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Recenzja

Numerical Treatment of Eigenvalue Problems, Vol. 5. (Workshop in Oberwolfach, February 25 – March 3. 1990), Edited by: J. Albrecht, L. Collatz, P. Hagedorn, W. Velte, International Series of Numerical Mathematics, Vol. 96, Birkhäuser Verlag Basel, 1991.

This volume contains the listed below lectures held at the conference at Oberwolfach (25 February – 3 March 1990) on “Eigenvalue problems in the natural and engineering sciences, and their numerical treatment”.

- [1] *J. Albrecht* – Eigenwertaufgaben mit Funktional-Differentialgleichungen,
- [2] *G. Alefeld, B. Illg, F. Potra* – An enclosure method with higher order of convergence – Applications to the algebraic eigenvalue problem,
- [3] *C.A. Beattie and W.M. Greenlee* – Some remarks concerning closure rates for Aronszajn’s method,
- [4] *L. Bittner* – An eigenvalue problem of the theory of Arma models and multistep iteration procedures,
- [5] *E. Brommundt* – Oscillations and stability of a wheel rolling on a flexible rail,
- [6] *L. Collatz* – Rational approximation for calculation of eigenvalues,
- [7] *I. Elishakoff* – Some questions in eigenvalue problems in engineering,
- [8] *Th. Huckle* – Computing the minimum eigenvalue of a symmetric positive definite Toeplitz matrix with spectral transformation Lanczos Method,
- [9] *P.P. Klein* – Numerical treatment of nonselfadjoint plate vibration problem,
- [10] *H. Kleindienst and R. Emrich* – Minimization of the variance. A method for two-sided bounds for eigenvalues of selfadjoint operators,

- [11] *A.V. Knyazev* – A preconditioned conjugate gradient method for eigenvalue problems and its implementation in a subspace,
- [12] *I. Marek* – Aggregation methods of computing stationary distributions of Markov processes,
- [13] *J. Neustupa* – Stability of a vibrating and rotating beam,
- [14] *B.N. Parlett and J. Le* – QR: Its forward instability and failure to converge,
- [15] *H.-R. Schwartz* – Eigenvalue problems and preconditioning,
- [16] *G. Still, E. Haaren-Retagne and R. Hettich* – A numerical comparison of two approaches to compute membrane eigenvalues by defect minimization,
- [17] *M. Vanmaele and R. Van Keer* – Convergence and error estimates for a finite element method with numerical quadrature for a second order elliptic eigenvalue problem,
- [18] *J.R. Whiteman* – Calculation of the forms of singularities in elliptic boundary value problems,

The preface written by J. Albrecht and L. Collatz and rewritten below describes the content of this book.

A first group of papers concern various methods for reaching eigenvalue boundaries in the case of general eigenvalue problems for (partial) differential equations, including those of rational approximation, approximation with finite elements and domain decomposition. One contribution treats eigenvalue problems that occur when one studies the singularities at corners and edges of the solutions to partial differential equations.

A second group of papers draws on concrete eigenvalue problems in engineering and the natural science; included here is the problem of oscillation of a wheel rolling on a rail, a nonselfadjoint problem for a vibrating plate, problems in quantum chemistry, as well as a problem taken from the theory of ARMA models.

A third area is devoted to the numerics of eigenvalue problems for large sparse matrices, and more specifically, how they arise from discretization of eigenvalue problems in partial differential equations. Preconditioning and stability of algorithms and new variants in iterative methods, including parallel algorithms, are among the topics considered.