

Optimal insider control of stochastic partial differential equations, with applications to optimal harvesting and optimal insider portfolio under noisy observations

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We study the problem of optimal control with inside information of an SPDE (a stochastic evolution equation) driven by a Brownian motion and a Poisson random measure. Our optimal control problem is new in two ways:

- (i) The controller has access to inside information, i.e. access to information about a future state of the system,
- (ii) The integro-differential operator of the SPDE might depend on the control.

In the first part of the paper, we formulate a sufficient and a necessary maximum principle for this type of control problem, in the following two cases:

- (a) The control is allowed to depend both on time t and on the space variable x .
- (b) The control is not allowed to depend on x .

In the second part of the paper, we apply the results above to the problem of optimal control of an SDE system when the inside controller has only noisy observations of the state of the system. Using results from nonlinear filtering, we transform this noisy observation SDE inside control problem into a full observation SPDE insider control problem.

The results are illustrated by explicit examples.

The presentation is based on joint works with Olfa Draouil, University of Tunis El Manar, Tunisia.