

Research topic for a PhD thesis entitled *Optimal monitoring of a stochastic model with applications to inference and simulation*

under the supervision of
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Subfield: Applied Mathematics, probability and statistics

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Short description: recently in [GL14a, GL14b], the difficult problem of finding the optimal times for controlling a stochastic system has been explicitly solved through a new asymptotic analysis consisting in letting the frequency of decision go to infinity. It has been successfully applied in stochastic finance for optimal risk managements.

The aim of this PhD work is to develop this new theory in three directions:

1. Optimal monitoring of a random system to which a control must be applied at some optimal dates. Applications to engineering sciences (hybrid vehicles, airplanes, industrial maintenance...) will be investigated.
2. Efficient simulation schemes for exit times of ellipsoids by stochastic processes, which play a crucial role in this theory.
3. Optimal monitoring of a random system with statistical inference in view, extending the results of [GCJ94] to more general random sampling schemes.

References

- [GCJ94] V. Genon-Catalot and J. Jacod. Estimation of the diffusion coefficient for diffusion processes: random sampling. *Scandinavian Journal of Statistics*, 21:193–221, 1994.
- [GL14a] E. Gobet and N. Landon. Almost sure optimal hedging strategy. *To appear in Annals of Applied Probability*, 2014.
- [GL14b] E. Gobet and N. Landon. Optimization of joint β -variations of Brownian semimartingales. *In revision for Electronic Journal of Probability*, 2014.