

APPROXIMATION OF PARAMETER DEPENDENT EIGENVALUE PROBLEMS

DANIELE BOFFI*

ABSTRACT

In this talk we deal with the numerical approximation of eigenvalue problems that involve the presence of certain parameters. The parameters can be introduced by the numerical discretization, like in the case of the Virtual Element Method [5], or could be part of the problem itself [3].

In the first case we discuss the dependence of the computed eigenvalues on the parameters, showing how the parameters can influence the correct approximation of the spectrum.

In the second case, we propose efficient numerical methods for the approximation of our model. In particular, we aim at methods that are robust and efficient for multidimensional, possibly stochastic, problems. This can be done with the introduction of reduced order models [4] and suitable greedy algorithms [1, 2].

REFERENCES

- [1] M. Alghamdi, F. Bertrand, D. Boffi, F. Bonizzoni, A. Halim, G. Priyadarshi. *On the tracking of eigensolutions to parametric partial differential equations*, in preparation (2022)
- [2] M. Alghamdi, D. Boffi, F. Bonizzoni. *A greedy MOR method for the tracking of eigensolutions to parametrized elliptic PDEs*, in preparation (2022)
- [3] R. Andreev, C. Schwab. *Sparse tensor approximation of parametric eigenvalue problems*, in Numerical analysis of multiscale problems, Lect. Notes Comput. Sci. Eng., 83, Springer, Heidelberg (2012), 203–241.
- [4] F. Bertrand, D. Boffi, A. Halim. *A reduced order model for the finite element approximation of eigenvalue problems*, arXiv:2203.14880 [math.NA] (2022)
- [5] D. Boffi, F. Gardini, L. Gastaldi. *Approximation of PDE eigenvalue problems involving parameter dependent matrices*, Calcolo 57(4) (2020), Paper No. 41.

* KING ABDULLAH UNIVERSITY OF SCIENCE AND TECHNOLOGY — KAUST (SAUDI ARABIA) AND UNIVERSITY OF PAVIA (ITALY), DANIELE.BOFFI@KAUST.EDU.SA