

**Title:** Finite element approximations in a non-Lipschitz domain

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**Abstract:** The goal of this talk is to present some results on finite element approximations in a non-Lipschitz domain. We consider the approximation by standard piecewise linear finite elements of a non homogeneous Neumann problem in a domain with an external cusp. Several difficulties arise in this problem because many of the results on Sobolev spaces, which are fundamental in the analysis of partial differential equations in variational form, do not apply. For example, standard trace and extension theorems are not valid in this domain.

We show that for the problem considered here the convergence of finite element approximations on quasi-uniform meshes can be of suboptimal order even if the exact solution belongs to  $H^2$ . Developing some new trace and extension theorems in weighted Sobolev spaces we are able to prove quasi-optimal order error estimates by using appropriate graded meshes.

*The results presented here are joint work with G. Acosta, M. A. Armentano and A. L. Lombardi.*