering Operations using Coherent Optics. The authors show how a coherent optical system can serve as a powerful processor for ordinary time signals (one-dimensional). In particular, some filtering functions which are practically impossible to realize in electrical networks are easily achieved in an optical system.

A. Papoulis, Two-Dimensional Systems with Applications to Modern Optics. The author considers the extension of some signal processing techniques that result by replacing the time variable by a two-dimensional spatial variable. The objective is to adapt these techniques to optical processing. The emphasis here is on linear and translation invariant systems which permit a simple analysis by the use of the Fourier transform. Some discussion of second order properties of random fields and their application is coherence theory is also given.

EUGENE WONG

Proceedings of the International School of Physics—the Optical Properties of Solids. Edited by J. TAUC. Academic Press Inc., New York, 1967. 434 pp. $22.00

Few summer schools have such a long and distinguished reputation as the Enrico Fermi International School of Physics. The 34th course on the optical properties of solids was directed, and the proceedings edited, by J. Tauc. Until recently, progress in our understanding of the electronic structure of solids has been rather slow; now, however, the situation is changing rapidly with improvement in experimental techniques for obtaining information about the electronic structure of matter and of phonons from reflection and absorption spectra.

The school was arranged on the "by the experts for the experts" basis and was not intended as an introduction to the subject for beginning graduate students; this was an advanced course given by lecturers who have contributed much to the advancement of the subject. The volume takes one to the frontiers of knowledge in the field in 1965; however, in a fast moving subject such as this much has happened in the last two years.

No effort was made to make this a comprehensive course on optical properties. The contributions were confined to intrinsic optical properties so there is no mentioned of impurities. The major portion of the book deals with the electronic structure of solids—excitons receiving special attention. Band theory, plasmons, and the effects produced by electric and magnetic fields are all covered. There is also brief but adequate discussion of phonons.

As there are eighteen articles, space here will not permit a discussion of individual contributions, except to point out that the standard is high, and that most of the articles emphasize theory rather than experiment, although sufficient diagrams of experimental results are included to illustrate the theory. It might be expected that a volume of a summer school proceedings would be different from a conventional *Advances in ...* type of book in that a lecture style of presentation with aids to easier understanding would be used. However, too much of the volume consists of long tracts of dry, formal theory which is unlikely to be bedtime reading for anybody not familiar with the literature. All too often the symbols used are not adequately defined, but for those who are prepared to persevere the reward will be a good knowledge of the quantum mechanics of the electronic structure of matter and of the interaction of visible and uv light with solids.

This expensive volume is superbly printed and bound—it needs to be as it is likely to be one of the most frequently used books on the shelf of a solid state electronic spectroscopist.

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