Numerical probabilistic method for Semi-linear Stochastic PDEs using Backward Doubly SDEs

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Abstract

In the first part of this talk, I will present a numerical probabilistic method to approximate the solution of a class of semi-linear stochastic partial differential equations (SPDEs in short). Pardoux and Peng [5] related Semi-linear SPDEs to backward doubly stochastic differential equations (BDSDEs in short). Our numerical scheme is based on discrete time approximation for solutions of systems of decoupled Forward-BDSDEs, generalizing numerical schemes for standard backward stochastic differential equations studied in [3] and [6]. Under standard assumptions on the parameters, we prove the convergence in time and the rate of convergence of our numerical scheme.

In the second part of the talk, I will present the resolution of the discrete dynamic programming equation arising from the time discretization by using nested empirical regression problems, following [4]. Error estimates are derived conditionally to the exterior noise.

The first part of this talk is based on [1] and the second part is based on [2].

References

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