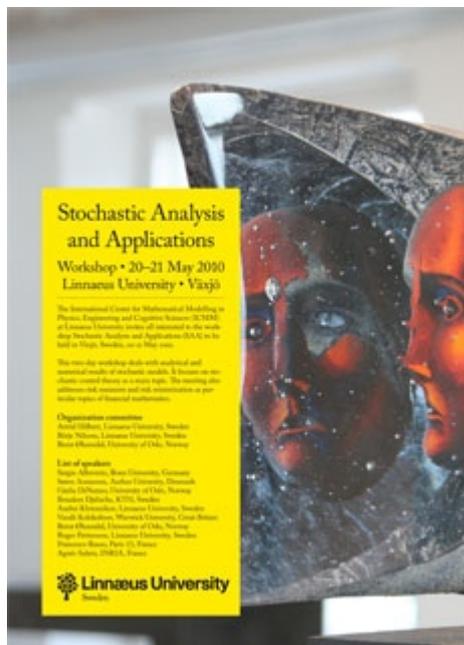# Stochastic Analysis and Applications

Welcome to the workshop Stochastic Analysis and Applications to be held in Växjö, Sweden, 20-21 May 2010.

The International Center for Mathematical Modelling in Physics, Engineering and Cognitive Sciences (ICMM) at Linnaeus University invites all interested to the workshop Stochastic Analysis and Applications (SAA) to be held in Växjö, Sweden, 20-21 May 2010.

This two-day workshop deals with analytical and numerical results of stochastic models. It focuses on stochastic control theory as a main topic. The meeting also addresses risk measures and risk minimization as particular topics of financial mathematics.

The official language for the conference is English, and all presentation material should be in English.

Learn more about the workshop by clicking the sub-menu links to the left.

The organizers

Astrid Hilbert
Börje Nilsson
Bernt Øksendal

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Programme

List of speakers

Sergio Albeverio, Bonn University, Germany
Søren Asmussen, Aarhus University, Denmark

Giulia DiNunno, University of Oslo, Norway
Boualem Djehiche, KTH, Sweden
Andrei Khrennikov, Linnaeus University, Sweden
Vassili Kolokoltsov, Warwick University, Great Britain
Bernt Øksendal, University of Oslo, Norway
Roger Pettersson, Linnaeus University, Sweden
Francesco Russo, Paris 13, France
Agnès Sulem, INRIA, France

List of participants

Sergio Albeverio, Bonn University, Germany
Haidar Al-Talibi, Linnaeus University, Sweden
S øren Asmussen, Aarhus University, Denmark
Giulia DiNunno, University of Oslo, Norway
Boualem Djehiche, KTH, Sweden
Astrid Hilbert, Linnaeus University, Sweden
Claes Jogréus, Blekinge Institute of Technology, Sweden
Andrei Khrennikov, Linnaeus University, Sweden
Vassili Kolokoltsov, Warwick University, Great Britain
Thorsten Lindström, Linnaeus University, Sweden
Bernt Øksendal, University of Oslo, Norway
Mikhael Nechaev, Halmstad University, Sweden
Börje Nilsson, Linnaeus University, Sweden
Peter Nyman, Linnaeus University, Sweden
Roger Pettersson, Linnaeus University, Sweden
Francesco Russo, Paris 13, France
Ulrika Sahlin, Linnaeus University, Sweden
Agnès Sulem, INRIA, France

Location

The workshop is held in room B1006 in the B building at Linnaeus University.

Programme, Thursday 20 May

	Lunch at Restaurant Rasken	
12.00-12.10	Welcome	
	Chairman: Søren Asmussen	
12.10-12.50	Agnès Sulem *INRIA Paris, France*	Singular stochastic control and optimal stopping with partial information of jump diffusions
13.00-13.40	Bernt Øksendal *Center of Mathematics for Applications (CMA), Norway*	Optimal control of stochastic delay equations and time-advanced backward stochastic differential equations
13.50-14.30	Coffee Break	

	Chairman: Bernt Øksendal	
14.30-15.10	Boualem Djehiche *KTH, Sweden*	Towards a general Stochastic Maximum Principle for SDEs of mean-field type
15.20-16.00	Giulia DiNunno *University of Oslo, Norway*	Time consistent linear and convex price systems in L_p
16.00-16.40	Coffee Break	
	Chairman: Sergio Albeverio	
16.40-17.20	Vassili Kolokoltsov *University of Warwick, Great Britain*	T.b.a.
17.30-18.00	Roger Pettersson *Linnaeus University, Sweden*	Malliavin approach for Monte Carlo computation of sensitivity measures with infinite activity asset prices
18.30	Dinner at Castle Teleborg	

Programme, Friday 21 May

	Chairman: Agnès Sulem	
9.00-9.40	Søren Asmussen *Aarhus University, Denmark*	T.b.a.
9.45-10.25	Francesco Russo *University Paris 13, France*	Hedging according to quadratic risk minimization in incomplete markets and applications. The case of additive processes.
10.25-11.00	Coffee Break	
	Chairman: Boualem Djehiche	
11.00-11.40	Sergio Albeverio *University of Bonn, Germany*	Stochastic Fitz Hugh Nagumo models, asymptotics of infinite dimensional processes on graphs
11.45-12.15	Andrei Khrennikov *Linnaeus University, Sweden*	Financial Heat Machine: on thermodynamical modeling of financial processes
12.20-14.00	Lunch at Restaurant Kristina	

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Abstracts

T.B.A.

Sergio Albeverio

Institut f. Angew. Mathematik Universität Bonn and HCM, BiBoS Universities of Bielefeld and Bonn, and CERFIM, Locarno, Switzerland

T.B.A.

Søren Asmussen

Department of Mathematical Sciences, Aarhus University, Denmark

T.B.A.

Giulia DiNunno

Department of Mathematics, University of Oslo, Norway

Towards a general stochastic maximum principle for SDEs of mean-field type

Boualem Djehiche

Department of Mathematics, KTH, Sweden

I will review some recent results on the Stochastic Maximum Principle for SDEs of mean-field type, for which the coefficients depend on the state of the solution process as well as of its expected value. Moreover, the cost functional is also of mean-field type. This makes the control problem time inconsistent in the sense that the Bellman optimality principle does not hold. For a general action space a Peng's-type stochastic maximum principle is derived, specifying the necessary conditions for optimality. This maximum principle differs from the classical one in the sense that here the first order adjoint equation turns out to be a linear mean-field backward SDE, while the second order adjoint equation remains the same as in Peng's stochastic maximum principle.

Financial heat machine: on thermodynamical modeling of financial processes

Andrei Khrennikov

DFM, Linnaeus University, Växjö-Kalmar, Sweden

We consider dynamics of financial markets as dynamics of expectations of its agents and discuss such a dynamics from the point of view of phenomenological thermodynamics. We describe a financial thermodynamic-like cycle and the financial analogue of a heat machine. We compare complexity of the financial cycles with complexity of analogous thermodynamic cycles. Our thermodynamiclike model of the financial market induces a rather unusual interpretation of the role of financial crises. In contrast to the common point of view, financial crises play a crucial role in functioning of the modern financial market. A financial cycle could not be completed without such a stage as well as any (physical) thermodynamic cycle. Thus, in spite of its destructive (at the first sight) consequences, the stage of financial crises is as well important as the stage of boiling of the "financial market". We also discuss a possible decision-making strategy for traders induced by our thermodynamic model. It is, in fact, a decision strategy at the market with an arbitrage possibility for a special group of traders.

T.B.A.

Vassili Kolokoltsov

Department of Statistics, Warwick University, Great Britain

Hedging according to quadratic risk minimazation in incomplete markets and applications. The case of additive processes.

Francesco Russo

INRIA Rocquencourt, Projet MathFi and Université Paris 13

For a large class of vanilla contingent claims, we establish explicit Föllmer-Schweizer decomposition when the underlying is a process with independent increments (PII) and an exponential of a PII process. This allows to provide an efficient algorithm for solving the mean variance hedging problem. Applications to models derived from the electricity market are performed.
This talk is based on a joint paper with Stéphane Goutte and Nadia Oudjane.

Malliavin approach for Monte Carlo computation of sensitivity measures with infinite activity asset prices

Roger Pettersson

DFM, Linnaeus University, Växjö-Kalmar, Sweden

In finance indicates sensitivity measures (Greeks) for option prices some of the risks with options. We consider the problem of Monte Carlo computation of sensitivity measures for option prices when the stock-price is an exponential Levy process with finite variation and in finite activity. We replace the small jumps by its mean and a Brownian motion as in Asmussen & Rosinski (2001). For European type options the derivation is taken with respect to jump sizes as in Bally, Bavouzet and Messaoud (2007).

Singular stochastic control and optimal stopping with partial information of jump diffusions

Agnès Sulem

INRIA, Paris, France

We study partial information, possibly non-Markovian, singular stochastic control of jump diffusions and obtain general stochastic maximum principles. Two different approaches are considered: (i) by using Malliavin calculus, leading to generalized variational inequalities (ii) by introducing a singular control version of the Hamiltonian and using backward stochastic differential equations (BSDEs). We show that the two methods are related, and we find a connection between them. The results are then used to find connections between singular stochastic control, reflected BSDEs and optimal stopping in the partial information case.
This talk is based on a joint paper with B. Ø ksendal.

Optimal control of stochastic delay equations and time-advanced backward stochastic differential equations

Bernt Øksendal

Center of Mathematics for Applications (CMA) Department of Mathematics, University of Oslo, Norway and The Norwegian School of Economics and Business Administration (NHH), Bergen, Norway

We consider the problem of controlling optimally a delay jump diffusion, i.e. a system described by a stochastic differential equation with delay, driven by Brownian motions and compensated Poisson random measures. Such delay systems may occur in several situations, e.g. in finance and biology where the growth of the state depends not only on the current value of the state but also on previous state values. We give both a sufficient and a necessary maximum principle for such control problems. These maximum principles involve backward stochastic differential equations (BSDEs) which are "anticipative", in the sense that they have a time-advanced drift coefficient. We prove existance and uniqueness theorems for such time-advanced BSDEs. The results are illustrated by examples.
This talk is based on a joint paper with Agnès Sulem and Tusheng Zhang.

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Travel and accomodation

Accomodation

Please observe that each participant has to book hotel accommodation by him-/herself.

Special rates have been negotiated with hotels for participants of the conference. You will receive a booking code for this after your registration.

Elite Park Hotel Konserthuset (formerly known as Quality Hotel Konserthuset)
Västra Esplanaden 10-14
Box 434, SE-351 06 Växjö, Sweden
Phone: +46 (0)470-70 22 00
Fax: +46 (0)470-475 77
E-mail: info.parkvaxjo@elite.se
Web: www.elite.se/eng/node/1336

Elite Stadshotellet Växjö
Kungsgatan 6
Box 198, SE-351 04 Växjö, Sweden
Phone: +46 (0)470-134 00
Fax: +46 (0)470-448 37
E-mail: info.vaxjo@elite.se
Web: www.elite.se/eng/node/717

Teleborgs Slott (Teleborg Castle)
SE-351 96 Växjö, Sweden
Phone: +46 (0)470-77 86 60
Fax: +46 (0)470-77 89 62

E-mail: info@teleborgsslott.com
Web: www.teleborgsslott.com (in Swedish)

Travelling to Växjö

How to get to Linnaeus University in Växjö

For connection to international flights, a taxi is recommended: Växjö Taxi, +46 (0)470-135 00, or Värends Taxi +46 (0)470-169 00. The taxi stand is situated at Resecentrum (the Travel centre, i e the train and bus station).

Travelling between central Växjö and Linnaeus University

There are three alternatives for travelling by bus between Resecentrum and the university:
• Route 7 (Centrum->Universitetet and Universitetet->Centrum) goes directly between Resecentrum and the university, and is thus recommended.
• Another alternative is to take bus no 1 (Centrum->Teleborg and Teleborg->Centrum) or 5 (Centrum->Lugnadal->Teleborg and Teleborg->Lugnadal->Centrum) to/from Teleborgs Centrum, which is located at 8–10 minutes walking distance from the university.

All bus routes are operated by Länstrafiken. Click here for bus time tables.

Click here for train table, Copenhagen airport to Växjö railway station. (Remark: copy "Köbenhavns Lufthavn/Kastrup" and "Växjö Station" and paste into in the fields From and To, respectively.)

Other useful information

Map of Linnaeus University in Växjö
Map of Växjö (in Swedish)
Växjö Tourist Office
Sweden's Museum of Glass
The Kingdom of Crystal
The weather forecast for Växjö (select "Växjö" in the drop down menu and click the arrow button)

Invitation for dinner

On the evening of 20 May, there will be an opportunity to participate in a traditional Swedish dinner.

Registration

In order to register for the workshop, please contact Astrid Hilbert at Linnaeus University by e-mail astrid.hilbert@lnu.se.