

MIXED VARIATIONAL FORMULATIONS OF VIRTUAL ELEMENTS FOR THE POLYHARMONIC OPERATOR $(-\Delta)^n$

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ABSTRACT. In this talk we will present a virtual element method to approximate the solution of a three-dimensional polyharmonic problem $(-\Delta)^n u = g$. The idea behind the proposed approach is to consider $m+1$ or m auxiliary unknowns when $n = 2m+1$ or $n = 2m$, respectively. In the former case, $n = 2m + 1$, we will solve m fourth-order problems and a second order one, while, in the latter case, m fourth-order problems have to be solved. To achieve this goal, we use C^1 and C^0 conforming virtual element spaces for fourth and second order problems, respectively. We also provide the convergence and error estimates for both cases. Finally, we will show a series of numerical tests for $n = 3, 4$ and 7 , to verify the theoretical results.

Keywords: Polyharmonic equation; Ciarlet-Raviart method; virtual element method; polytopal meshes; error estimates.

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