

## On some aspects of singular control of stochastic differential equations

**Brahim Mezerdi**

Laboratory of Applied Mathematics  
University Mohamed Khider, Po. Box 145  
Biskra (07000) Algeria

### Abstract

In this talk, we present various results on the stochastic maximum principle for systems governed by stochastic differential equations, with non linear coefficients, allowing both classical as well as singular control, see [1, 2, 3, 4]. In a second step, we investigate the relationship between the stochastic maximum principle and the dynamic programming principle for this kind of problems. In particular, we show that the solution of the adjoint equation coincides with the derivative of the value function. An example from mathematical finance is solved by using these techniques.

### References

- [1] **K. Bahlali, F. Chighoub, B. Djehiche, B. Mezerdi**, Optimality necessary conditions in singular stochastic control problems with nonsmooth data. *J. Math. Anal. Appl.* **355** (2009), no. 2, 479--494
- [2] **S. Bahlali, B. Djehiche, B. Mezerdi**, The relaxed stochastic maximum principle in singular optimal control of diffusions. *SIAM J. Control Optim.* **46** (2007), No. 2, 427--444.
- [3] **K. Bahlali, B. Djehiche, B. Mezerdi**, On the stochastic maximum principle in optimal control of degenerate diffusions with Lipschitz coefficients. *Appl. Math. Optim.* **56** (2007), No. 3, 364—378.
- [4] **S. Bahlali, B. Mezerdi**, A general stochastic maximum principle for singular control problems. *Electron. J. Probab.* 10 (2005), no. 30, 988--1004