

A Priori and a Posteriori Estimates for Vectorial Problems via Convex Duality

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Abstract

By exploiting remarkable properties of the Crouzeix-Raviart and Raviart-Thomas finite elements, numerous works in recent years have been able to employ convex duality theory to derive error estimates for a diverse set of problems, including total variation minimisation, the p-Laplacian, the obstacle problem, elastoplastic torsion, among others. However, virtually all of the available results have been developed for scalar problems with homogeneous Dirichlet boundary conditions. This work extends the existing results in three directions, taking the incompressible Stokes and linear elasticity systems as prototypical examples: it considers vectorial as opposed to just scalar problems, it includes non-homogeneous mixed boundary conditions, as well as loads in the dual of the energy space. This is joint work with Alex Kaltenbach (TU Berlin).

References

- [1] P. A. Gazca-Orozco, A. Kaltenbach, *A priori and a posteriori error identities for vectorial problems via convex duality*. Submitted, 2026. ArXiv:2602.04368.