Journée EDP Stochastiques non linéaires et Applications

Le Vendredi 25 Mars 2011

- **Dan CRISAN (Imperial College London)**

Title : Conditional distributions, exchangeable particle systems and stochastic partial differential equations

Abstract: Motivated by a financial model of asset price determination in which the price is given as a quantile of the valuations of a large number of individual investors, we study a class of stochastic partial differential equations with non-Lipschitz. The main result states that, under mild nondegeneracy conditions on the coefficients of the stochastic differential equation, the conditional distribution of its solution charges any open set. Under stronger conditions we show that it is absolutely continuous with respect to Lebesgue measure and its density is positive almost everywhere. As applications we show the existence of a solution of a system of interacting diffusions and study the properties of the solution of the nonlinear filtering equation within a framework that allows for the signal noise and the observation noise to be correlated. This is work with Tom Kurtz and Yoonjung Lee.

- **Arnaud DEBUSSCHE (ENS Cachan Antenne de Bretagne)**

Title : On the 3D stochastic Navier-Stokes equations

Abstract: We first give a brief overview of a series of results on the construction of Markov semigroup for the 3D Navier-Stokes equation. Since uniqueness is an open problem, the construction is not obvious. We show that under appropriate conditions on the non degeneracy of the noise, it is possible to do this in a constructive way and obtain a transition semigroup which is (and even strong) Feller. This is the result of joint works with G. Da Prato and C. Odasso. Exponential convergence to equilibrium follows from an argument due to C. Odasso. Then we consider physically more realistic noises which do not satisfy the above non degeneracy condition and prove that the projections of the distribution onto finite dimensional spaces of any (weak) solution have a density with respect to the Lebesgue. Since Malliavin calculus does not seem to be applicable, we use and extend a recent idea due to N. Fournier and J. Printems. This is a joint work with M. Romito.

- **Laurent DENIS (Université d'Evry)**

Title: Existence and uniqueness of Parabolic SPDE's with obstacle

Abstract :
We prove existence and uniqueness of quasi-linear parabolic SPDE's thanks to a penalization method. It is based on a joint work with A. Matoussi and J. Zhang.

- **Nicole EL KAROUI (CMAP/UPMC)**

Title : Some examples of transformations of forward utilities PDE's, with financial applications

Abstract: Forward utilities first introduced by Musiela and Zariphopoulo, have been intensively analysed in the recent years. In particular , we have shown that under regularity assumptions, these utilities can be inferred directly from optimal portfolio and optimal risk martingale measure and their inverses. The interpretation of this result in Markovian setting, in terms of non stochastic PDEs is not easy. Financial examples based on power utilities and their mixtures bring some insights on this question.

- **Harald OBERHAUSER (Technical University of Berlin)**

Title: Pathwise aspects of some stochastic partial differential equations.

Abstract:
I will report on ongoing joint-work with M. Caruana, J. Diehl and H. Oberhauser concerning a (rough) pathwise view on certain non-linear stochastic partial differential equations.

- **Bruno SAUSSEREAU (Université de Besançon)**

Title : Scalar conservation laws with fractional stochastic forcing: existence, uniqueness and invariant measure

Abstract :
We study a fractional stochastic perturbation of a first order hyperbolic equation of nonlinear type. Existence and uniqueness of the solution is investigated via a Lax-Ole{\u\i}nik formula. To construct the invariant measure we mainly us two ingredients. The first one is the notion of generalized characteristic in the sense of Dafermos. The second one is the fact that the oscillations of the fractional Brownian motion are arbitrarily small for an infinite number of intervals of arbitrary length.

- **Sergey NADTOCHIY (Oxford-Man Institut)**

  Title: Solution to the forward performance, SPDE and the Ill-posed HJB equation.

Abstract :
We review the general results on the forward performance processes, including the existence of solutions to the corresponding SPDE. We, then, concentrate on explicit constructions of the forward investment performance processes with non-zero forward volatility in a Markovian setup. The forward performance process is represented in a closed-form via a deterministic function of the wealth and the state variables of the system. This function is, in turn, given as a solution to an ill-posed Hamilton-Jacobi-Bellman equation. We analyze the solutions of this problem in detail. We, also, provide examples for specific stochastic volatility models, including the log-mean reverting volatility and the Heston model.

Journée Organisée par :

L'Equipe de Probabilités et Mathématiques financières
Laboratoire Manceaux de Mathématiques (LMM)