A LOWEST ORDER STABILIZATION-FREE MIXED VIRTUAL ELEMENT METHOD

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ABSTRACT. In these years, the study of numerical methods for solving partial differential equations on polygonal and polyhedral meshes has been experiencing a growing interest in the scientific community. One of them, the Virtual Element Method (VEM), gained more and more attention thanks to its great flexibility and robustness in treating elements with arbitrary and highly distorted shapes. The core idea behind VEM consists of using local approximation spaces of functions whose analytical expression is not known, suitable polynomial projections, and particular bilinear forms stabilizing the method. Unfortunately, in some specific cases, the choice of stabilization term can affect the results. Therefore, there is a strong interest in developing self-stabilized virtual elements that preserve the advantages of the VEM.

In this talk, we present a lowest-order self-stabilized VE scheme for the Poisson problem in mixed form. The idea, to avoid the stabilization term, is to use a suitable projection operator over the gradients of harmonic polynomials of suitable degree. A complete theoretical analysis of the stability and convergence is developed in the case of quadrilateral meshes. Some numerical tests are provided in order to show the validity and the potential of our analysis [1].

Keywords: Virtual element method, Mixed formulation, Quadrilateral meshes, Poisson problem

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REFERENCES

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