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A priori error estimates for finite element methods with numerical quadrature for nonmonotone nonlinear elliptic problems

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Review text:

A quasilinear elliptic problem posed on a bounded polyhedron subset in \mathbb{R}^d , where $d \leq 3$ is considered. The tensor involved in the quasilinear elliptic problem is assumed to be satisfied some suitable conditions which allow to get a unique solution. A family of partitions of the domain in simplicial or quadrilateral elements is introduced. A suitable quadrature formula is considered. Based on this quadrature formulas, a finite element solution with numerical integration is defined. The existence of a finite element solution as well as some discrete a priori estimate are already known in the literature. Under some suitable conditions on the data of the problem, new error estimates in H^1 and L^2 norms are stated and proved. If in addition, the family of partitions is satisfying an inverse assumption, it is proved that the finite element solution is unique.

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