Contribution ID: **7**   Type: **not specified**

An a priori error analysis for a linear transmission problem using a mixed Hybrid High Order method

Thursday 12 January 2023 09:00 (1 hour)

In this talk we introduce a new Hybrid High-Order (HHO) method for a linear elliptic transmission problem in a bounded domain. In HHO the solution of the problem at hand is approximated by attaching polynomials of degree k to the mesh cells and to their boundaries. Specific element-local operators are then employed to obtain a high-order reconstruction of the solution. Following this construction, a well-posed nonconforming discrete formulation is obtained. A significant advantage of HHO is that cell-based unknowns can be eliminated locally via a Schur complement, obtaining a global problem posed on the mesh skeleton. This in turn allows to obtain a compact global linear system with a significantly reduced number of unknowns. In our scheme an auxiliary unknown, which plays the role of a Lagrange multiplier, is introduced to deal with the nonhomogeneous transmission conditions. We prove that the proposed method is optimally convergent in the energy norm, as well as in the L^2-norm for the potential and a weighted L^2-norm for the Lagrange multiplier, for smooth enough solutions. Finally, we include some numerical experiments that validate our theoretical results, even in situations not covered by the current analysis.

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