

Applications of Stochastic Control in Algorithmic Trading

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Abstract / Resumo:

Morning Session (Background on Control - 2hrs)

- Why stochastic control, motivation via the problem of optimally trading a day VWAP.
- SDEs, existence and uniqueness results for the Lipschitz case, Markov nature of solutions and the flow property. Analogous results for controlled SDEs.
- Dynamic programming, Bellman's principle of optimality and the value function. Heuristic derivation of the HJB PDE.
- Difficulties in showing the value function to be a priori smooth, verification theorem, examples.

Afternoon Session (Algorithmic Trading - approx 2hrs)

- Trading a day VWAP as a linear quadratic regulator problem, solution via Riccati equations and discussion of the optimal control.
- Simple numerical implementation of the VWAP trader, discussion of market impact modelling.
- Optimal liquidation as a linear quadratic regulator problem. Introduction to dark pools, how to extend optimal liquidation to the case of dark pools.
- Analysis of modelling assumptions, how robust are the solutions, how easy is it to calibrate the input parameters?