

Statistics and Data Science Seminar

A Martingale Approach for Fractional Brownian Motions and Related Path Dependent PDEs

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Abstract: Motivated by option pricing in a financial market with rough volatility, we study backward SDEs in a framework where the (forward) state process satisfies a Volterra type SDE, with fractional Brownian motion as a typical example. Such processes are neither Markov processes nor semimartingales, and most notably, they feature a certain time inconsistency which makes any direct application of Markovian ideas impossible without passing to a path-dependent framework. Our main result is a functional Ito formula, extending the seminal work of Dupire to our more general framework. In particular, unlike in Dupire's setting where one needs only to consider the stopped paths, here we need to concatenate the observed path up to the current time with a certain smooth observable curve derived from the distribution of the future paths. This new feature is due to the time inconsistency involved in this paper. We then derive the path dependent PDEs for the backward problems. The talk is based on a joint work with Frederi Viens.

Wednesday, October 9 at 3:00 PM in 636 SEO