

# BSPDES AND THEIR APPLICATIONS TO STOCHASTIC OPTIMAL CONTROL

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In this talk we will present briefly the theory of existence and uniqueness of solutions to backward stochastic partial differential equations (BSPDEs). Such an equation is driven by an infinite dimensional martingale. This result is based on our work in [4]. Applications of BSPDEs to stochastic optimal control problems governed by SPDEs are provided. We shall cover the case when the control domain is not necessarily convex. All proofs of these applications can be found in [1], [2] and [3]. Further extensions and examples will be discussed as well.

## REFERENCES

- [1] Al-Hussein, A., Maximum principle for optimal control of stochastic partial differential equations, arXiv:1202.4006v1 [math.PR], 2012.
- [2] Al-Hussein, A., Necessary and sufficient conditions of optimal control for infinite dimensional SDEs, arXiv:1202.4011v1[math.PR], 2012.
- [3] Al-Hussein, A., Necessary conditions for optimal control of stochastic evolution equations in Hilbert spaces, Appl. Math. Optim., 63, no. 3 (2011), 385–400.
- [4] Al-Hussein, A., Backward stochastic partial differential equations driven by infinite dimensional martingales and applications, Stochastics, 81, no. 6 (2009), 601–626.