Universidade Estadual de Campinas

Workshop in Stochastic Analysis and Applications

- August, 2018 -

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Method to Find a ϵ-Optimal Control Non-Markovian Systems

Abstract

We present a general solution for finding the epsilon-optimal controls for non-Markovian stochastic systems as stochastic differential equations driven by Brownian motion. Our theory provides a concrete description of a rather general class, among the principals, we can highlight financial problems such as portfolio control, hedging, super-hedging, pairs- rading and others. The pathwise analysis was made through a discretization structure proposed by Leão e Ohashi[1] jointly with measurable selection arguments, has provided us with a structure to transform an infinite dimensional problem into a finite dimensional. The theory is applied to stochastic control problems based on path-dependent SDEs where both drift and diffusion components are controlled. We are able to explicitly show optimal control with our method [2].

[1] Leão, D. and Ohashi, A. (2013). Weak approximations for Wiener functionals. Ann. Appl. Probab, 23, 4, 1660−1691
[2] Leão, D. Ohashi, A. and Souza, F. (2017). STOCHASTIC NEAR-OPTIMAL CONTROLS FOR PATHDEPENDENT SYSTEMS. arXiv: 1707.04976.

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$W^{1,p}$-solutions of the transport equation by stochastic perturbation

Abstract

In this work we study the stochastic transport equation given by:

$$\partial_t u(t,x) + \left(b(t,x) + \frac{dB_t}{dt} \right) \nabla u(t,x) = 0, \qquad u|_{t=0} = u_0 \tag{1}$$

where $(t,x) \in [0,T] \times \mathbb{R}^d$, $\omega \in \Omega$, $b\colon \mathbb{R}_+ \times \mathbb{R}^d \to \mathbb{R}^d$ is a vector field (drift) and $B_t = (B_t^1, ..., B_t^d)$ is a standard Brownian motion in $\mathbb{R}^d$. Indeed, considering a Holder continuous, possibly unbounded, divergence-free drift we will prove well-posedness of the Cauchy problem (1), namely, we show existence, uniqueness and strong stability of $W^{1,p}$-weak solutions. In particular, this result implies the *persistence of regularity* for initial conditions $u_0 \in W^{1,p}(\mathbb{R}^d)$, with $1 < p < \infty$.