

# VEM ALLOWING SMALL EDGES FOR THE REACTION-CONVECTION-DIFFUSION EQUATION: SOURCE AND EIGENVALUE PROBLEMS

FELIPE LEPE AND GONZALO RIVERA

ABSTRACT. In this talk we present a lowest order virtual element method for the classic load reaction-convection-diffusion problem and the convection-diffusion spectral problem, where the assumptions on the polygonal meshes allow to consider small edges for the polygons. Under well defined seminorms depending on a suitable stabilization for this geometrical approach, we derive the well posedness of the numerical scheme and error estimates for the load problem, whereas for the spectral problem we derive convergence and error estimates for the eigenvalues and eigenfunctions. We report numerical tests to assess the performance of the method. **Keywords:** Virtual element methods a priori error estimates, small edges.

**Mathematics Subject Classifications (2010):** 49K20, 49M25, 65N12, 65N15, 65N25, 65N30.

## REFERENCES

- [1] L. Beirão da Veiga, C. Lovadina, and A. Russo, Stability analysis for the virtual element method. *Math. Models Methods Appl. Sci.*, 27, pp. 2557–2594, 2017.
- [2] D. Boffi, Finite element approximation of eigenvalue problems *Acta Numerica*, 19, pp. 1–120, 2010.
- [3] F. Gardini and G. Vacca, Virtual element method for second-order elliptic eigenvalue problems, *IMA J. Numer. Anal.*, 38, pp. 2026–2054, 2018.

UNIVERSIDAD DEL BÍO-BÍO  
*Email address:* flepe@ubiobio.cl

UNIVERSIDAD DE LOS LAGOS  
*Email address:* gonzalo.rivera@ulagos.cl