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Quadrilateral $H(\text{div})$ finite elements. (English) Zbl 1086.65105
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Finite elements in $H(\text{div})$ on quadrilaterals require that the Piola transformation is used when going from the reference element to the quadrilateral in the physical domain. For this reason the usual condition on the reproduction of polynomials is not sufficient for guaranteeing an approximation of order $r + 1$. Extra conditions are considered. New error estimates for quadrilateral Raviart-Thomas elements are also derived, and a new quadrilateral element with approximation of full order is proposed. The paper concludes with numerical results.

Reviewer: [Dietrich Braess \(Bochum\)](#)

MSC:

- 65N30** Finite element, Rayleigh-Ritz and Galerkin methods for boundary value problems involving PDEs
- 65N15** Error bounds for boundary value problems involving PDEs

Cited in **2** Reviews
Cited in **75** Documents

Keywords:

$H(\text{div})$ finite elements; Piola transformation; error estimates; quadrilateral Raviart-Thomas elements; numerical results

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