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Finite element approximation of a contact vector eigenvalue problem. (English)

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Summary: We consider a nonstandard elliptic eigenvalue problem of second order on a two-component domain consisting of two intervals with a contact point. The interaction between the two domains is expressed through a coupling condition of nonlocal type, more specifically, in integral form. The problem under consideration is first stated in its variational form and next interpreted as a second-order differential eigenvalue problem. The aim is to set up a finite element method for this problem. The error analysis involved is shown to be affected by the nonlocal condition, which requires a suitable modification of the vector Lagrange interpolant on the overall finite element mesh. Nevertheless, we arrive at optimal error estimates. In the last section, an illustrative numerical example is given, which confirms the theoretical results.

MSC:

65N30 Finite element, Rayleigh-Ritz and Galerkin methods for boundary value problems involving PDEs

Keywords:

nonlocal coupling condition; finite elements

Full Text: [DOI](#) [EuDML](#)

References:

- [1] F. A. Mehmeti, S. Nicaise: Nonlinear interaction problems. *Nonlinear Anal.* 20 (1993), 27-61. · [Zbl 0817.35035](#) · [doi:10.1016/0362-546X\(93\)90183-S](#)
- [2] P. A. Raviart, J. M. Thomas: *Introduction à l'analyse numérique des équations aux dérivées partielles (2ième tirage)*. Masson, Paris, 1993.
- [3] P. G. Ciarlet: *The Finite Element Method for Elliptic Problems*. North Holland Publishing Company, Amsterdam, 1978. · [Zbl 0383.65058](#)
- [4] M. Vanmaele, R. Van Keer: An operator method for a numerical quadrature finite element approximation for a class of second-order elliptic eigenvalue problems in composite structures. *RAIRO Model. Math. Anal. Numer.* 29 (1995), 339-365. · [Zbl 0836.65113](#) · [eudml:193776](#)

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