# Pointwise error estimates for $C^0$ interior penalty approximation of biharmonic problems

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In this talk we will discuss pointwise error estimates for the biharmonic equation on a convex polygonal domain. Finite element discretization of this problem is not straightforward and various approaches were proposed over the years. However, they all have some drawbacks. The $C^0$ interior penalty method is a sound alternative. This method is attractive since the finite elements consist of usual Lagrange elements of arbitrary order and it is straightforward to implement. Pointwise error estimates is a well-developed area for the second order problems, however, there are few such results for fourth order problems. Many such pointwise error estimates are obtained via Sobolev embedding. This is not satisfactory since such results are usually not optimal and often the discrepancy between norms makes them hard to use for applications, for example, for optimal control problems. In addition, it is hard to localize them. I will discuss an approach based on dyadic domain decompositions and local energy estimates that allow us to obtain the best approximation global and local type results for the second derivative. In this talk we will discuss the main ideas of the proof and highlight the major differences between the analysis of the second and fourth order problems.

References:

[1] https://www.ams.org/journals/mcom/2021-90-327/S0025-5718-2020-03596-0/

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