

## Preface to the Revised Edition

The first edition of this book was printed by Prentice-Hall, Inc., in 1962, and the book went out of print some years later. I then agreed to prepare a revised version of this book for the Springer Series in Computational Mathematics.

One of the many reasons it has taken so long to prepare this revision is that numerical analysis has very much matured since 1962, into a highly diverse field, and it was difficult to decide just what could be easily added. For example, even a modest treatment of finite elements, with Sobolev norms, etc., was questionable, particularly when new books, devoted solely to this theme, had subsequently appeared in print. This was also the case for multi-grid methods, Krylov subspace methods, preconditioning methods, and incomplete factorization methods. In the end, only a few items were added, items which required little additional background on the part of the reader. These new items include ovals of Cassini, a semi-iterative analysis of SOR methods, H-matrices and weak regular splittings, ultrametric matrices, and matrix rational approximations to  $\exp(-z)$ . New references and new exercises have been added in a rather selective way, misprints have been corrected, and numerous minor improvements and additions have been made.

Finally, I wish to thank many unnamed colleagues and friends, who encouraged me to finish this revision, and in particular, I thank Apostolos Hadjidimos and Daniel Szyld for their comments and suggestions on this revision. Also, I thank the Mathematics Office, at Springer-Verlag Heidelberg, for their constant and untiring support in this effort, and lastly, Mrs. Joyce Fuell, of the Institute for Computational Mathematics at Kent State University, for her careful typing of the entire manuscript.

Kent State University, July 1999.

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