

Extension and construction of Quasi-Wilson and modified Quasi-Wilson finite elements

Yassine ZAIM¹

SUMMARY

The main purpose of this paper is to introduce an approach for the extension and construction of Quasi-Wilson and modified Quasi-Wilson elements, in two dimensions. Contrary to these later, our proposed approach uses non-polynomial enrichment functions. Indeed, we will enrich the standard space Q_1 by two general functions which satisfy some orthogonality conditions. Our motivation is to extend the results of [2] and [3] by improving the consistency error as much as we want. To this end, we choose the basis functions that satisfy some general criteria, such as smoothness and orthogonality conditions. Finally, in the second part we have applied our element to the elastic problem.

Keywords: Quasi-Wilson element, modified Quasi-Wilson element, Consistency error.

AMS Classification: 65N30, 65N15

References

- [1] B. ACHCHAB, A. GUESSAB, Y. ZAIM. A new class of nonconforming finite element for enrichment of Q_1 element on convex polytope. *Applied Mathematics and Computation* **271**(2015), 657-668, 2015.
- [2] D. SHI, L. WANG, X. LIAO. Nonconforming finite element analysis for poisson eigenvalue problem. *Computers and Mathematics with Applications* **70**(2015), 835-845, 2015.
- [3] X. HAO, D. SHI, D. SHI. Special convergence analysis of Quasi-Wilson element, *Multimedia Technology (ICMT), International Conference on Hangzhou* doi: **10.1109/ICMT.2011.6002547**(2011), 6016-6018, 2011.

¹Laboratoire de Mathématiques et de leurs Applications, UMR CNRS 4152
Université de Pau et des Pays de l'Adour, 64000 Pau, France
Laboratory of Analysis and Modelisation of Systems for Decision Support,
Hassan First University of Settat Morocco
email: ing.zaim.yassine@gmail.com, yassine.zaim@univ-pau.fr