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Convergence of approximation methods for eigenvalue problem for two forms. (English)

Zbl 0584.65033

Apl. Mat. 29, 333-341 (1984).

The eigenvalue problem $b(u, v) = \lambda a(u, v) \forall v \in V; u \in X$, defined by two bilinear forms on a complex vector space V is considered. The form a is supposed to be symmetric and positive definite, b to be continuous with respect to a ; X being the closure of V in the a - norm.

The approximation of the considered problem is defined by a sequence of forms a_n, b_n on the space V , with similar properties as a and b , related to a and b by a number of ordering and convergence conditions. By means of the sequence a_n , an external approximation $\{X_n, r_n, p_n\}$ of the space X is defined such that $X_n = \bar{V}$ in the a_n -norm. Then the general theory of the spectral approximation via (external) approximation of the space is applied.

The main goal of this paper is Theorem 7 giving the convergence of spectral elements (without error bounds). This result covers the classical method of *N. Aronszajn* [Proc. Symposium spectral theory differential problems, 179-202 (1955; Zbl 0067.091)] and generalizes the paper of *R. D. Brown* [Rocky Mt. J. Math. 10, 199-215 (1980; Zbl 0445.49043)] concerning the case when b is symmetric.

Reviewer: [K.Moszyński](#)

MSC:

- [65J10](#) Numerical solutions to equations with linear operators (do not use [65Fxx](#)) Cited in 1 Document
- [47A10](#) Spectrum, resolvent
- [47A55](#) Perturbation theory of linear operators
- [47A70](#) (Generalized) eigenfunction expansions of linear operators; rigged Hilbert spaces

Keywords:

[external approximation](#); [eigenvalue problem](#); [bilinear forms](#); [spectral approximation](#); [convergence](#)

Full Text: [EuDML](#)

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