AN ADAPTIVE SUPERCONVERGENT FINITE ELEMENT METHOD BASED ON LOCAL RESIDUAL MINIMIZATION

IGNACIO MUGA, SERGIO ROJAS, PATRICK VEGA*

ABSTRACT

During the last decades, residual minimization methods has been increasing in popularity due to its stabilization properties. Among the most popular is the discontinuous Petrov-Galerkin (dPG) method, introduced in [1]. In 2020, a new residual based Adaptive Stabilized Finite Element Method (AS-FEM) (see [2]) was introduced, combining a residual minimization approach with the inf-sup stability offered by a large class of discontinuous Galerkin (dG) methods. As in dPG methods, this method also delivers a stable solution and a residual representative. Inspired in [2], in this talk we will introduce a novel adaptive stabilized finite element method for a class of mixed methods. The method consists of performing a residual minimization in terms of the Stenberg's prostpocessing strategy (see [3]), being a superconvergent and fully localizable postprocess for the scalar variable. As a result, we obtain both, a superconvergent approximation for the scalar variable, and a residual representative to drive the adaptivity. However, the new scheme inherits the fully localizable property of Stenberg's postprocessing, implying that the cost of solving the residual minimization can be neglected, making it competitive with respect to standard a posteriori residual estimators. We will detail its derivation and will show its performance considering challenging diffusion problems.

References

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* Pontificia Universidad Católica de Valparaíso, patrick.vega@pucv.cl