

Some path-dependent processes from signatures

Eduardo Abi Jaber
(École Polytechnique)

12 June 2024, 17:15–18:15* Berlin time

IRTG 2544: "Stochastic Analysis in Interaction"
— Berlin Probability Colloquium —

WIAS Berlin
Hausvogteiplatz 5-7
10117 Berlin
Library, Room 411

Abstract

We provide explicit series expansions to certain stochastic path-dependent integral equations in terms of the path signature of the time augmented driving Brownian motion. Our framework encompasses a large class of stochastic linear Volterra and delay equations and in particular the fractional Brownian motion with a Hurst index H in $(0, 1)$.

Our expressions allow to disentangle an infinite dimensional Markovian structure. In addition they open the door to: (i) straightforward and simple approximation schemes that we illustrate numerically, (ii) representations of certain Fourier-Laplace transforms in terms of a non-standard infinite dimensional Riccati equation with important applications for pricing and hedging in quantitative finance.

Based on joint works with Louis-Amand Gérard and Yuxing Huang.

*Punctual, i.e. sine tempore!