BOOK REVIEWS

A Fortran reference manual by Philip F. Ridler. Published by Pitman Publishing Ltd., 39, Parker Street, London, WC2B 5PB, 1979, viii + 120 pp.

This manual is useful to all Fortran language users. This is particularly so to (non-computer) engineers and scientists who like to solve design, development, and research problems on a digital computer (m/c) using a Fortran language. In essence, this is a good aid to those who are learning Fortran using a Fortran text-book and a handy reference book with excellent detailed contents, appendices, and index to others who know Fortran either to a small extent or to a large extent.

This manual is based on USASI × 3·9 1966 Standard Fortran specification and is a guide to the rules of Standard Fortran.

The text contains eleven chapters. Chapter 1 is a concise introduction to computer languages, storage, compilers, programs, input/output, data, and records. Chapter 2 gives a precise explanation of character set, names, lines, statements, statement labels, blank columns, sequence number, and data cards. Chapter 3 is all about constants, variables, and arrays, while Chapter 4 deals with arithmetic and logical expressions. Chapters 5 and 6 describe assignment and control statements. Function and subroutine subprograms, Fortran-supplied standard functions, statement functions, and arguments are discussed in Chapter 7. Chapter 8 exposes specification statements, *viz.*, type, dimension, external, common, equivalence, data, and block data statements. Input/Output (Read/Write) and Format statements are in Chapters 9 and 10. Chapter 11 talks about definition, redifinition and undefinition. Besides an index at the end of the book, there are four appendices which include

(i) List of statements allowed in Standard Fortran

(ii) Statement ordering within segments.

(iii) Intrinsic and basic external functions.

(iv) Fortran Coding Form.

Among many plus points the presentation of Format specification (considered to be a relatively involved concept) with illustrative examples is worth mentioning.

The program written in this Fortran can be run (with proper insertion of job or command control statements which usually vary from m/c to m/c) in most mini- and large m/cs without any modification. This high degree of m/c independency is desirable but users of a modern versatile Fortran compiler (run on a large m/c) using this Fortran subject themselves to unnecessary restrictions (say, in mixed mode computations, non-availability of double precision complex, pp. 26-27) which do not exist.

While the book contains reasonably sufficient illustrative examples throughout, there is still a scope to add illustrations to some statements (say, labelled Common blocks, p. 64).

In page 26 it is better to replace the 9th line from top by

" A + E6 gives E7

E7–E3 gives final result."

By the by, " E5 + E1 " in the previous line should be replaced by " E5 * E1 ".

However, it is necessary to comment that the objectives of the author are satisfied. The minor slip and omission mentioned above are the ones from which most books are not free and the author is very correct when he writes in the Preface " It is too much to hope that the text is completely free from error,...".

S. K. SEN

Advanced mechanics of solids by L. S. Srinath. Published by Tata McGraw-Hill Publishing Company Limited, New Delhi 110 002, 1980, Pp. 372, Price Rs. 24·75.

Mechanics of solids is one of the basic subjects in the curriculum of any engineer concerned with structural design. Consequently any presentation that helps in the understanding of this vital area is to be welcomed. In the last few decades, aeronautical designers and educators have tried to replace the strength of materials approach by the theory of elasticity approach in understanding the basic phenomena like bending, torsion, buckling, etc., due to the compulsions involved in dealing with thin-walled structures. Many books had been written by western authors with this outlook. On similar lines, Dr. Srinath tried to adopt in this book an approach midway between strength of materials and theory of elasticity to provide continuity between the first course in structures and the one covered by books on theory of elasticity. He provides adequate, bordering on exhaustive, coverage of the fundamentals of theory of elasticity in the first two chapters on Analysis of Stress and Analysis of Strain. Most of the concepts are illustrated, at proper locations, with numerical examples. This should serve to clarify many intricate points to the student. For some reason, Dr. Srinath omits strain ellipsoid, Mohr's circle of strains, etc. On p. 45, Example 1.11, the name of the stress function could have been given.

In the chapter on Constitutive Equations, it would have been appropriate, looking at the level of presentation, to indicate that the constitutive relations can be derived from an energy potential. The inclusion of material on failure of solids, yield criteria and plasticity is very thoughtful and will help in the moulding of outlook of the student. The presentation on factor of safety is particularly interesting.

In terms of solution techniques, the stress on energy methods devoting the whole Chapter 5 is very pertinent. The student can get at a very early stage in his education the important idea that approximate solutions with convergence possibilities are as important as closed form solutions. Consistent with his approach and theme of the book Dr. Srinath could however have shown in one simple section of a chapter the link between energy methods and equilibrium formulations.

The chapters on bending, torsion, axisymmetric problems and thermal stresses are written with clarity and comprehension, which is characteristic of the author. However Dr. Srinath's intention of showing the path midway between elasticity and strength of materials approaches could have been well served if he had presented some problems on built up sections, sandwich beams and laminated structures.

Normally books are written to present an outlook acquired and formulated over years of experience in imparting knowledge. I think the book reflects such an outlook of Dr. Srinath. However, it would have been useful if some of the most common concerns of the present day structural engineers were brought to the level of undergraduate presentation. These are: laminated beams, laminated tubes, concepts of stress concentration and fracture. These could have been treated as examples at appropriate places. It is my belief that Dr. Srinath, with his teaching and writing abilities, can easily do this without unduly increasing the size of the book.

On the whole, the book is a valuable addition to the Indian text-book literature on mechanics of solids. This can be adopted as a text-book for the professional courses.

P. N. MURTHY

Correspondence

Dr. V. G. Tikekar's review of the book 'Engineering Mathematics, Vol I' by Prof. R. S. L. Srivastava (Sept. 1979) has evoked considerable interest. The author felt that the reviewer has missed the focus of the material presented in the volume and therefore desired to answer the criticism. We requested Dr. Tikekar to see if he had something to say about the comments of the author. He had chosen to reply. Their correspondence is reproduced below for the benefit of our readers.

Author's observations

This review is concerned more with what is not given in the book than what has been actually included in the book.

In modern times, the knowledge of numerical methods and computer techniques has grown in content to an extent that even for an engineering degree a separate course needs to be designed and given to students as an elective. This is being done in some

Institutes/Universities of advanced learning. Nevertheless, a student opting for such a course must be fully conversant with the topics included in the book under review. Similarly, an elective course in linear algebra is offered for engineering students where the points raised by the reviewer regarding introducing the concepts of a vector as an element of vector space and matrix as a function are emphasized. The book presents those topics of mathematics which every analytical engineer must know. The suggested topics can be included in a third volume as a continuation of the material presented in the two volumes. This third volume could then also include some other topics like tensors, Fourier transform, potential theory, linear programming, sampling theory, testing of hypotheses, etc., which could not find a place in the two volumes due to constraints of space and time.

The definition of a function as given on p. 23 of the book has not gone wrong. What has really gone wrong is this reviewer's sense of English grammar; otherwise how could the words ' a real number y ' be interpreted as meaning ' more than one real number y ' —a conclusion, the reviewer seems to have drawn deliberately. Unfortunately, the orthodox definition of a function given by the reviewer, confuses a beginner between the meanings of a *constant function* and a *function in general*. To avoid such a confusion it also requires illustration by a 'correct' example.

A reference to Cramer's rule in the context of electronic computers seems unnecessary since the scope and limitations of using an electronic computer are invariably emphasized by an instructor in the very beginning of a course on Computer Programming. While making an observation on ∞ in the complex plane the reviewer has obviously skipped problem 1 given on p. 65 of the book.

Some misprints have crept in inadvertently. These will be rectified in future print of the book.

Reviewer's reply

The reviewer had pointed out that the treatment of the topics in the book was old-fashioned. In his review he stressed that in modern times, an analytical engineer should be introduced to the subject with a modern viewpoint. There is no reason why the author should not introduce matrix as a function when he has chosen to do so for sequence. Such modern approaches to different concepts which the author did not include, have naturally been pointed out by the reviewer and dangers of not including them cited.

One of the points of emphasis by the reviewer was that the scope and limitations of any method in the light of the impact of the advent of computers on mathematics should be pointed out at the place where the method is introduced. This is all the more necessary when the treatment is claimed to be unified and emphasising the applications of mathematics in physics and engineering. Such important, informative, and critical remarks should not be relegated to elective courses, but should form an integral part

of the main treatment. Elective courses may not be taken by all the students. Therefore the reviewer continues to hold the view that the remarks made by him regarding Cramer's rule in the review should find place when Cramer's rule is introduced. Such knowledge is too important to be missed by an analytical engineer during his core courses in mathematics. Note that a computer is an offspring of applied mathematics (see *Mathematics and Computers* by G. R. Stibitz and J. A. Larrivee, McGraw-Hill, 1957, p. 6). If certain topics are planned for the third volume, there should be proper plan in the beginning, and cross-references between the material from different chapters and from different volumes should be introduced. This book is claimed to be the first of a two-volume set. But as pointed out by the reviewer, even the contents of Vol. II are not found anywhere in the book, what to talk about Vol. III, which looks to be an after-thought now. The spirit of the reviewer's comments cannot be met by an isolated treatment of the topics.

And now about the colourful suggestion regarding the reviewer's sense of English grammar. Whenever in a definition (as in the case of the definition of a function under consideration here), words like ' there is assigned ', ' there corresponds ', ' relates ,' ' associated ', ' there exists ' are used and precisely one member is intended for assignment or association or correspondence, mere article 'a ' will not convey that sense, but words like ' one and only one ', ' unique ', ' exactly one ', ' a definite ', ' a single definite ' must be used. One can convince oneself about this by seeing the definition of ' function ' in any of the following standard works: (1) A. N. Kolmogorov and S. V. Fomin: *Introductory real analysis*, Dover, 1970 (translated and edited by Richard A. Silverman. p. 4. (2) *The international dictionary of applied mathematics*, Van Nostrand, 1960, p. 386. (3) James and James, *Mathematics dictionary*, third edition, Van Nostrand, 1968, p. 153. (4) *Handbook of mathematics*, Ed. L. Kuipers and R. Timman, Eng. translation ed. by I. N. Sneddon, Pergamon press, 1969, p. 96. (5) *Mathematics—Its contents, methods, and meaning* Vol I, Eds. A. D. Aleksandrov, A. N. Kolmogorov, M. A. Lavrent'ev, (tr. by S. H. Gould and T. Bartha), The MIT Press, 1963, p. 75. (6) G. M. Fikhten got's: *The fundamentals of mathematical analysis*, Vol. I, trans. ed. by I. N. Sneddon, Pergamon press, 1965, p. 28. To convince the reader further that mere use of article ' a ' in such a definition means ' one or more ' or ' at least one ', the following definition of function from *Manual of mathematics* by G. A. Korn and M. A. Korn (McGraw-Hill, 1967, p. 60) is quoted: " Given a rule of correspondence which associates a real or complex number $y = f(x)$ ..... (1) with each given real or complex number x of a set S_x, y is called a (numerical) function $y = y(x) = f(x)$ of the argument x Equation (1) specifies a value (*or values*) $y = Y = f(x)$ of the variable y corresponding to each suitable value $x = X$ of the variable x". (See also p. 85 of *Mathematical handbook for scientists and engineers* by the same authors and publishers). The moral of all this explanation is that in mathematical sense, ' a ', used along with words like ' there exists ', ' there corresponds ', ' there is assigned ', means ' one or more ' or ' at least ' one and not ' one and only one '. Thus one can see that the definition in the book has really gone wrong.

V. G. TIKEKAR

No further correspondence on this subject will be entertained—Editor