

Finite element error estimates for Dirichlet boundary control problems with pointwise state constraints

Ira Neitzel

Technische Universität München, Germany

neitzel@ma.tum.de

Abstract: In this talk we discuss discretization error estimates for a linear quadratic Dirichlet control problem in 2D polygonal domains governed by pointwise state constraints in the interior of the domain. The control may or may not be subject to pointwise control bounds. We derive a priori error estimates for the finite element discretization of the model problem depending on the largest interior angle of the boundary. The challenge of this work is due to the fact that unlike in e.g. distributed or Neumann control problems, the state functions associated with L^2 -Dirichlet controls have very low regularity, being elements of $H^{1/2}(\Omega)$. By considering the state constraints in the interior it is possible to make use of higher regularity and separate the regularity limiting influences of the boundary on the one hand, and the measure in the right-hand-side of the adjoint equation on the other hand. We note in passing that in case of control constraints, these may be interpreted as state constraints on the boundary.

This is joint work with Mariano Mateos (Universidad de Oviedo).