19[3.15].—BERESFORD N. PARLETT, *The Symmetric Eigenvalue Problem*, Prentice-Hall, Englewood Cliffs, N. J., 1980, xix + 348 pp., $23\frac{1}{2}$ cm. Price, cloth $25.00.

In his preface Professor Parlett describes his book as a sequel to Chapter 5 of my 1965 book *The Algebraic Eigenvalue Problem*. As such it is of particular interest to me. Seeing the material assembled in one place, I was struck by how much progress has been made in the last fifteen years on a topic which one might have felt was already worked out.

Most of the 'classical' material in the A.E.P. is covered, but Parlett is adept at giving it a new slant. I was constantly struck by his ability to present standard material from an individualistic and challenging point of view. The old material is interwoven with numerous new results in a way which keeps the reader familiar with the topic constantly on his toes. In this area I would like to single out for special mention:

(i) The concentration on the use of Sylvester's inertia theorem for the location of eigenvalues by spectrum slicing.

(ii) The presentation of Kahan's proof that Rayleigh quotient iteration converges for almost all starting vectors.

(iii) The proof of the global convergence of the QL tridiagonal algorithm using Wilkinson's shift.

Chapter 10, on eigenvalue bounds, presents a great deal of material, some of which was available but widely scattered in the literature, but much of which lay buried in notes by Kahan. I am grateful to have a unified and lucid exposition of these results. Chapters 11, 12, and 13 concentrate mainly on large scale problems, a topic scarcely mentioned in the A.E.P.; research in this area is bound to dominate future work on the symmetric problem. They cover the material generally associated with the Rayleigh-Ritz process, Krylov subspaces, and the rejuvenated Lanczos algorithm. The latter includes a highly readable account of Paige's theorem; this is not as widely known as it should be.

A final chapter is devoted to the generalized eigenvalue problem. Although it covers much new material, including a brief account of the Fix-Heiberger reduction, singular pencils, the generalized Jacobi algorithm, and subspace iteration, I found it more fragmentary than the rest of the book. Perhaps the author could be excused for feeling that he was starting rather late in the day on a large topic and it was time the manuscript was sent to the printer.

Mention must be made of the numerous excellent exercises provided throughout the book. The reader will neglect these at his peril. They constitute an essential part of the argument.

Professor Parlett is to be congratulated on providing a book which maintains a sense of excitement from start to finish. It is scholarly without being pedantic and yet should make the material accessible to anybody capable of appreciating the meaning of the results. Last, but not least, at a time when books in general seem to be getting progressively more stodgy, this by contrast is really fun to read. It is highly recommended to all who have an interest in the eigenvalue problem.

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