Seminar of Probability and Stochastic Process

Monday, 4th April, from 15h15
MA 11, EPFL, Ecublens

Prof. Arnulf Jentzen

ETHZ

Mild stochastic calculus and weak approximations for stochastic partial differential equations

Abstract:

Abstract: In this talk, we introduce a certain class of stochastic processes, which we suggest to call mild Itô processes, and a new - somehow mild - Itô type formula for such processes. Examples of mild Itô processes are mild solutions of stochastic evolution equations (SEEs) and their numerical approximation processes. We illustrate the use of the mild Itô formula by several applications. In particular, we use the mild Itô formula to study numerical approximations of SEEs. More specifically, strong convergence rates for (temporal, spatial, and noise) numerical approximations of SEEs with smooth and regular nonlinearities are well understood in the scientific literature. Weak convergence rates for numerical approximations of such SEEs have been investigated for about 12 years and are far away from being well understood: roughly speaking, no essentially sharp weak convergence rates were known for parabolic SEEs with nonlinear diffusion coefficient functions; see Remark 2.3 in A. Debussche, Weak approximation of stochastic partial differential equations: the nonlinear case, Math. Comp. 80 (2011), no. 273, 89-117 for details. We will use the mild Itô formula to solve the problem emerged from Debussche's seminal paper and, in particular, we use the mild Itô formula to establish essentially sharp weak convergence rates for SEEs with nonlinear diffusion coefficient functions. This talk is based on joint works with Adam Andersson (TU Berlin, Germany), Daniel Conus (Lehigh University, USA), Giuseppe Da Prato (Scuola Normale Superiore di Pisa, Italy), Ryan Kurniawan (ETH Zurich, Switzerland), and Michael Roeckner (Bielefeld University, Germany). Further details on this topic can also be found at rch/projects.html?details=35.

2016 10:08:37, by Carlo Ciccarella