Oberseminar Numerik am 22.11.12:

Herr Dr. Jan Stebel (Academy of Science, Prague)

"Shape Optimization for Navier-Stokes Equations with Algebraic Turbulence Model"

Abstract:
We study the shape optimization problem for the paper machine headbox which distributes a mixture of water and wood fibers in the paper making process. The aim is to find a shape which a priori ensures the given velocity profile on the outlet part. The mathematical formulation leads to the optimal control problem in which the control variable is the shape of the domain representing the header, the state problem is represented by the generalized Navier-Stokes system with nontrivial boundary conditions. The existence analysis is complicated by the fact that due to the turbulence model the weak formulation of the state problem involves weighted Sobolev spaces. We prove the existence of an optimal shape, analyze the finite element approximation of the problem and present its numerical solution. The talk is based on a joint work with M. Bulicek, J. Haslinger and J. Malek.