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## SEMINARVORTRAG

Das Institut für Mathematik lädt zu folgendem Vortrag ein:

**Prof. Dr. Arnulf Jentzen**

ETH Zürich

### **Approximations and regularities for nonlinear stochastic ordinary and partial differential equations**

In this talk we analyze how smooth the solution of a nonlinear stochastic differential equation (SDE) depends in the strong  $L_p$ -sense on the initial value as well as the related questions of regularity preservation of the associated deterministic second-order linear Kolmogorov partial differential equation (PDE) and of convergence rates for numerical approximations of the considered nonlinear SDE.

In the first part of this talk we give an example of a second-order linear Kolmogorov PDE with a globally bounded and smooth drift coefficient, a constant diffusion coefficient and a smooth initial function with compact support such that the unique globally bounded viscosity solution of the PDE is not even locally Hölder continuous and, thereby, we disprove the existence of globally bounded classical solutions of this PDE. This, in particular, shows that there exist an SDE with a globally bounded and smooth drift coefficient and a constant diffusion coefficient whose solution does in the strong  $L_p$  sense not depend smoothly on the initial value. In addition, we demonstrate that the Euler-Maruyama approximation scheme converges without any arbitrarily small polynomial rate of convergence to the solution process of this SDE.

In the second part of this talk we present a result that gives sufficient conditions to ensure that the solutions of nonlinear SDEs depend smoothly on the initial values. Based on this regularity analysis, we then establish strong convergence rates for suitable numerical approximations of the considered nonlinear SDEs. We illustrate these results by a few example SDEs from finance, physics and biology.

Zeit: **Montag, den 11. November 2013 um 17.15 Uhr**

Ort: **Victor-Franz-Hess Haus, Technikerstraße 25, HS D**

**Gäste sind herzlich willkommen!**

*Christel & Stefan Geiß*