

## BOOK REVIEWS

**Flow in open channels (Volumes I and II)** by K. Subramanya. Tata McGraw-Hill Publishing Company Ltd., 12/4, Asaf Ali Road, 3rd Floor, New Delhi 110 002, 1982, Vol. I—pp. 290, Rs. 60, Vol. II—pp. 160, Rs. 60.

Although there are many excellent books on open channel flows like those of Ven Te Chow and F. M. Hendersen, the book by Subramanya is a welcome addition. It should serve as a very useful book for the professional engineers in the area of water resources as well as for engineering students both at the undergraduate and graduate levels.

Volume I which should serve mostly the needs of undergraduate students, consists of six chapters. Chapter 1 is an *Introduction*. *Energy-depth relationships* are presented in Chapter 2. While *Uniform Flow* is discussed in Chapter 3, *Gradually-varied Flow Theory* is outlined in Chapter 4. Chapter 5 contains a detailed discussion of the various methods available for *Gradually-varied Flow Computations*. Details of the *Hydraulic Jump* are presented in Chapter 6.

Volume II which should meet the requirements of graduate students in particular is presented in 4 chapters. While Chapters 7 and 8 discuss *Rapidly-varied Flows* and *Spatially-varied Flows* respectively, *Supercritical Flow Transitions* and *Unsteady Flow* are dealt with respectively in Chapters 9 and 10.

The book is written in a lucid style, presentation of the material is well organised and systematic, illustrations are good, workedout examples are carefully chosen, the problems and questions (Multiple choice type) are thought provoking and well designed for testing the fundamental principles. The numerical methods presented for computer applications are specially noteworthy.

Since the book is written in SI units, it should find a wide international readership. The list of references at the end of each chapter is up-to-date and should stimulate further reading interests.

The book is highly recommended for engineering students (undergraduate as well as graduate) and for all the professional engineers involved in the design of canal systems. The book is a must for all the science and engineering libraries.

Department of Civil Engineering  
Indian Institute of Science  
Bangalore 560 012.

N. S. LAKSHMANA RAO

The dioptr  $\rho$

*Decimal multiples and submultiples for use in the SI :*

The name of the prefix is followed by the symbol and the numerical value.  
exa, E,  $10^{18}$  ; peta, P,  $10^{15}$  ; tera, T,  $10^{12}$  ; giga, G,  $10^9$  ; mega, M,  $10^6$  ; kilo, k,  $10^3$  ; hecto, h,  $10^2$  ; deca, da, 10 ; deci, d,  $10^{-1}$  ; centi, c,  $10^{-2}$  ; milli, m,  $10^{-3}$  ; micro,  $\mu$ ,  $10^{-6}$  ; nano, n,  $10^{-9}$  ; pico, p,  $10^{-12}$  ; femto, f,  $10^{-15}$  ; atto, a,  $10^{-18}$ .  
The use of the prefixes centi, deci, deca, and hecto is generally not recommended,

**Computer aided power system operation and analysis** by R. N. Dhar. Tata McGraw-Hill Publishing Company, New Delhi, 1982, pp. 266, Rs. 48.

In recent years, the rapid industrialisation of the country has led to a large increase in the demand for electrical power. There has been an equally rapid rise in fuel costs. As a result, the electricity boards have been forced to resort to power cuts, and their operation has become uneconomical. In response to these problems, which are likely to intensify in the future, the power industry has embarked on ambitious expansion plans, which include the erection of super-thermal power plants, the exploitation of available hydro resources, and the construction of extra high voltage transmission networks. Steps are being taken to involve the computer in expansion planning and operational control of the system, because it is only thus that reliable and economical supply of power can be guaranteed.

The power industry can successfully meet the challenges of the future only if it can employ an adequate number of engineers who possess a sound knowledge of electrical machinery, power systems, computers and systems theory. These manpower needs can be satisfied by the production of well trained engineering graduates in the power specialisation along with the updating of the skills of the engineers who are presently employed ; this updating can be achieved by their deputation to M.E. degree programmes. The running of short-term training programs by universities, and by the training establishments of the industry, is also of importance. These manpower development efforts need to be supported by the availability of good text-books ; these books should also be adaptable for self-study. Recently, a number of text books on the application of computers to power problems have appeared ; the latest in this category is the book under review.

The book touches on all the major topics of computer-aided analysis and control of power systems. After the introduction, the first topic is load forecasting. The stress is on the physical nature of the load, rather than on the details of the forecasting techniques; this is appropriate, since the wide variety in the techniques precludes their inclusion to any depth.

Under unit commitment, the costs associated with steam plants are discussed, and hydro plants are described. The commitment problem is not mathematically formulated, nor are solution techniques presented. Although in the present Indian context of shortage, unit commitment may not be of significance, the power engineer must be trained for the future, where installed capacity should be adequate ; thus the sketchy treatment of the topic is to be regretted. Short term load scheduling for both purely thermal and hydro-thermal systems is clearly developed and a solution technique is included. Long-term scheduling is not discussed.

The construction of impedance and admittance matrices leads into the topics of load flow and optimal load flow. The load flow problem, and its solution techniques

are thoroughly investigated. The optimal load flow is effectively developed. These chapters are very well written, and are a highlight of the book.

Under load frequency control, the single area and the multi-area cases are considered. The block diagrams are developed, and the response in the uncontrolled case is obtained. Control strategies are touched upon, although no mention is made of the matrix Riccati equation, through which the optimal controller gains are computed.

Short circuit analysis begins with symmetrical components. Studies are then carried out for different types of faults. Sparse network concepts are used in the solution. This chapter is a very comprehensive one and maintains a high standard.

In transient stability studies, the swing equation is derived, and different numerical integration techniques are applied to its solution. The equal area criterion is demonstrated for a two-machine system. Security and reliability are only briefly presented but the problem formulations and solution techniques are lucidly explained, and illustrative examples are provided.

Although the book provides a wide-ranging overview of computer application to power systems, the large number of topics forces the author to present only problem formulations, and not solution techniques, for many of them. In the reviewer's opinion, the best written and most comprehensive chapters are the ones on load flow, short circuit studies and transient analysis ; these are subjects which have a prominent place in this book's predecessors in the field. Its effectiveness would have been enhanced if it had been viewed as a complement to the earlier works, and stress had been laid on such topics as unit commitment, load scheduling, reliability, security and state estimation. In its present form, it can serve as a graduate level text-book, but will have to be supplemented by material from journals.

The author has a very clear style of presentation, and the novice will gain a good understanding of the fundamentals of the subject ; the only prerequisites are an elementary knowledge of control theory, matrices and computer fundamentals. The book is remarkably free of typographical and other errors, and there are a number of illustrative examples, which make it adaptable for self-study. A representative list of references is included.

In summary, the book is a welcome addition to the literature in computer applications to power systems, and will serve as a reference both for practising engineers and graduate students.

Department of Electrical Engineering  
Indian Institute of Science  
Bangalore 560 012.

LAWRENCE JENKINS

**Wood and bamboo for rural water supply** by Kick van den Heuvel. Delft University Press, Mijnbouwplein 11, 2628 RT Delft, The Netherlands, 1981, pp. 76, Dfls. 12.50.

This book deals mainly with the author's experiments in using bamboo pipes for drinking water supply in rural Tanzania. Although the title of the book has 'wood' for its first word, bamboo claims all the attention after the first couple of pages.

The main topic of the book starts off with a review of the growth cycle of bamboos. A discussion of a few species of bamboo found in Tanzania follows. After a description of a tool to remove the partition walls in bamboos, the rest of the book concerns itself mostly with the interaction of bamboo protection with water quality. A fairly detailed discussion of the treatment of bamboos for protection against cracking and the likely contamination of the drinking water by leaching of chemicals used in the treatment is given. Results of some experiments, including those with wood, are quoted. The discussion on overall suitability of bamboo pipes for drinking water, however, is left inconclusive.

Cost estimates have been worked out comparing bamboo pipes with plastic pipes for different sizes. Transport is shown to account for a large share in the cost of bamboo pipes, although this probably is true for places where bamboo production is confined to particular regions.

The book is useful reference material for concerned research workers. The book carries a bibliography at the end.

Civil Engineering Department  
Indian Institute of Science  
Bangalore 560 012.

RAMA PRASAD

**Safety and laboratory practice** by B. P. Clarke. Van Nostrand Reinhold Company, London, 1981, pp. 158, £ 3.75.

This is a simple book which must be read by every experimenter, working in a chemical, physical, electrical or mechanical laboratory, which covers almost all places of R & D work. Written in a simple language, the book can be used by laboratory assistants also. Instead of being a collection of do's and don't's, the book attempts a tutorial objective, by having a number of self-assessment questions with the answers provided at the end of the book. In some sense this redresses the situation where most people acquire skills by experience over a period of time, resulting in an incomplete knowledge of the safety aspects. A formal instruction of the correct laboratory practices and safe working techniques is desirable at all stages of the working person's career.

The contents of the book go beyond the safety aspects. The first chapter is no doubt concerned with laboratory safety and the second chapter on general laboratory hazards. These cover electrical, mechanical, chemical and physical aspects. The third chapter deals with the legal questions of the environmental laws, the laws regarding work in hazardous environments and the responsibilities of the employer as well as the employee. The fourth chapter is a quick survey of common laboratory measuring and testing techniques. The accident procedures are treated in chapter 5, which includes some first-aid tips. The last chapter covers the elements of scientific report writing especially of laboratory work. An appendix, indicating the disposal procedures and treatment of the spillage of some common chemical reagents, is then given. A list of 33 references is also provided besides a brief index.

The text combines a wide variety of topic areas which are essential to laboratory workers. Usually these are available in reference books. The book attempts to condense all these in about 150 pages. Therefore the treatment of any one item is bound to be brief and simplified. The fact that the author has been careful about being too superficial is a measure of the care with which the text has been prepared. The level is such that a technician or a laboratory assistant can profitably read the book.

Central Instruments and Services Laboratory  
Indian Institute of Science  
Bangalore 560 012.

E. S. R. GOPAL