

BSDES, MARTINGALE PROBLEMS, ASSOCIATED DETERMINISTIC EQUATIONS AND APPLICATIONS.

Workshop on “One day on Stochastic Analysis and Applications”, Verona, February 5th 2018

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The talk will be based on partial joint work with Adrien Barrasso (ENSTA ParisTech) and Ismail Laachir (ZELIADE) .

The aim of this talk consists in introducing a new formalism for the deterministic analysis associated with backward stochastic differential equations driven by general càdlàg martingales, coupled with a forward Markov process.

When the martingale is a standard Brownian motion, the natural deterministic analysis is provided by the solution u of a semilinear PDE of parabolic type coupled with a function v which is associated with the ∇u , when u is of class C^1 in space. When u is only a viscosity solution of the PDE, the link associating v to u is not completely clear: sometimes in the literature it is called the *identification* problem.

The idea is to introduce a suitable analysis to investigate the equivalent of the identification problem in a general Markovian setting with a class of examples. An interesting application concerns the hedging problem under basis risk of a contingent claim $g(X_T, S_T)$, where S (resp. X) is an underlying price of a traded (resp. non-traded but observable) asset, via the celebrated Föllmer-Schweizer decomposition. We revisit the case when the couple of price processes (X, S) is a diffusion and we provide explicit expressions when (X, S) is an exponential of additive processes.