INSTITUT FÜR ANGEWANDTE ANALYSIS UND NUMERISCHE SIMULATION

mathematik ians

Universität Stuttgart

having a coffee in a Banach space makes you feel complete

Vortragsankündigung Oberseminar

Sommersemester 2018

10:00 Uhr im Raum 0.42 Allmandring 5b

18.07.2018 **Larissa de Vries** (Universität Stuttgart)

Quantifying uncertainty in Richards' equation – An approach via Multilevel Monte Carlo and Finite Elements

Abstract: Modelling a water flow in unsaturated soils, the Richards' equation is chosen in this report. In particular, we consider a second order parabolic partial differential equation with random variables regarding the advective and diffusive forces, although the Richards' equation can also be hyperbolic. In order to reduce the computational costs, but keeping the convergence rate, the Mulitlevel Monte Carlo method is chosen for calculating the approximated solution of the partial differential equation. Additionally, the Finite Element method is picked for the discretization with a non-adaptive grid in space and time. Continuing, the error calculation per timestep is analyzed and includes the subsequent consideration of the mean values over errors per timestep. The occurring instabilities when changing to the hyperbolic character or while using the time integration via the Theta method in a conditionally stable state are addressed in this work.

Alle Interessenten sind herzlich eingeladen!

```
39 typedef Dune::ACFem::MassModel<EllipticModelType> MassModelType;
40 MassModelType bareMassModel(implicitEllipticModel);
41
42 auto massModel(mu * (mat.Z_a) * J + mat.Z_w) * bareMassModel);
```

Die Professoren des Instituts für Angewandte Analysis und Numerische Simulation

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