(E.g., the Lax-Wendroff method is unstable in all L_p-spaces except $p = 2$.) Its main practical importance is, after all, that many methods which are unstable in $\underline{L_2}$ are "exponentially unstable" and useless.

I further believe that a course of this nature should devote some space to the construction of finite difference methods on irregular meshes, e.g., the control volume method. (Their analysis would be too far afield.) As it is, irregular meshes are presented only in a short section on the finite element method. However, the flashy cover picture is for a highly irregular mesh, as are all those nice pictures given in the introduction to grab the student's attention!

One can always argue with the material selected; I have taught a similar course at Cornell and then placed more emphasis on modern fast iterative methods (and, irregular meshes). By sticking to the straight and narrow in carefully selected material rather than painting with a broad brush, this book should succeed in imparting a critical attitude and feeling to the students for what should or should not be done in a practical solution.

LARS B. WAHLBIN

7[65-01]—*Computer Numerik 1, 2*, by Christoph Überhuber, Springer, Berlin, 1995, (Part 1) xvi + 511 pp., (Part 2) 515 pp., $23\frac{1}{2}$ cm, softcover, DM 78.00

Although, formally, *Computer Numerik* by Christoph Überhuber comes in two parts, both volumes should be regarded as a whole. *Computer Numerik* thus is a comprehensive, 1000 page textbook on numerical computing for practitioners. It bridges the gap between mathematics dominated treatises on numerical analysis on the one hand and recipe-type collections of numerical programs on the other hand.

The first 8 (out of 17) chapters of *Computer Numerik* discuss general aspects of numerical computing like the modelling process, basic numeric concepts, sources and types of errors, modern computing platforms (hardware and languages) and basic issues on commercial as well as public domain software for numerical computing. Modelling related issues and error identification are given particular emphasis and the author develops a fairly elaborate, detailed, sometimes novel (not always standard) terminology and concept formation in this context.

Chapters 9 to 17 deal with different problem classes for which existent numerical software has reached a sufficient state of maturity: Approximation, interpolation, Fourier-transforms, evaluating integrals, linear and nonlinear systems of equations, the eigenproblem, sparse matrices and random number generation. Each of these topics is approached in a way that particularly fits the needs of the practitioner: Mathematical *concepts* are explained in detail while *proofs* or more involved *numerical details* in the algorithms are left out. Limitations and finite precision issues in each problem class are identified so that the reader gets a clear impression of what can realistically be achieved. For each problem class the book points to the relevant available software in commercial numerical libraries like NAG and IMSL and to corresponding state-of-the-art public domain software packages like LAPACK, QUADPACK or ITPACK. All subjects are illustrated by various (more than 500 in total!) impressive and non-trivial example applications. However, I would have liked to see one more chapter on validating numerical techniques (which take round-off into acount) and corresponding software instead of the one and only very short remark on that subject in Chapter 4.

If numerical analysts have been complaining that their admitted high quality public domain software packages do not yet have the deserved impact on the 'end-user', this book will certainly contribute to change the situation. But it is more than just a guide to numerical software: It is a fundamental work on numerical computation which makes many major achievements in numerical analysis available to the practitioner.

An English translation of the book is under preparation.

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8[68Q05, 68–06]—*Abstract machine models for highly parallel comptuers*, John R. Davy and Peter M. Dew (Editors), Oxford University Press, New York, 1995, xii + 337 pp., 24 cm, $80.00

For sequential computers the von Neumann model has served the needs of practitioners and theoreticians for a long time. In its simplest form a von Neumann computer executes instructions one at a time in a fetch-execute cycle. First an operation code and operand data are fetched from memory, then the corresponding instruction is executed and the result is sent back to memory for storage. Despite the many elaborations of this simple idea in actual computer hardware, reality has been represented closely enough by this model for some purposes. On the practical side, software and hardware designers have been able to advance their own craft without need for a detailed understanding of the opposite craft. And theoreticians concerned with such issues as complexity analysis of algorithms have also been able to make effective use of the model.

The model breaks down when multiple processors and memories are linked together in a parallel computer system. A variety of replacement models have emerged but often these are positioned too closely to either the software or the hardware end of the spectrum, with the result that the main advantages of the von Neumann model (simplicity and generality) are lost. This book contains 18 papers presented at a Workshop on Abstract Machine Models for Highly Parallel Computers which was held at Leeds University in April, 1993. The purpose of this workshop, the second on the subject, was to consider whether a model can be devised to bridge the hardware-software gap somewhere near its center. Interestingly, relatively concrete proposals have been made that appear to do this quite well. This book provides a valuable cross section of work in this important area of computer science.

Daniel W. Lozier

9[86-06]—*Mathematics, climate and environment*, J.-I. Diaz and J.-L. Lions (Editors), Research Notes in Applied Mathematics, Vol. 27, Masson, Paris, 1993, 315 pp., 24 cm, softcover, F 320

There are many books on water waves that are a successful blend of high quality mathematics and physics. With regards to mathematics, climate, and environment, however, books written in the same spirit are difficult to find. Among the climate-related books, M. Ghil and S. Childress' "Topics in Geophysical Fluid Dynamics: