

BENCHMARKING STABILIZED AND SELF-STABILIZED P -VIRTUAL ELEMENT METHODS WITH VARIABLE COEFFICIENTS

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Virtual Elements are a family of numerical methods for PDEs well-suited for complex geometries, as they allow the use of general polytopal meshes. The basis functions describing the discrete space are implicitly defined as solutions of local PDEs, so that they are never fully evaluated. Hence, the discrete problem is constructed by employing polynomial projections and well-posedness is guaranteed by an additional stabilization term handling the non-polynomial contribution [1]. However, the stabilization term is generally artificial and does not conform to the physics of the problem under consideration. For this reason, virtual element methods not requiring a stabilization term (i.e. *stabilization-free* [2] or *self-stabilized* [3]) are gaining popularity. In addition, if the polynomial projection is not appropriately chosen, the accuracy of the method may deteriorate in presence of variable coefficients, which are, however, very common in practical applications.

This study [4] investigates the p -version of virtual elements and compares the performance of popular stabilized and stabilization-free formulations. The comparison includes both academic test cases and application-oriented scenarios.

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