

Research topic for a PhD thesis entitled
*Stochastic expansion of non-linear stochastic
processes*

under the supervision of
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Subfield: Applied Mathematics, probability and stochastic analysis

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Short description: the aim of this thesis is to design and develop a framework to obtain analytical approximations of non-linear processes such as Backward Stochastic Differential Equations, McKean-Vlasov diffusion equations and some Stochastic PDEs, using stochastic analysis tools. This is a fundamental concern for simulating such processes, with crucial applications in engineering and social sciences, in order to model interactions between physical particles or economic agents, or to solve stochastic control problems. We will investigate how to adapt the efficient stochastic analysis approach developed in the linear case [BG13, GM14] to the current non-linear setting. Comparison with other Monte-Carlo schemes such as [GT13] will be performed.

References

- [BG13] R. Bompis and E. Gobet. SAFE method for analytical approximation of multi-dimensional diffusion. *Submitted for publication*, 2013.
- [GM14] E. Gobet and M. Miri. Weak approximation of averaged diffusion processes. *Stochastic Processes and their Applications*, 124:475–504, 2014.
- [GT13] E. Gobet and P. Turkedjiev. Linear regression MDP scheme for discrete backward stochastic differential equations under general conditions. *In revision for Mathematics of Computation*, 2013.