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Applied Optics **BOOKS**

Optical Information Processing. By FRANCIS T. S. YU. John Wiley & Sons, New York, 1982. 562 pp. $52.50.

There are a number of texts on holography and Fourier optics aimed at the Electrical Engineering student, e.g., Goodman,[1] Cathey,[2] and Carlson.[3] Each makes use of the students' rich background in linear systems and Fourier analysis. As far as the basics are concerned, Yu's book is no different. What makes the volume an outstanding contribution is its generous lucid inclusion of recent results in holography and optical processing. The reader is taken to the state of the art in many areas. Much of the material has hitherto been available only from book chapters and journal articles. The task of placing this material in a single volume has been performed admirably by Professor Yu.

The text is an outgrowth of lecture notes used at Pennsylvania State University and, according to the author, is an extensive update of his previous text *INTRODUCTION TO DIFFRACTION, INFORMATION PROCESSING AND HOLOGRAPHY*.[4,5] The present book has fourteen chapters and can be roughly divided into four major topic areas: Fourier optics; recording media; optical processing; and holography.

The first three chapters contain the standard review of linear systems and introductory scalar diffraction theory. Partial coherence is introduced in Chap. 4. A brief review of basic stochastic processes would seem to be consistent but is not included. Further statistical prerequisites are assumed in the following chapter on recording materials where, in addition to standard subjects, such topics as film grain noise and Markov photographic noise are treated. Newer subjects not found in similar texts include the PROM and the liquid crystal light valve.

Chapter 6 introduces the lens as a phase transmittance and looks at some applications. Newer material includes scale invariant correlation using Mellin transforms. A section on area modulation—a technique used in motion picture soundtracks—is fun.

Chapters 7–9 deal with optical processing. Newer coherent techniques discussed include nonlinear processing using halftone screens and space-variant processing. Noncoherent techniques include archival film storage, image subtraction, and pseudocoloring. Results in these three areas are nicely illustrated by four pages of color plates.

Holography is the topic of the last five chapters. Chapter 10 contains an adequate introduction. The following chapter explores effects of nonlinearities in holography. Rainbow holography ranks in the status of two chapters—one introductory and one on applications. The reason seemingly is to allow Yu to include a more detailed discussion of his many contributions in the area, as is the case elsewhere in the book. Indeed the vast plurality of references in the volume are to works coauthored by Yu. The final two chapters, sadly, contain no exercise problems.

In all, Yu's effort is a significant contribution to the fields of optical processing and holography, particularly in the area of education. At the present time, there is no text in this field that comes close to being as timely.

1. J. W. Goodman, *Introduction to Fourier Optics* (McGraw-Hill, New York, 1968).
2. W. T. Cathey, *Optical Information Processing and Holography* (Wiley, New York 1974).
3. F. P. Carlson, *Introduction to Applied Optics for Engineers* (Academic, New York, 1977).
4. F. T. S. Yu, *Introduction to Diffraction, Information Processing and Holography* (MIT Press, Cambridge, 1973).
5. J. R. Williams, Review of Ref. 4, Appl. Opt. **13**, 685 (1974).

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