techniques are addressed (finite-difference, finite-element, spectral and particle methods). It also includes studies of parallel algorithms of relevance beyond fluid dynamics, such as parallel versions of

- iterative methods for solving discretizations of elliptic boundary value problems,
- integer sorting, and
- discrete Fourier transforms.

It also begins with an overview chapter (by the editor and two colleagues), and ends with a chapter (by the editor and a different colleague) discussing hardware and software issues related to projected teraflops computers and their use for parallel CFD.

The audience for these books is large and interdisciplinary. The publication of the proceedings makes them available to a much broader audience than would normally be the case with a proceedings published by an engineering or science disciplinary organization or just by the conference itself. This series is off to a good start, and it is easy to recommend it for library acquisition. The individual books reviewed here will be valuable to researchers specializing in the particular area covered by each book. People interested in programming unstructured fluids codes will want all three.

L. R. S.

21[65-06, 65P05, 35R35].—P. NEITTAANMÄKI (Editor), *Numerical Methods for Free Boundary Problems*, Internat. Ser. Numer. Math., Vol. 99, Birkhäuser, Basel, 1991, xvi + 439 pp., 24 cm. Price $98.00.

This book is the proceedings of a conference held at the University of Jyväskylä, Finland, in July, 1990. The subject is free-boundary problems for partial differential equations. Although this may sound like a unified theme, it is not, owing to the diversity of types of free-boundary problems. Even in the area of fluid dynamics, there are three distinct research areas represented here, having essentially no relationship between them. No synthesis of these different areas has been attempted in this book.

The decision to publish a proceedings such as this can be justified on various grounds. The proceedings [1] intended to stimulate the combination of numerical and analytical techniques for studying singularly perturbed differential equations. One can argue this is a need that is not being met by regular journals. The justification for the proceedings under review seems less strong and rests primarily in the extra visibility provided to the important subject(s) of free-boundary problems for partial differential equations.

The proceedings consists of 39 papers, averaging 11 pages in length. In fact 29 of them are between 8 and 12 pages (with 10 pages being the mode). It would appear that authors were instructed to provide manuscripts ten pages in length, as is typical in many conferences today. This length leads to rather long extended abstracts (or in some cases advertisements) of work to be found elsewhere. Indeed, any restriction is somewhat unnatural; one finds far more variability in length of paper (and longer papers) in a typical journal, such as this one. This criticism is meant for the genre of conference proceedings as a whole, not just this book in particular. In fact, many of the papers are informative at a survey level, even if important details are often missing.

To provide coherence to the book, Neittaanmäki has written an extended Preface, which describes the various topics covered. The papers are not grouped accordingly, but rather are presented in alphabetical order based on the last name of the first-named author. Using the Preface, one can scan for a particular topic area, then easily look up the corresponding paper based on the author names which are provided in the Preface.

The areas described in the Preface are organized in three groups. The first is "Stefan-like problems" devoted to models for phase transition in materials. This group is further subdivided into 'modeling, existence and uniqueness' and 'modeling and numerical methods.' The first of these subgroups has papers with basic information relevant to numerical modeling but which contain nothing about numerics themselves. The second subgroup contains papers more in line with the title of the book. The second group in the Preface is devoted to "optimal control, optimal shape design and identification." The final group is on fluid flow with free boundaries.

There are three distinct areas of fluid flow with free boundaries that are covered in this book. One concerns flow of a fluid in a porous medium, with flow of water through a dam being a typical example. Another example is a two-fluid interface, such as the air-water interface. Two regimes are covered. In the case of an inviscid fluid having a free boundary, waves in the free surface are an area of research covered in the book. For viscous fluids having a free boundary, such as honey pouring from a jar, different phenomena are important, and this is also covered by papers in the book. It would be interesting to explore the relationships (if any) between the various types of free-boundary problems outlined in the Preface, but none exists so far to my knowledge.

Libraries have likely made their acquisition decisions regarding this book, through standing orders, as it appears in a well-known series. It is certainly a valuable library holding, and it will be important for researchers in any area of free-boundary problems to consult it. Whether an individual would want to buy a copy is more debatable. It provides a snapshot of the state of research in an important group of areas. However, some of these areas (for example, fluid-dynamical free-boundary problems) are not covered in sufficient depth to justify buying the book by an individual working only in that area.

L. R. S.

1. Hans G. Kaper et al., eds., *Asymptotic analysis and the numerical solution of partial differential equations*, Lecture Notes in Pure and Appl. Math., vol. 130, Dekker, New York, 1991; Reviewed in Math. Comp. **59** (1992), 303–304.

22[41A15, 65–04, 65D10, 65D17].—PAUL DIERCKX, *Curve and Surface Fitting with Splines*, Clarendon Press, Oxford, 1993, xviii + 285 pp., 24 cm. Price $53.00.

Over the past fifteen years, the author of this book has developed an extensive collection of algorithms for fitting curves and surfaces using spline functions. This book was written to explain the mathematics involved, to discuss the intricacies of the associated algorithms, to present examples to show how they work in practice, and to serve as a manual for his package (which consists of 83 FORTRAN routines, and is available to the public under the name FITPACK).