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Book reviews

Computational Methods and Problems in Aeronautical Fluid Dynamics, edited by D. L. Hewitt, C. R. Illingworth, R. C. Lock, K. W. Mangler, J. H. McDonnell, Catherine Richards and F. Walkden, 1976; 525 pages. (*Academic Press*, £12·00)

This book is based upon the proceedings of a conference organised by the Institute of Mathematics and its Applications in September 1974. It represents, in effect, a survey of the current state of the art of the 'aeronautical division' of computational fluid dynamics by some of its most experienced practitioners. It will be of most use to the specialist aerodynamicist, but will repay study by anyone who is interested in the application of numerical methods. Introductory chapters on industrial requirements (H. Hitch) and numerical analysis (L. Fox) set the scene. Fox confines himself, essentially, to finite difference methods; the finite element method is introduced by J. H. Argyris and P. C. Dunne who comment that it is 'too early to predict whether the method will eventually contribute to a better understanding of . . . fluid mechanics'. There are review chapters on inviscid, incompressible flow (R. C. Lock), transonic flow (M. G. Hall) and supersonic flow (F. Walkden), together with chapters on more specific problems in these areas. Of particular interest might be the discussion by R. W. MacCormack, *et al.* of fluid dynamical applications of the Illiac IV computer. Viscous flows, as such, are represented by chapters on boundary layers (D. B. Spalding) and turbulent swirling flows (D. B. Lilley). The book is handsomely bound and produced on good quality paper. However the printed page is a non-reduced photocopy of typescript which (excepting pp. 383-384!) has been produced by an inferior machine. At the price, this is unfortunate.

N. RILEY (Norwich)

Fundamentals of Operating Systems, by A. M. Lister, 1975; 144 pages. (*MacMillan*, £7·95 hard cover, £2·95 paper)

Operating systems—the management of concurrent and co-operating processes on a computer—is a subject of rapidly growing importance. For the most part, the basic methods were first worked out on the large general purpose computers of the mid and later sixties; but now they have spread in application, and form an essential part of every system in the real time and transaction processing domains.

With time, we have gained a much better understanding of the principles involved in operating systems. The entire subject can now be seen as a well structured and rational entity. We know enough about operating systems to be able to design one to a given specification and to predict its performance quite accurately. In short, operating systems are both important and academically respectable and it is proper that they should be taught in computer science degree courses.

Andrew Lister's book forms an excellent introduction to the subject. The book is well planned—sections follow one another in a logical sequence and accurately mirror the structure of an operating system itself. After a brief preamble, the reader is introduced to the essential core of the matter—a consideration of processes, communication between them, and the properties of the hardware needed in support. The text then adds layer upon layer to this kernel—memory management, input and output, filing, resource allocation, protection, and job control languages. The integration of all the ideas is ensured by illustrating them with the gradual construction of a so-called 'paper operating system'. In a practical course, the teacher would doubtless pursue the illustration further by coding some of the system for an actual machine as a class project.

The style of the book is direct and clear. It is also refreshingly free from mathematics; there is no queueing theory as such, and the results of various scheduling policies are discussed in a qualitative way.

The book, being designed for the undergraduate, is necessarily short. The author has been obliged to omit certain topics of increasing importance, such as multiprocessor systems and communications. The treatment of the remaining subjects is not deep, and the book would hardly be suitable material for someone about to embark on operating systems research. Nevertheless in its context as a first introduction, the book succeeds admirably. I recommend it as worthwhile reading to anyone starting a course on operating systems, and I would urge lecturers to give strong consideration to using it as a standard text.

A. J. T. COLIN (Glasgow)

Nonlinear Parameter Optimization, by Dr. Ph. Th. Stol, 1975; 197 pages. (*Pudoc*, 49·40 Dutch guilders)

This book, based on the author's Ph.D. thesis, investigates nonlinear parameter optimization for least squares problems. These have distinguishing properties which have encouraged many investigators to develop special methods.

Dr Stol, with a rewarding insight into the differential geometry of the problem, considers the properties of the spaces and surfaces which play a role in least squares techniques. He analyses the use of scaling factors as a means of speeding up convergence. He introduces a 'back projection method' to correct deviations of points on the search path from the direction of differential corrections in the tangent plane caused by the curvature of the parametric curves and scale factor variants and develops two algorithms to implement the method. His results seem to lead to improved convergence.

The first half of the book is taken up by this careful analysis from which suggestions for the improved algorithms emerge. In the second half he gives details of all the programs and examples of their use.

This is a thoroughly competent and useful addition to the literature.

ANDREW YOUNG (Coleraine)