PATH DEPENDENT STOCHASTIC CALCULUS, AN INFINITE DIMENSIONAL PDE AND FINANCIAL PERSPECTIVES

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Abstract This talk develops some aspects of stochastic calculus via regularization for path dependent random variables. After some brief reminds on stochastic calculus in a general Banach space B, main interest will be devoted to the case when B is the space of real continuous functions defined on $[-T, 0]$, $T > 0$ and the process is the window process $X(\cdot)$ associated with a continuous real process X which, at time t, it takes into account the past of the process. If X is a finite quadratic variation process (for instance Dirichlet, weak Dirichlet), it is possible to represent a large class of path-dependent random variable h as a real number plus a real forward integral in a semiexplicite form. This representation result of h makes use of a functional solving a path dependent infinite dimensional partial differential equation of Kolmogorov type. Two recent general existence results of its classical solutions related to different classes of final conditions will be presented. The decomposition result generalizes, in some cases, the well known Clark-Ocone formula which is true when X is the standard Brownian motion W. Some examples will be given explicitly developed and discussed.

This is a joint work with Francesco Russo (ENSTA ParisTech Paris).

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