Universität Konstanz

Fachbereich
Mathematik und Statistik

Prof. Dr. Heinrich Freistühler

Prof. Dr. Reinhard Racke

Prof. Dr. Oliver Schnürer

Im

Oberseminar Partielle Differentialgleichungen

gibt es am

Donnerstag, dem 16. Mai 2013,

einen Vortrag von

Prof. Dr. Arnaud Münch *(Université Blaise Pascal, Aubière)*:

"Numerical null controllability of semi-linear heat equations: fixed point, least squares and Newton methods".

Beginn: **15:15 Uhr**

Raum: **F 426**

Interessenten sind herzlich willkommen!

H. Freistühler, R. Racke, O. Schnürer

Abstract: The talk deals with the numerical computation of distributed null controls for semi-linear heat equations, in the sublinear and slightly superlinear cases. Under sharp growth assumptions, the existence of controls has been obtained in [Fernandez-Cara and Zuazua, /Null and approximate controllability for weakly blowing / /up semi-linear heat equation, 2000] via a fixed point reformulation/; and also [Barbu, /Exact controllability / /of the superlinear heat equation/, 2000]. More precisely, Carleman estimates and Kakutani's Theorem together ensure the existence of solutions to fixed points for an equivalent fixed point reformulated problem. A nontrivial difficulty appears when we want to extract from the associated Picard iterates a convergent (sub)sequence. In this paper, we introduce and analyze a least squares reformulation of the problem; we show that this strategy leads to an effective and constructive way to compute fixed points. We also formulate and apply a Newton-Raphson algorithm in this context. Several numerical experiments that make it possible to test and compare these methods are performed. The talk will also address the cases of the wave equation and of the Navier-Stokes system. This work is partially in collaboration with N. Cindea (Université Blaise Pascal, Clermont-Ferrand) and E. Fernandez-Cara (Universidad Sevilla).

(invited by Prof. Dr. Reinhard Racke)