Institut für Mathematik
und Wissenschaftliches Rechnen
Karl-Franzens-Universität Graz

Colloquium in Applied Mathematics

in honor of

Gunther H. Peichl

Date: Thursday, June 30 2016, 3pm

Location: SR 11.33, Heinrichstraße 36/3
Institute for Mathematics and Scientific Computing

OCLOC
From Open to Closed Loop Optimal Control of PDEs
Karl-Franzens-Universität Graz
RICAM Linz

Der Wissenschaftsfonds.

Scientific Program

Opening
Karl Kunisch (Karl-Franzens-Universität, Graz)

15:00-15:45 **Jaroslav Haslinger** (Charles University, Prague)
The Stokes system with threshold slip boundary conditions in shape optimization

15:45-16:30 **Rachid Touzani** (Université Blaise Pascal, Clermont-Ferrand)
Finite Element Method for modelling of Coal-Bed Methane Reservoirs

16:30-17:00 **Coffee break**

17:00-17:45 **Gunther H. Peichl** (Karl-Franzens-Universität, Graz)
On a shape optimization problem in lithotripsy

17:45-18:30 **John A. Burns** (Virginia Tech, Blacksburg)
Modeling and Control of Thermal Fluid Systems: Applications and Opportunities

Jaroslav Haslinger
The Stokes system with threshold slip boundary conditions in shape optimization

The first part of the talk presents the fluid flow problem with threshold slip boundary conditions, i.e. the slip of the fluid on the wall occurs only when the shear stress attains a slip bound which may also depend on the solution itself. The mathematical model is given by an inequality type problem. The second part deals with a stability of its solutions with respect to an appropriate class of domains. On the basis of this result we prove the existence of optimal shapes for a large class of cost functionals. Finally, numerical results of several model examples will be presented.

Rachid Touzani
Finite Element Method for modelling of Coal-Bed Methane Reservoirs

We present a mathematical model for the simulation of immiscible two-phase flows in porous media. In particular, the model simulates coal-bed Methane (CBM) reservoirs where the gas is recovered by desorption from coal-bed matrices. We derive the set of equations and construct a finite element method for numerical approximation. Numerical simulations are given to demonstrate the efficiency of the numerical method.

Gunther H. Peichl
On a shape optimization problem in lithotripsy

We consider a shape optimization problem motivated by the use of high intensity focused ultrasound in lithotripsy. This leads to the problem of designing a Neumann boundary part in the context of the Westervelt equation, which is a common model in nonlinear acoustics. We discuss existence and regularity results for solutions of this equation and its linearization, and briefly adress the shape derivative for this problem.

John A. Burns
Modeling and Control of Thermal Fluid Systems: Applications and Opportunities

In this talk we discuss some mathematical and computational problems that arise in the modeling and control of thermal fluid systems. We present applications that have not received wide attention in the PDE control community and provide examples to highlight some mathematical issues.