Monday	***3.1.2011***	***Chairman***
9:40 - 10:10	*registration*	*K. Janeček↓*

10:10 - 11:00 Bohdan Maslowski · `KPMS MFF UK, Prague, CZ`

Stochastic PDEs with fractional Gaussian noise

11:10 - 12:00 Olympia Hadjiliadis · `City University of New York, USA`

Multi-dimensional quickest detection

We consider the problem of quickest detection in the presence of multiple random sources each driven by distinct sources of noise represented by a Brownian motion. We make the assumption that the driving noises are independent. We identify the problem of two-sided alternatives as a special case of this problem in the case that the driving Brownian motions have a correlation equal to -1. The case described in this set-up corresponds to 0 correlation in the noise component of each source. The first problem we will address is the one of detecting a change in the drift of Brownian motions received in parallel at the sensors of decentralized systems. We examine the performance of one shot schemes in decentralized detection in the case of many sensors with respect to appropriate criteria. One shot schemes are schemes in which the sensors communicate with the fusion center only once; when they must signal a detection. The communication is clearly asynchronous and we consider the case that the fusion center employs one of two strategies, the minimal and the maximal. According to the former strategy an alarm is issued at the fusion center the moment in which the first one of the sensors issues an alarm, whereas according to the latter strategy an alarm is issued when both sensors have reported a detection. In this work we derive closed form expressions for the expected delay of both the minimal and the maximal strategies in the case that CUSUM stopping rules are employed by the sensors. We prove asymptotic optimality of the above strategies in the case of across-sensor independence and specify the optimal threshold selection at the sensors.

Moreover, we consider the problem of quickest detection of signals in a coupled system of N sensors, which receive continuous sequential observations from the environment. It is assumed that the signals, which are modeled by a general It? processes, are coupled across sensors, but that their onset times may differ from sensor to sensor. Two main cases are considered; in the first one signal strengths are the same across sensors while in the second one they differ by a constant. The objective is the optimal detection of the first time at which any sensor in the system receives a signal. The problem is formulated as a stochastic optimization problem in which an extended minimal Kullback-Leibler divergence criterion is used as a measure of detection delay, with a constraint on the mean time to the first false alarm. The case in which the sensors employ cumulative sum (CUSUM) strategies is considered, and it is proved that the minimum of N CUSUMs is asymptotically optimal as the mean time between false alarms increases without bound. In particular, in the case of equal signal strengths across sensors, it is seen that the difference in detection delay of the N-CUSUM stopping rule and the unknown optimal stopping scheme tends to a constant related to the number of sensors as the mean time between false alarms increases without bound. While in the case of unequal signal strengths, it is seen that this difference tends to 0.

12:00 - 14:00	*lunch time*	*J. Večeř↓*

Monday	***3.1.2011***	***Chairman***
12:00 - 14:00	*lunch time*	*J. Večeř↓*

14:00 - 14:50 Karel Janeček · `RSJ a.s., Prague, CZ`

Optimal investment with high-watermark performance fee

We consider the problem of optimal investment and consumption when the investment opportunity is represented by a hedge-fund charging proportional fees on profit. The value of the fund evolves as a geometric Brownian motion and the performance of the investment and consumption strategy is measured using discounted power utility from consumption on infinite horizon. The resulting stochastic control problem is solved using dynamic programming arguments. We show by analytical methods that the associated Hamilton-Jacobi-Bellman equation has a smooth solution, and then obtain the existence and representation of the optimal control in feedback form using verification arguments.

15:00 - 15:50 Tomáš Tichý · `Technical University of Ostrava, CZ`

Market risk measuring for internationally diversified portfolio

15:50 - 16:20	*coffee break*	*T. Tichý↓*

16:20 - 17:10 Tomáš Bunčák · `KPMS MFF UK, Prague, CZ`

Mean-variance hedging

The talk is focused on investigation of the particular hedging technique: mean-variance hedging (MVH), i.e. hedging with a quadratic measurement of the hedging error at the terminal time of an investment. This widely studied method, proposed by [1] among others, could be solved employing various techniques that we can categorize into two approaches, namely a projection approach and a stochastic control approach. The idea behind the projection approach stems from the fact that finding a MVH optimal strategy by minimizing the squared difference between the payoff of a contingent claim H and the terminal value of a hedging strategy could be considered as a projection of the claim H on the space of terminal values of admissible strategies in $L^2(\mathbb{P})$. Therefore methods such as Galtchouk-Kunita-Watanabe decomposition are utilized. We review the methodologies used within this approach coming out from [5, 2] mainly. In our research concerning the stochastic control approach, we are interested in examining the possibility of using the methods of optimal stochastic control (namely the linear-quadratic stochastic control (LQSC) framework, the dynamic programming, and the maximum principle) in MVH and we study the problem of our interest in several settings of the market models; involving cases of pure diffusion models and a jump-diffusion case. Our endeavor shall transparently demonstrate usage of the optimal stochastic control techniques in the area of MVH problem. In particular, we provide solutions for the MVH problem in the setting of the Heston model via both of the approaches: the projection approach solution adopted from [3] and the stochastic control approach solution motivated by the LQSC framework of [4].

References

[1] N. Bouleau and D. Lamberton. Residual risks and hedging strategies in markovian markets. Stochastic Processes and their Applications, 33(1):131–150, 1989.

[2] A. Černý and J. Kallsen. On the structure of general mean-variance hedging strategies. The Annals of Probability, 35(4):1479–1531, 2007.

[3] A. Černý and J. Kallsen. Mean-variance hedging and optimal investment in Heston's model with correlation. Mathematical Finance, 18(3):473–492, 2008.

[4] M. Kohlmann and S. Tang. Global adapted solution of one-dimensional backward stochastic Riccati equations, with application to the mean-variance hedging. Stochastic Processes and their Applications, 97:255–288, 2002.

[5] H. Pham. On quadratic hedging in continuous time. Math. Meth. Oper. Res., 51:315–339, 2000.

17:20 - 18:10 Andrea Karlová · `KPMS MFF UK + ÚTIA AS CR (AV ČR), Prague, CZ`

Dark Noise: On Beyond Black

19:00 - 22:00	*dinner*

Tuesday	***4.1.2011***	***Chairman***
9:10 - 9:40	*tea*	*B. Maslowski↓*

9:40 - 10:30 Yuliya Mishura · `Taras Shevchenko National Univ. of Kyiv, Ukraine`

Long-range dependence and non-semimartingale models in finance

We consider the model of financial market that involves both Wiener and fractional Brownian component. It is proved that the market is arbitrage-free. The problem of quantile hedging is studied as well as the problem of equilibrium of such a model and the pricing of options.

10:40 - 11:30 Jan Pospíšil · `University of West Bohemia, Plzeň, CZ`

Fractal Concepts in Surface Growth

In this talk we give a brief introduction to mathematical models of surface growth occurring both in nature and in nanotechnological industrial processes. Several discrete mathematical models will be presented together with the motivation to consider continuum stochastic growth equations.

11:30 - 13:00	*lunch time*	*Y. Mishura↓*

13:00 - 13:50 Jan Swart · `ÚTIA AS CR (AV ČR), Prague, CZ`

Intertwining of Markov processes

When is a function of a Markov process itself a Markov process? This is certainly the case when the given function is an autonomous process, i.e., when its transition rates do not depend on the state of the rest of the system. Under certain circumstances, however, it may happen that a function of a Markov process is itself a Markov process, even though it is not autonomous. This gives rise to the interesting concept of intertwining of Markov processes, of which I will give some examples.

14:00 - 14:50 Jan Večeř · `Frankfurt School of Fin. & Manag., Frankfurt, Germany`

On the equivalence of the prices of some Arrow-Debreu securities

14:50 - 15:20	*coffee break*	*J. Swart↓*

15:20 - 16:10 Peter Bank · `TU Berlin, Berlin, Germany`

A large investor trading at market indifference prices

We consider a financial market where a finite number of market makers quote prices for a given security. The market makers rehedge the acquired positions among themselves so as to keep the allocation of risk in a Pareto-optimum. We show how this model extends to continuous-time by deriving a nonlinear SDE for the market makers' utility process. (Joint work with Dmitry Kramkov).

16:20 - 17:10 Martin Šmíd · `ÚTIA AS CR (AV ČR), Prague, CZ`

Approximation of Hill process

17:20 - 17:40 Jana Šnupárková · `KPMS MFF UK, Prague, CZ`

Weak existence of bilinear equation driven by FBM in infinite dimension