

SOME EIGENVALUE PROBLEMS IN NON-LIPSCHITZ DOMAINS

GABRIEL ACOSTA¹ AND MARÍA GABRIELA ARMENTANO²

ABSTRACT. The goal of this talk is the analysis of piecewise linear finite element approximations of spectral problems in a plane domain $\Omega = \{(x; y) : 0 < x < 1; 0 < y < x^\alpha\}$; which gives, for $\alpha > 1$, the simplest model of an external cusp. This kind of problems has not been covered by the known literature which, as far as we know, only has dealt with polygonal or smooth domains. Indeed, since Ω is curved and non-Lipschitz, the classical spectral theory can not be applied directly, in particular, certain classical results in Sobolev spaces do not hold in domains with external cusps. Nevertheless, for the spectral approximations of the Laplace operator with mixed boundary conditions, we can present the eigenvalue problem in a proper setting and relying on known convergence results for the associated source problem (see [1, 3, 4]) we can obtain quasi optimal order of convergence for the eigenpairs [2].

REFERENCES

- [1] G. ACOSTA AND M. G. ARMENTANO, *Finite element approximations in a non-Lipschitz domain: Part. II*, Math. Comp. **80**(276), (2011) 1949-1978.
- [2] G. ACOSTA AND M. G. ARMENTANO, *Eigenvalue Problem in a non-Lipschitz domain*, IMA Journal of Numerical Analysis, vol. 34 (1), (2014) 83-95.
- [3] G. ACOSTA, M. G. ARMENTANO, R. G. DURÁN AND A. L. LOMBARDI, *Nonhomogeneous Neumann problem for the Poisson equation in domains with an external cusp*, Journal of Mathematical Analysis and Applications **310**(2), (2005) 397-411.
- [4] G. ACOSTA, M. G. ARMENTANO, R. G. DURÁN AND A. L. LOMBARDI, *Finite element approximations in a non-Lipschitz domain*, SIAM J. Numer. Anal. **45**(1), (2007) 277-295.

¹ Supported by ANPCyT, under grants PICT 2007-00910 and PICT 2010- 01675, and by Universidad de Buenos Aires under grant 20020100100143, gacosta@dm.uba.ar Departamento de Matemática, Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires -IMAS-Conicet, Argentina.

² Supported by ANPCyT, under grants PICT 2007-00910 and PICT 2010- 01675, and by Universidad de Buenos Aires under grant 20020100100143, garmenta@dm.uba.ar Departamento de Matemática, Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires -IMAS-Conicet, Argentina.