

WORKSHOP ON
NONLINEAR PDES AND FINANCIAL MATHEMATICS
11 AND 12 NOVEMBER 2004
UNIVERSITY OF LEIPZIG

Thursday 11.11. Morning, Ziegenledersaal, Main building of the University, Augustusplatz

09:15 Welcome

09:20 – 10:30 Ljudmila A. Bordag, Halmstadt

Methods of the Lie-Group theory in applications to nonlinear partial differential equations

Abstract. This lecture is devoted to the methods of the Lie-Group theory and its applications to nonlinear partial differential equations. Last time a series of advanced models in Financial Mathematics appeared as a further development of the Black-Scholes theory for option pricing. These models typically include nonlinear partial differential equations or system of such equations. In this crash course we start with introduction of the most important ideas. We will try to explain useful analytical tools as well as a possible benefit and problems connected with the applications of this theory.

10:30 – 11:00 Coffee break

11:00 – 12:00 Rüdiger Frey, Leipzig

Pricing and Hedging of Derivative Securities under Market Frictions and Nonlinear PDEs

Abstract. In this talk we discuss the pricing and hedging of derivatives under market frictions such as a lack of market liquidity. We begin with a brief review of standard arguments of financial mathematics in frictionless markets. We explain in detail, how market frictions lead to nonlinear versions of the well-known parabolic Black Scholes PDE. These nonlinear PDEs will be discussed in several of the later talks. Finally, we present results from a simulation study.

12:00 – 14:00 Lunch break (Rektorklausur, Mensa)

Thursday afternoon, Sitzungszimmer of Mathematical Institute (Room 4.40)

14:00 – 14:45 Ulrike Polte, Leipzig

Pricing and Hedging of Derivative Securities with Random Market Liquidity

14:45 - 15:15 Georgi Tchilikov, Halmstadt

First steps in symmetry analysis of a three dimensional nonlinear generalization of the Black-Scholes model

15:15 – 15:45 Alina Chmakova, Cottbus

Numerical experiments on a nonlinear model of financial derivatives using explicit solutions

16:15 – 17:00 Eric Jarpe, Halmstadt

Monitoring stock market booms and crashes

Abstract. Trading attitudes in stock market booms and crashes spread by individual interaction in time and space. To capture process instability properties a Markov field Markov chain (Guyon, 1995) is used where the individual trading attitudes interact according to an underlying random lattice structure which in turn is modelled as a Markov chain. Semi-perfect simulation methods are indicated, and by using these, algorithms for quick and accurate detection of an abrupt change in the trading attitude as a sign of a bubble or a crash are derived and evaluated. Finally, conclusions are made and some still open problems are mentioned.

Friday, 12.11. Morning, Seminarraum G10, MPI Mathematics in the Sciences, Inselstraße 22

09:15 – 10:00 Michael Fröhner, Cottbus

Numerical Methods for the Black-Scholes Model in one and two Assets

Abstract. Consider the Black-Scholes model of an American put contract and solve the free boundary value problem by FDM/FEM methods and explicit time discretization. Analyzing the market value data we can find the optimal exercise time. A practical realization in the case of two underlying assets will be given.

10:00 – 10:45 Sabine Pickenhain, Cottbus

Sufficiency Conditions for Infinite Horizon Optimal Control Problems

Abstract. In this talk we formulate and use duality in the sense of Klötzler for infinite horizon optimal control problems.

10:45 – 11:15 Coffee break

11:15 – 12:00 Karl-Johan Bäckström, Halmstadt

Lie-algebras from a purist point of view

12.00 – 12.45 Thorsten Schmidt, Leipzig

Modelling Credit Risk: an Overview

12:45 – 14:15 Lunch break (Rektorklausur, Mensa)

Friday afternoon, Sitzungszimmer of Mathematical Institute (Room 4.40)

14:15 – 14:45 Monika Popp, Leipzig

Importance Sampling in Credit Risk Models

14:45 – 15:15 Jochen Backhaus, Leipzig

Interacting Default Intensities and Pricing of Credit Derivatives

