Three lectures on Stochastic Processes

Universiteit van Amsterdam
Korteweg-de Vries Instituut voor Wiskunde
Room P.016
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Programme

14.30–15.15  Jean Mémin (Université de Rennes 1)
15.15–16.00  Harry van Zanten (Vrije Universiteit)
16.00–16.15  Coffee break
16.15–17.00  Marc Yor (Université Paris VI & Paris VII)

Abstracts

Jean Mémin: On the robustness of backward stochastic differential equations

In this talk we study the robustness of backward stochastic differential equations (BSDE in short) with respect to the Brownian motion; more precisely we will show that if $W^n$ is a martingale approximation of a Brownian motion $W$ then the solution of the BSDE driven by the martingale $W^n$ converges to the solution of the classical BSDE, namely the BSDE driven by $W$. Here we will not assume that $W^n$ has the predictable representation property. As a byproduct of the result we obtain the convergence of the "Euler scheme" for BSDEs corresponding to the case where $W^n$ is a time discretization of $W$.

Harry van Zanten: On Donsker Theorems for Additive Functionals of Ergodic Diffusion Processes

In this talk we discuss the uniform central limit problem for additive functionals of an ergodic, 1-dimensional diffusion process. We consider a regular diffusion $X$ on an open interval $I$, with finite speed measure $m$ and diffusion local time $(l_t(x) : t \geq 0, x \in I)$. If $\Lambda$ is a collection of signed measure on $I$ and the total variations of these signed measures are uniformly bounded, we give a sufficient condition on $\Lambda$ under which the random map

$$\lambda \mapsto \sqrt{t} \int_I \left( \frac{1}{t} l_t(x) - \frac{1}{m(I)} \right) \lambda(dx)$$

satisfies a Donsker theorem.
converges weakly, as $t \to \infty$, to a tight weak limit in the space $\ell^\infty(\Lambda)$ of bounded functions on $\Lambda$. The condition on $\Lambda$ is formulated in terms of the metric entropy of the class with respect to a suitable metric. We also discuss a number of applications of the abstract result.

Marc Yor: *On subordinators, self-similar Markov processes and some factorizations of the exponential variable*

In this lecture, I shall prove that if $I = \int_0^\infty ds \exp(-\xi s)$ is the ‘exponential functional’ associated to $(\xi_s, s \geq 0)$, a subordinator, then it is always a factor in a multiplicative decomposition of the exponential variable. I shall illustrate this result with several examples.

*This afternoon is jointly organized by CWI (Spatial Stochastics Seminar) and the Universiteit van Amsterdam (Colloquium on Probability, Statistics and Financial Mathematics)*