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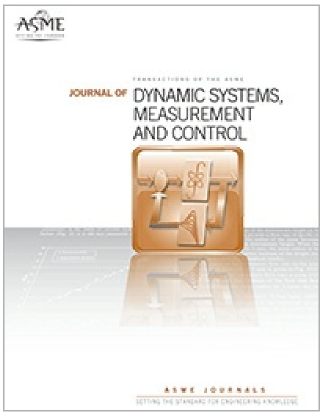

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BOOK REVIEWS

Fluidic Systems Design

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+ Author and Article Information

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A third significantly different feature is the use of nearly four hundred illustrations many of which are taken from *The Engineers Sketchbook* with equations handwritten on the sketches. The informality is welcome and relieves the text from many equations except in the last few chapters.

In the first chapter components of mechanical, electrical, and hydraulic systems are categorized according to their function in a system configuration. The list of functions is lengthy including conductors, connections, references, directors, protectors, energy storers, fixed and variable dissipators, disconnectors, actuators, transformers, and convertors. Engineering sketches are provided of examples of components for each function in the three media. A similar type of categorization occurs in Chapter 2 for systems according to the functions; periodic to continuous power conversion, filtering, timing, amplifying and switching regulation. Analogies and duals are discussed on the basis of generalized through and across variables.

In Chapters 3 and 4, the detailed generalized discussion on two and three-port component characteristics and steady state system design is found. Chapter 5 is concerned with dynamic models of components, linearized system models and the formulation of system differential equations in state form. State form is preferred because of its inherent simplicity for preparation for analog or digital computation. Chapters 6 and 7 discuss the mathematical problems of ordinary linear differential equation solution. Both D operator and Laplace Transform methods are included and emphasis appears to be placed on the root locus method for response determination. The coupling of mechanical rotation and translation is discussed and Chapter 7 ends with the response of multivariable systems, natural and forced modes. Chapters 8 and 9 complete the volume with a treatment of nonlinear component effects on system dynamics illustrated by graphical phase plane methods. One example treats the start-up of a motor coupled to load with inertia and nonlinear source-load characteristics.

On the negative side, the book does not contain enough examples of completely worked out system design including system specifications component sizing and dynamic considerations all numerically evaluated. Hydraulic system analysis and design tend to be oversimplified and a slight preference for transistor devices and systems could be detected. However, these are not serious shortcomings.

I would recommend the book to students of design and system dynamics alike and suggest that it be considered primarily for a course in Engineering System Design at perhaps the junior level. To appreciate the fine points of design and analogy students should have a background of differential equations, electronic circuits, mechanics, and fluid mechanics before taking the course. A subsequent course would probably need to be problem oriented with aspects of design optimization included. Also, if its use as a substitute for a vibrations text is anticipated, it would have to be supplemented by additional notes and examples.

TRENDS IN GENERAL SYSTEM THEORY, George J. Klir, Ed., Wiley-Interscience, N.Y., 1972, 462 pp.

REVIEWED BY DEAN KARNOPP[7]

A systems engineer in search of stimulation might seriously consider general systems theory. It is only mildly addicting, so far still legal, and despite the most recent trends as evidenced by this book, the possibility of permanent brain damage seems small. (For engineers, the antidote for an overdose is simply prescribed—a few hours' work on hardware problems.)

The old masters such as Ludwig von Bertalanffy, Anatol Rapoport, and W. Ross Ashby are well represented here by the rambling, speculative, inspirational, and slightly cloudy style of article which has for years teased systems specialists in a variety of fields to study general systems theory. Some newer voices continue the tradition of communication without equations (John Milsum on General Living Systems, for example) but the trends are all toward mathematization of the theory if the evidence of the latter part of this book is to be believed. Alas for the poor engineer, the mathematics most used is full of the backwards letters, strange arrows, and mysterious symbols of set theory and logic. Although one supposes that the arguments must be becoming more precise as they become more abstract, it seems to this reviewer that most engineers will draw even less nourishment from the newer mathematical theory than they did from the older descriptive theory.

What seems to be happening is that a breed of specialized generalists is arising to take the place of the generalized specialists who founded general system theory. How else can one explain the reference list of one of the last contributors to this collection who saw fit to cite 28 works, 27 of which he had written himself? Such an interior monolog is hard to find in the earlier publications of the Society for General Systems Research in which scientists of widely varying backgrounds were attempting to communicate with each other. Perhaps in the future, general system specialists will see no need to communicate at all with those outside the pale and this book may represent the engineer's last best chance to glimpse the soaring towers of a beautiful and powerful theory.

[7]Professor of Mechanical Engineering, University of California, Davis, Calif.

FLUIDIC SYSTEMS DESIGN, by C. A. Belsterling, Wiley-Interscience, New York, 1971, 232 pp.

REVIEWED BY J. R. MANNING[8]

It is a time-honored practice in academia to publish essentially the same material in slightly altered form as many times as one can get away with it.[9] This has the dual advantages of fattening the author's publication list and making important results available to the widest possible audience. Most of the material in *Fluidic Systems Deisgn* is taken literally word for word from Belsterling's 1967 report for the Army Aviation Material Laboratories [1],[10] which is available from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Va. 22151, for about $0.65 microfilm or microfiche, $3 paper copy.

The Wiley book version retails for $14. What does one get for his $11? A 14 page history of how fluidic design techniques developed , a 12 page overview of the fluidic systems design process, and about 12 pages scattered through the book of new material on digital devices (the AVLABS report dealt with analog devices exclusively). With the exception of some material on terminology, nomenclature, etc., which was moved in the book to an appendix, the order of presentation is identical. The figures have been redrawn and integrated into the text instead of placed on separate pages; they are now easier to refer to while reading but the smaller scale renders numerical data less accurate. All in all, the book seems a bad bargain compared with the report.

[8]Assistant Professor, Dept. of Mechanical Engineering, Stanford University Stanford, Calif.
[9]For example, this review is excerpted from a much longer version done for Fluidics Quarterly.
[10]Numbers in brackets designate References at end of review.

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Semantic Scholar extracted view of "Trends in General System Theory." by Irwin Marin et al. @inproceedings{Marin1974TrendsIG, title={Trends in General System Theory.}, author={Irwin Marin and George J. Klir}, year={1974} }. Irwin Marin, George J. Klir. Published 1974. Sociology. View via Publisher. Save to Library. Create Alert. General system theory. A system is a set of interconnected components that form a whole and show properties that are properties of the whole rather than of the individual components. This definition is valid for a cell, an organism, a society, or a galaxy. Therefore, as Joanna Macy expressed it, a system is less a thing than a pattern. Systems thinking uses the concept of system to apprehend the world. Following the trend in systems science of looking for theoretical and methodological complementarity, there are approaches that seek to integrate the knowledge base of systems thinking, general evolutionary processes, and human science. Evolution, both as a scientific theory and as a universal myth, is a powerful story for the transformation of consciousness and society. Systems theory studies the structure and properties of systems in terms of relationships, from which new properties of wholes emerge. It was established as a science by Ludwig von Bertalanffy, Anatol Rapoport, Kenneth E. Boulding, William Ross Ashby, Margaret Mead, Gregory Bateson and others in the 1950's. Systems theory, in its transdisciplinary role, brings together theoretical principles and concepts from ontology, philosophy of science, physics, biology and engineering. This trend in modern psychology has appeared as a reaction to the sterility of behaviorism. General Systems Theory represents an expanded paradigm for psychology, without which much of present-day psychology would be in a state of arrested development.