schemes come to light. The above comments are not meant to belittle the ingenuity of the studies described, especially not the very interesting hovering motion discussed in the article by Freymuth, Gustafson and Leben, but, given the present state of development of the field, it might be necessary to consider less complicated flows to allow a careful, scientific assessment of the modelling process. The book rounds off with two essays of a more theoretical nature. The penultimate chapter by Buttke gives a nice introduction to the theory of vortex motions in superfluid helium, and the final chapter is the aforementioned essay by Chorin.

A very important practical issue with regard to particle methods is that of computational complexity as, all too often, this can limit the scope of a particular computation. The workload becomes just too time-consuming to allow properly converged solutions to be obtained. There are many very attractive features associated with using the vortex method, and thus the reduction of the computational complexity is an issue of central importance if the methods are to be used on complicated practical problems. Several advances in this direction have been made in recent years, and more emphasis could have been placed on these issues. Nevertheless, I found the book to present an interesting and provocative view of the subject. I think it will provide a very useful introduction for people who wish to get a good overall view of the current status of the area associated with vortex and particle methods.

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19[35-06, 35A20, 35B25, 35B40, 65-06, 65N06, 65N12].—Hans G. Kaper & Marc Garbey (Editors), *Asymptotic Analysis and the Numerical Solution of Partial Differential Equations*, Lecture Notes in Pure and Appl. Math., Vol. 130, Dekker, New York, 1991, viii+271 pp., $25\frac{1}{2}$ cm. Price: Softcover $99.75.

This book is the proceedings of a Workshop on both asymptotic analysis and numerical solution of partial differential equations held at Argonne, Illinois in February, 1990. The Workshop (and resulting proceedings) had an ambitious objective of stimulating the combination of numerical and analytical techniques for studying differential equations, especially singularly perturbed ones. The book succeeds quite well by displaying different problems where singular perturbations arise, and by giving substantial evidence that progress can be made by combining both approaches.

The combination of numerical and analytical techniques could occur in various ways. One would be to use analytical techniques to handle the more singular part of the problem and thereby simplifying the numerical solution. A variant of this is to use asymptotic techniques to derive novel discretization schemes. Another is to use analytical techniques to analyze the limiting behavior of numerical methods for differential equations which become singular as some parameter tends to a limit. All of these combinations (and more) are well represented in the volume.

Numerous physical applications areas are presented in the book, mostly in fluid dynamics, but those range from oceanography to combustion. Research regarding the limiting behavior of numerical methods for singularly perturbed differential equations has been done in solid mechanics for some time and new results [3, 1] have recently appeared. In the area of neutral particle transport, studies of this kind have been carried out for many years and are continuing [2]. The growing interest (and success) in this type of research makes the book quite timely and easy to recommend strongly.

L. R. S.

1. I. Babuška and M. Suri, *On locking and robustness in the finite element method*, SIAM J. Numer. Anal. (to appear).
2. C. Börgers, E. W. Larsen, and M. L. Adams, *The asymptotic diffusion limit of a linear discontinuous discretization of a two-dimensional linear transport equation*, J. Comput. Phys. **98** (1992), 285–300.
3. S. C. Brenner and L.-Y. Sung, *Linear finite element methods for planar linear elasticity*, Math. Comp. **59** (1992), to appear.

20[65-04].—Julien C. Sprott, *Numerical Recipes—Routines and Examples in BASIC*, Cambridge Univ. Press, Cambridge, 1991, xi+398 pp., 23 cm. Price: Softcover $32.50.

This book contains translations into BASIC of the routines contained in [1] as well as of the demonstration routines in [2]. The author cautions the reader that the routines will run only on more advanced BASIC dialects, for example, without change, on Microsoft Corp.'s QuickBASIC 4.5 or later versions, and, with minor modifications, on Borland International's Turbo BASIC and its compatible successors.

W. G.

1. W. H. Press, B. P. Flannery, S. A. Teukolsky and W. T. Vetterling, *Numerical recipes—The art of scientific computing*, Cambridge Univ. Press, Cambridge, 1986. [Review **3**, Math. Comp. **50** (1988), 346–348.]
2. W. T. Vetterling, S. A. Teukolsky, W. H. Press, and B. P. Flannery, *Numerical recipes example book*, Cambridge Univ. Press, Cambridge, 1985. [Review **4**, Math. Comp. **50** (1988), 348–349.]

21[78-01, 78-04, 78-08].—Yves R. Crutzen, Giorgio Molinari & Guglielmo Rubinacci (Editors), *Industrial Application of Electromagnetic Computer Codes*, Computer and Information Science, Vol. 1, Kluwer, Dordrecht, 1990, v+263 pp., $24\frac{1}{2}$ cm. Price $94.00/Dfl.150.00.

This book is part of a series devoted to the publication of courses and educational seminars organized by the Joint Research Centre Ispra. It focuses on the underlying mathematical models and capabilities of current computer-aided design software tools for the computation of electromagnetic fields. The exposition is given from an engineering point of view.

Electromagnetic computer codes deal with the approximation of solutions to Maxwell's equations. The codes discussed are for magnetostatic field problems,