tools, the reader should develop an intuitive feeling for the art and science of simulation and its many applications. The book is well-designed to serve as a text for a first course in simulation and modeling.

Digital Signal Analysis—S. D. Stearns (Rochelle Park, NJ: Hayden Book Company, 1975, 280 pp.). *Reviewed by N. Ahmed, Department of Electrical Engineering, Kansas State University, Manhattan, KS 66506.*

This is an excellent book which introduces the engineer, mathematician, and computing scientist to the fundamentals of signal analysis, with an emphasis on digital signals. It has evolved from a one-year course in digital signal analysis taught at the University of New Mexico, beginning in 1969, and at the Sandia Laboratories in Albuquerque, NM, starting in 1970.

The book consists of fourteen chapters, the first three of which are devoted to a review of linear signal analysis, least squares, Fourier series, continuous transforms, transfer functions, etc. Topics related to sampling, analog-to-digital conversion, the fast Fourier transform, and spectral computations with digital signals are discussed in Chapters 4–7. Throughout these chapters, the author does a fine job of emphasizing the relationships between continuous and discrete waveforms and spectra.

Topics pertaining to recursive and nonrecursive digital systems, digital simulation of continuous systems, and the design of digital filters are considered in Chapters 8–12. Some discussion pertaining to errors due to finite word lengths is also included. A topic which deserves special mention is the design of cascaded digital Butterworth and Chebyshev filters via the bilinear transformation; the related treatment is one of the best this reviewer has seen. A set of Fortran programs which enable one to readily design cascaded Butterworth filters is included in an appendix. Finally, a concise but well-written discussion related to random digital signals and their spectral estimation is presented in Chapters 13 and 14.

In summary, this is a carefully prepared book which consists of numerous illustrative examples and thought-provoking exercises. It is essentially self-contained and is of great value to any serious student of digital signal processing.

System Dynamics: A Unified Approach—D. Karnopp and R. Rosenberg (New York: Wiley-Interscience, 1975, 402 pp.). *Reviewed by Alan S. Perelson, Los Alamos Scientific Laboratory, University of California, Los Alamos, NM 87545.*

It is now generally recognized that most lumped-parameter systems have a common mathematical structure. Viewing a system as a collection of interacting parts leads to system descriptions in which there are sets of equations describing the properties of each component, i.e., constitutive equations and sets of equations which describe the manner in which the system components are connected together—the system's topology. The separability of the topological and constitutive aspects of a system was probably first noted by Kirchhoff when he formulated his now famous current and voltage laws, KCL and KVL. The modern graph theoretic approach to electrical network theory is based upon this separability.

In recent years a number of undergraduate texts have attempted to present a broad unified view of system dynamics by discussing electrical, mechanical, hydraulic, and thermal components and graph theoretic procedures for describing their interconnection. The classification of variables as "through" and "across" (i.e., obeying a generalized KCL and KVL, respectively) is basic to this unity of description.

The Karnopp–Rosenberg book is notable because it is the first text to solely rely upon *bond graphs* as the means of representing system topology. Bond graphs provide a convenient description for systems with multiport components and energy transductions. Consequently, electromechanical, electrothermal, or thermodynamic systems can be depicted and analyzed with unified notations and techniques. Biological and chemical processes have also been treated via bond graphs. Much of the book deals with bond graphs and techniques of bond-graph modeling. As such it is probably the best available primer on bond graphs and is highly recommended to anyone interested in bond-graph modeling.

Linear Control System Analysis and Design—J. D'Azzo and C. Houpis (New York: McGraw-Hill, 1975, 636 pp.). *Reviewed by Richard L. Brunson, Air Force Institute of Technology, Wright Patterson Air Force Base, OH.*

This text is unique in the control system field. Professors D'Azzo and Houpis address the conventional control theory topics normally presented in an undergraduate text and in addition relate them to modern control theory. This correlation between conventional and modern control theory makes this text particularly invaluable for use in an intermediate course bridging the gap between the conventional and modern control disciplines. Also, the text is excellent for use in an introductory control course since the modern control discussion provides the student with additional insight into control system formulation and solution techniques.

The 15 chapters of this text can be classified into the following three categories: 1) introductory course material (Chapters 1 through 9); 2) control system compensation (Chapters 10 through 12); and 3) advanced topics (Chapters 13 through 15). Chapters 1 through 9 present control system representation and analysis methods which include root locus, frequency response, and state variable formulation methods. Chapters 10 and 11 introduce the design of cascade and feedback compensation through the use of root locus and frequency response methods. Chapters 13 through 15 cover quadratic forms, Liapunov stability, the Riccati equation, performance indexes, and optimal linear system design.

An especially significant feature evident throughout the text is the liberal use of example problems. Each example problem is very well conceived and illustrates the intended concept quite well. Logical and orderly equation development is another key feature of the text. Only the obvious steps are deleted during the course of an equation development. These two features suggest the book as an excellent self-study text for the practicing engineer.

In summary, this text is especially well suited for either an introductory or intermediate level undergraduate course, as well as a self-study text for the practicing engineer. The text displays a superb job of editing since the original printing had only very minor errors which were corrected in the errata sheet to the text.

Inners and Stability of Dynamic Systems—E. I. Jury (New York: Wiley, 1974, 308 pp.). *Reviewed by Lawrence Stark and V. V. Krishnan, University of California, Berkeley, CA.*

In this exciting contribution, Professor E. I. Jury presents his unified treatment of both continuous and discrete systems. The history of dynamical systems has been, to a considerable extent, the development of various criteria and tests of root clustering and root distributions. The inners approach now combines consideration of stability, aperiodicity, observability, realizability, controllability, optimality, integral-square-measures, and others, in a beautiful, elegant, and parsimonious form. Living as we do in the explosive growth phase of science and technology, where even reading titles of new articles is beyond a man's capability, it is reassuring to know that scholars like Professor Jury are working to create simple order and unity where diversity and dissimilarity prevailed.

The classical theory of differential equations was of paramount importance in Jury's background; contrariwise, during his academic career he has been immersed in difference equations—sampled-data theory, the Z-transform, and the modified Z-transform. Thus it was not unnatural that the unified inners approach should have sprung into Jury's head as he was "unoccupied" one April afternoon in 1970 on his daily three-mile stroll around beautiful Lake Merritt near the Berkeley campus. Among the pleasures this development has given