Monday	*5.1.2015*	*Chairman*
9:20 - 10:50	*registration*	*T. Tichý↓*

9:50 - 10:40 Jan Večeř · `Frankfurt School of Fin. & Manag., Frankfurt, Germany`

Risk Based Capital for Guaranteed Minimum Withdrawal Benefit

The guaranteed minimum withdrawal benefit (GMWB) is a recent innovation in the insurance market. It is sold as a rider to variable annuity contracts, which guarantees the return of total purchase payment regardless of the performance of the underlying investment funds. The valuation of GMWB has been extensively covered in the previous literature, but the more challenging and interesting problem is the computation of the risk based capital (RBC) which is required by the risk management and regulatory reasons. The most common measures of RBC are the value at risk and the shortfall risk. GMWB has embedded two option features - the policy holder withdrawals result in an average price of the accumulated fund which corresponds to some version of the Asian option, but only up to the time of the fund hitting zero which corresponds to some version of the barrier option. Thus the GMWB is mathematically more complicated than Asian or barrier options traded on the financial markets. We can find the RBC as a solution to a partial differential equation in two spatial dimensions that can be solved numerically.

10:50 - 11:40 Jan Swart · `ÚTIA AS CR (AV ČR), Prague, CZ`

Self-organized criticality on the stock market

11:40 - 13:40 *lunch time* *J. Večeř↓*

13:40 - 14:30 František Žák · `Imperial College London, UK`

Exponential ergodicity for infinite system of interacting diffusions

We present a new way of constructing system of interacting diffusions on unbounded lattice. The method allows us to prove strong ergodicity properties of the whole system, as well as cover cases, where the generator of diffusion is degenerate elliptic, such as Heisenberg group.

14:40 - 15:30 Karel Kadlec · `KPMS MFF UK, Prague, CZ`

Adaptive control in the case of Lévy processes

In this contribution, the square integrable Lévy processes with values in Hilbert spaces are considered and the weak solutions of the stochastic evolution equations with this Lévy noise are stated. The commonly known Ito formula is directly applicable only to the strong solutions of the stochastic evolution equations. The assumption of the existence of the strong solution is too restrictive, so the Ito formula for the quadratic functional in the suitable form for the weak solution of the stochastic evolution equation with the Lévy noise is derived. The LQ stochastic optimal control problem is formulated, the sufficient conditions for the convergence a.s. and in mean of the average value of the cost functional are stated and the limiting value is given.

15:30 - 15:40 *coffee break* *J. Swart↓*

15:40 - 17:10 Václav Kozmík · `KPMS MFF UK, Prague, CZ`

Multiperiod Risk Measures

17:20 - 17:50 Tomáš Tichý · `Technical University of Ostrava, CZ`

17:50 - 18:20 Jiří Hozman · `Technical University of Liberec, CZ`

Numerical pricing of selected options

In the first part, we focus on the current progress in numerical pricing of various options with special focuse on path dependent options. Next, we study discontinuous Galerkin approach for numerical solution of PDE and utilize it for option pricing, including several case studies. Finally, several directions for subsequent research are suggested.

19:15 - 22:00 *dinner*

Tuesday	***6.1.2014***	***Chairman***
9:20 - 9:50	*tea*	*J. Pospíšil↓*

9:50 - 10:40 Markus Riedle · `King's College in London, UK`

Cylindrical Lévy processes in Banach spaces and Hilbert spaces

The objective of this talk is the introduction of cylindrical Lévy processes and their stochastic integrals in Hilbert spaces. The degree of freedom of models in infinite dimensions is often reflected by the request that each mode along a dimension is independently perturbed by the noise. In the Gaussian setting, this leads to the *cylindrical Wiener process* including from a model point of view the very important possibility to model a Gaussian noise in both time and space in a great flexibility (space-time white oise). Up to very recently, there has been no analogue for Lévy processes. Based on the classical theory of cylindrical processes and cylindrical measures we introduce *cylindrical Lévy processes* as a natural generalisation of cylindrical Wiener processes. We continue to characterise the distribution of cylindrical Lévy processes by a cylindrical version of the Lévy-Khintchine formula. In Hilbert spaces we introduce a stochastic integral for operator-valued stochastic processes with respect to cylindrical Lévy processes. We apply the developed theory to derive the existence of a solution for a Cauchy problem and to consider spatial and temporal regularity and irregularity properties of the solution. [parts of this talk are based on joint work with D. Applebaum or A. Jakubowski]

10:50 - 11:20 Tomáš Sobotka · `University of West Bohemia, Plzeň, CZ`

Calibration of a dynamic SABR model to index option markets

In this talk we review a popular model with respect to fixed income derivatives pricing the SABR model (Hagan et al, 2002). After the standard version of this approach is presented, we look at the model with time-dependent parameters that are in a functional form. The dynamic-parameter model can be successfully calibrated, unlike the original one, to an index option market with multiple maturities. This will be illustrated by a numerical example involving real-market data.

11:30 - 12:00 Milan Mrázek · `University of West Bohemia, Plzeň, CZ`

Extension to Heston stochastic volatility model and its application

We introduce time dependent Heston model with piecewise constant parameters and describe the iterative approach to determine the price of European call option. We verify the formula first for one piecewise parameter and also compare the results to their Monte Carlo counterparts using QE scheme approximating the non-central chi-square distribution of the variance process. The calibration algorithm is described and model is then applied to ODAX market data. Model prices are verified using the retrieved parameters by Monte Carlo simulation and performance is compared to the static Heston model.

12:00 - 14:00	*lunch time*	*B. Maslowski↓*

14:00 - 14:50 Jan Pospíšil · `University of West Bohemia, Plzeň, CZ`

On multi level Monte Carlo methods for stochastic differential equations in finance

In this talk we give an introduction to multi level Monte Carlo (MLMC) methods and their usage in simulation of stochastic differential equations (SDEs) that are widely used in finance. We will also discuss how MLMC can be applied to parabolic stochastic partial differential equations (SPDEs).

15:00 - 15:30 Petr Čoupek · `KPMS MFF UK, Prague, CZ`

Analysis of Volterra processes

The aim of this talk is to present a wide class of stochastic processes, which generalize the fractional Brownian motion. Volterra processes are centered continuous Gaussian processes which admit the canonical representation of the form $X_t = \int_0^t K(t,r)\mathrm{d}W_r$ with $\mathcal{F}_t^X = \mathcal{F}_t^W$, where W denotes the standard Brownian motion. The Volterra process is constructed as a canonical process on the space of continuous functions, null at the origin, and conditions on the kernel K, under which the above representation holds, are given. We then construct a stochastic integral of deterministic functions with respect to a Volterra process and show that under some regularity conditions on the kernel K a certain Lebesgue space can be embedded in the space of possible integrands. The results extend the results known for the fractional Brownian motion with Hurst parameter $H > \frac{1}{2}$ and find their application in the theory of stochastic evolution equations.