

pendix in this new edition. He continues to be amused by the authors' complaint that the use of the word "colorimetry" by the chemists is improper. (The authors are correct from an etymological point of view, but historical usage is in favor of the chemist.)

Senior author Judd mentions that this revision of *Color in Business, Science, and Industry* could not have been prepared had not junior author Wyszecki been able to join him in writing the second edition. But the styles of the old and of the new parts of the text are so nearly identical that it is impossible to say that Dr. Judd wrote this, or that Dr. Wyszecki wrote that—a most remarkable writing team.

In bringing this book up to date, material has been included on color-matching functions for 10-degree fields; the colorimetry of fluorescent materials; metrics of uniform color-space; dark and light and chromatic adaptation; object-color perception in complicated scenes; color rendering of light sources; and color harmony. The treatment of the topics included in the first edition has been expanded to cover the more significant of recent developments.

This reviewer makes the unqualified recommendation that the second edition of *Color in Business, Science, and Industry* be added to the library of everyone interested in color, its measurement, and its applications.

Differential-Difference Equations. By Richard Bellman and Kenneth L. Cooke. Vol. 6, Mathematics in Science and Engineering, edited by Richard Bellman. 462 pp. Academic, New York, 1963. \$13.75. Reviewed by J. Gillis, *Weizmann Institute of Science, Israel*.

AMONG the proliferating scientific literature of our day, we occasionally find a new book which says something better than it has been said before. But it is rarely indeed that we come across a book which actually opens up a new subject. Dr. Bellman effectively does just that, with the first broad treatment ever published of differential-difference equations.

The presentation is clear and lucid, while the examples are chosen from a wide range of mathematical literature and take us, in many cases, up to the frontiers of what is known. It is claimed that "only slight acquaintance with the theory of Laplace transforms and differential equations is required", but this seems disingenuous to the reviewer, as such assertions so often are. It is formally true, but since the book is, by its entire tone, addressed to mathematicians, the claim really adds very little to the situation.

The material represents a reasonable balance of methods of solution, existence questions, asymptotic behavior of solutions, and problems of stability; the whole seasoned rather liberally with items of fundamental mathematics. It might have been even more useful if the author had included a chapter on numerical methods of solution. Perhaps the omission will be made good in a later edition. The stability discussion includes nonlinear equations, where it leans heavily on Poincaré-Liapounov ideas. It is interesting that the

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high-speed computing machines which enable us at long last to do something with nonlinear problems have led to a renewed and practical interest in what seemed 60 years ago to be an elegant intellectual exercise.

In view of the theory's increasing range of applications, there is little doubt that it is going to grow considerably. It is interesting to observe in it a clear example of how rigorous, pure mathematics can still profit from sound intuition, including physical intuition.

The Concept of the Positron. A Philosophical Analysis. By Norwood Russell Hanson. 236 pp. Cambridge Univ. Press, New York, 1963. \$5.95. Reviewed by Norman Feather, University of Edinburgh.

IT is perhaps surprising that this is the first book by an established philosopher of science devoted specifically to the problem of antimatter. One might have supposed that the glamor of the topic would have proved irresistible long ago.

To be precise, "The denouement of the book is its ninth chapter. There the intricate story of the discovery of anti-matter is set out" (p. 1), or, to be more precise, "Chapter IX is called *The Positron* . . . the positron is the first anti-particle" (p. 3). So, Professor Hanson has attempted to provide, in the first eight chapters (pp. 5-134), the prolegomena appropriate to the denouement of the ninth (pp. 135-165)—and in 18 pages of appendices, and 42 pages of notes, the critical apparatus for the program as a whole.

The reader who wishes to derive full value from these sixty pages of appendices and notes must be no mean scholar; he must be able to translate the Latin of Descartes, Grimaldi, and Newton, the French of Joliot and Curie, and the German of Skobel'tzyn; he must have had some grounding in quantum field theory—and his knowledge of the literature must be such that he is able to supply many missing or incomplete references out of his head (authors crop up, every now and again, previously unmentioned, with a mere *loc. cit.* to direct the searcher to his quest). If he is a conscientious reader, he will have been making regular reference to the notes as he followed the main text of book. There, too, not to be overwhelmed by the author's parade of learning, he will have had to call on his own knowledge of philosophy and history—and of physics itself—to a considerable degree. Too often, Professor Hanson introduces a character, for a moment, only to dismiss him again with equal celerity—Beeckman, the seventeenth-century Dutch geometer, for instance, or Benton, of whom all that we are told (and I have discovered no more) is that he wrote *unintelligibilia*. Too often, also, bits and pieces of the formalism of theoretical physics are encountered, with no guide to the uninitiated by way of a definition of symbols.

We wonder what reader is equal to the whole task. This reviewer, certainly, is not. He can evaluate Professor Hanson's account of the doings of experimenters, and he admits to some acquaintance with the history