A Posteriori Error Analysis for a Nonconforming Virtual Element Method for the Monge-Ampère Equation

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Abstract

Fully nonlinear partial differential equations (PDEs) are known as the class of nonlinear PDEs that are nonlinear in the highest order derivatives of the unknown function. A well known example of a fully nonlinear second-order PDE is the Monge-Ampère equation. Using the vanishing moment method, the fully nonlinear Monge-Ampère equation is approximated by a fourth order quasilinear PDE. The C^1-nonconforming – C^0-conforming Virtual Element Method is applied to this quasilinear PDE. Extending [1], which performed the a priori analysis for this problem, we present the a posteriori error analysis and derive a residual based error estimator. The estimator is fully computable, and we prove upper and lower bounds of the error, which are explicit in the local mesh size. We use this estimator to drive an adaptive mesh refinement algorithm, and present numerical experiments to validate the error bound.

References

[1] Scott Congreve, Alice Hodson, Anwesh Pradhan. *Nonconforming virtual element method for the Monge-Ampère equation*, in preparation.