this can often be the case (it may be quite rare), and if so whether anything can be done about it (for example, possibly a temporary switch to one of the other modes of significance arithmetic).

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**9 [2.55, 4, 5].**—I. Babuska, M. Prager, I. Vitasek, *Numerical Processes in Differential Equations*, John Wiley & Sons, Inc., New York, 1966, x + 351 pp., 24 cm. Price $9.50.

This translation from the 1964 Czech edition reads quite well and has the following chapters:

1. Introduction, 4 pages
2. Stability of Numerical Processes and Some Processes of Optimization of Computations, 44 pages
3. Initial-Value Problems for Ordinary Differential Equations, 56 pages
4. Boundary-Value Problems for Ordinary Differential Equations, 150 pages
5. Boundary-Value Problems for Partial Differential Equations of the Elliptic Type, 50 pages
6. Partial Differential Equations of the Parabolic Type, 35 pages.

The stability chapter contains some nice examples of the loss in accuracy due to finite word length. Definitions of stability are given and applied. They boil down to continuous dependence on the inhomogeneous data or specified (polynomial) growth of errors.

Much of the standard convergence and stability (in the sense of Dahlquist) theory for linear multistep and one-step methods is presented in a neat form. Unfortunately, predictor-corrector methods are never mentioned.

Only linear two-point boundary-value problems are considered for second- and fourth-order equations. "Factorization" methods in which the boundary-value problem is replaced by several initial-value problems for first-order equations (in both directions) are studied in some detail. As is later shown, these methods are suggested by the factorization of the tri- and qui-diagonal matrices so familiar in difference methods for such problems. The stability of the initial-value problems is shown under appropriate conditions. The "shooting" method is but briefly mentioned and the usual warning of possible instability is based on an example. A detailed treatment of finite-difference methods, including higher-order accurate schemes, is given. Finally, the Ritz method for self-adjoint positive-definite problems is considered in some generality.

The material on elliptic problems is devoted mainly to setting up difference equations for second-order self-adjoint problems with no mixed derivatives and to solving the difference equations by some of the standard iterative methods (not including alternating directions).

Linear parabolic problems in one- and two-space dimensions are treated briefly using maximum estimates for implicit and explicit schemes and Lee's energy estimates for the Crank-Nicolson scheme in one dimension. Alternating directions are described.

This book presents a good introduction to the several topics which it treats. However, the level of presentation is rather mixed, since about one third of the material assumes a knowledge of functional analysis.

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10 [4, 6].—IVAR STAKGOLD, *Boundary Value Problems of Mathematical Physics, Vol.* I, The Macmillan Company, New York, 1967, viii + 340 pp., 24 cm. Price $12.95.

This is the first of two volumes intended for a graduate course in mathematical physics. Although the topics discussed are mathematical in nature, it is written in a clear and pleasant style by a man who knows how to talk to physicists and engineers and who enjoys doing so.

While the easier results are proved, more difficult theorems or those requiring lengthy proof are motivated heuristically, in such a way that the reader at least gets the feeling of how the proof goes. In such cases it is clearly stated that a proof is needed, and whether the proof is difficult or easy.

Chapter 1 deals with ordinary differential equations. In addition to the standard material on this subject, there is a beautiful discussion of one-dimensional distribution theory. Its purpose is to provide a firm foundation for the Dirac delta function, which is then used to define fundamental solutions and Green's functions.

Chapter 2 is an introduction to linear spaces, with particular emphasis on linear transformations in a Hilbert space.

These concepts are applied in Chapter 3 to the study of linear integral equations with symmetric kernels. This chapter includes some discussion of variational methods both for nonhomogeneous problems and for eigenvalue problems. In particular, eigenfunction expansions are discussed, and the Rayleigh-Ritz method and the eigenvalue inclusion theorem are presented.

Chapter 4 deals with singular self-adjoint boundary value problems for second-order ordinary differential operators. It includes a proof of Weyl's limit point-limit circle theorem, and a discussion of the general spectral representation.

The author has been able to concoct a large set of exercises which are nontrivial and educational, but still not too difficult for students taking the course for which the book is designed.

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11 [4, 5, 7].—A. W. BABISTER, *Transcendental Functions Satisfying Nonhomogeneous Linear Differential Equations*, The Macmillan Company, New York, 1967, xi + 414 pp., 24 cm. Price $14.95.

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