Balasundaram, S.; **Bhattacharyya, P. K.**
A mixed finite element method for fourth order elliptic equations with variable coefficients.
(English) ｜Zbl 0553.65080｜
Comput. Math. Appl. 10, 245-256 (1984).

The Dirichlet problem for a fourth order selfadjoint elliptic operator with variable coefficients on a convex polygonal region is considered. Using the inverse of an appropriate matrix of the coefficients of the operator another variational problem is stated (a mixed method formulation). This new problem is investigated and its relation to the solution of the initial one is shown. Three examples are considered: The biharmonic operator, the bending problem of a clamped orthotropic plate with variable thickness and the isotropic case. The derived problem is approximated by the finite element method using piecewise polynomial basis functions on the triangles of a regular triangulation of the considered region. Error estimates in Sobolev spaces are proposed. In the case of the considered examples this mixed finite element method gives a simultaneous approximation of the displacement and twisting and "actual" bending moments which is of a great practical importance.

Reviewer: P.S.Vassilevski

MSC:

65N30	Finite element, Rayleigh-Ritz and Galerkin methods for boundary value problems involving PDEs
74S05	Finite element methods applied to problems in solid mechanics
35J40	Boundary value problems for higher-order elliptic equations
74K20	Plates

> Cited in **1** Review
> Cited in **11** Documents

Keywords:

mixed finite element method; Dirichlet problem; fourth order; variable coefficients; biharmonic operator; bending problem of a clamped orthotropic plate; Error estimates; bending moments

Full Text: DOI

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