BRÅKET

Information om seminarier och högre undervisning i matematiska ämnen i Stockholmsområdet

NR 34 **FREDAGEN DEN 23 OKTOBER 2009**

BRÅKET

Veckobladet från Institutionen för matematik vid Kungl Tekniska Högskolan och Matematiska institutionen vid Stockholms universitet

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Sista manustid för nästa nummer:
Torsdagen den 29 oktober kl. 13.00.

Disputation i matematisk statistik

Jens Svensson skall disputera på avhandlingen *On Importance Sampling and Dependence Modeling* fredagen den 23 oktober kl. 13.00 i sal D2, KTH, Lindstedtsvägen 5, b.v. Se Bråket nr 32 sidan 6.

Kurs

Johan Håstad: Theoreticians Toolkit. Se sidan 8.

SEMINARIER

Fr 10–23 kl. 11.00. Optimization and Systems Theory Seminar. Professor Clyde F. Martin, Texas Tech University: *Control of Information: The Role of Information in New Markets.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 32 sidan 7.

Fr 10–23 kl. 15.15–16.15. Matematiska kollokviet i Uppsala. Reinhard Siegmund-Schultze, Universitetet i Agder, Norge: *Refugee mathematicians from Nazi-Germany: Recent findings with some emphasis on emigration to Scandinavia.* Häggsalen, Ångströmlaboratoriet, Uppsala universitet. Kaffe/te serveras utanför föreläsningssalen kl. 14.55. Se Bråket nr 33 sidan 7.

Må 10–26 kl. 10.00–11.00. Presentation av examensarbete i matematik (15 högskolepoäng, grundnivå). **Christian Helanow:** *Spherical harmonics: a theoretical and graphical study.* Handledare: **Andreas Axelsson.** Sal 21, hus 5, Matematiska institutionen, SU, Kräftriket. Se sidan 4.

On 10–28 kl. 9.00. Presentation av kandidatarbete i matematisk statistik. Gustaf Sporrong: *Conservative estimation of the reproducibility in calibration based on bilateral inter-laboratory comparisons.* Handledare: **Jan-Olov Persson.** Sal 31, hus 5, Matematiska institutionen, SU, Kräftriket. Se sidan 3.

Fortsättning på nästa sida.

Disputation i matematisk statistik

Daniel Andersson skall disputera på avhandlingen *Contributions to the Stochastic Maximum Principle* fredagen den 30 oktober kl. 13.00 i sal F3, KTH, Lindstedtsvägen 26, b.v. Se Bråket nr 33 sidan 4.

Money, jobs: Se sidan 8.

Seminarier (fortsättning)

On 10–28 kl. 10.15–12.00. Kombinatorikseminarium. Petter Brändén, KTH/SU: *Infinite log-concavity and zeros of polynomials.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 5.

On 10–28 kl. 11.00. Presentation av masterarbete i matematisk statistik. Lei Sun: *An analysis of the dynamics of a social network.* Handledare: **Åke Svensson.** Sal 31, hus 5, Matematiska institutionen, SU, Kräftriket. Se sidan 3.

On 10–28 kl. 13.15–14.15. Seminarium i analys och dynamiska system. Tomas Johnson, Uppsala: *Oscillatory motion for the universal area-preserving map associated with period doubling.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 5.

On 10–28 kl. 15.15. Seminarium i matematisk statistik. Dmitrii Silvestrov, SU: *Nonlinearly Perturbed Stochastic Processes.* Rum 306 (Cramérrummet), hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 4.

To 10–29 kl. 9.00. Seminarium i teoretisk datalogi. Gerardo Schneider, Chalmers tekniska högskola, Göteborg: *Evolving contracts.* MDI-torget, CSC, KTH. Se Bråket nr 33 sidan 6.

Observera att tiden och lokalen för Gerardo Schneiders seminarium har ändrats. I Bråket nr 33 anges fel tid och fel lokal för detta seminarium.

To 10–29 kl. 14.00–15.00. Institut Mittag-Leffler Seminar. Ralf Schindler, Universität Münster: *Woodin's axiom (*), bounded forcing axioms, and related issues. Part II.* (Continued from Thursday, October 1.) Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 6.

To 10–29 kl. 15.30–16.30. Institut Mittag-Leffler Seminar. Daisuke Ikegami, Universiteit van Amsterdam: *Blackwell determinacy.* Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 6.

Fr 10–30 kl. 13.15–14.15. Graduate Student Seminar. Fredrik Johansson (prel.): *Title to be announced.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

Må 11–02 kl. 15.15–16.00. Seminarium i finansiell matematik. Yuwei Zhao presenterar sitt examensarbete: *Numerical algorithms for a class of obstacle problems.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 6.

On 11–04 kl. 11.00–12.00. KTH/Nordita/SU Seminar in Theoretical Physics. *(Observera lokalen!)* **Göran Lindblad,** KTH: *Hidden Markov chains: models of quantum dynamics with memory.* Rum 122:026, AlbaNova universitetscentrum. Se sidan 5.

On 11–04 kl. 13.15–14.15. Seminarium i analys och dynamiska system. Henrik Shahgholian, KTH: *Obstacle type problems: An overview and some recent results.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 7.

On 11–04 kl. 16.00. KTH/SU Mathematics Colloquium. Professor Nils Dencker, Lunds universitet: *The spectral instability of differential operators.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Kaffe/te serveras kl. 15.30 i pausrummet, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 4. Se sidan 7.

Fortsättning på nästa sida.

Seminarier (fortsättning)

On 11−25 kl. 15.15. Seminarium i matematisk statistik. Dmitrii Silvestrov, SU: *Optimal Stopping and Convergence for American Type Options.* Rum 306 (Cramérrummet), hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 8.

PRESENTATIONER AV KANDIDATARBETE OCH MASTERARBETE I MATEMATISK STATISTIK

Onsdagen den 28 oktober kommer ett kandidatarbete och ett masterarbete i matematisk statistik att presenteras vid Matematiska institutionen, SU. Lokalen för båda presentationerna är sal 31, hus 5, Matematiska institutionen, SU, Kräftriket. De två rapporterna kommer inom kort att finnas på sidan http://www2.math.su.se/matstat/reports/.

Kl. 9.00 ges följande presentation (kandidatarbete):

Gustaf Sporrong:
Conservative estimation of the reproducibility in calibration based on bilateral inter-laboratory comparisons

Handledare: **Jan-Olov Persson.**

Abstract: The optical properties of a paper, such as reflectance, whiteness, brightness and opacity are of great importance to a paper maker. The ISO brightness is a measure of the radiance factor in the blue region. In a hierarchy of laboratories producing reference standards for the ISO brightness, it is of interest to find a measure of reproducibility between laboratories. This in order of giving a quality warranty statement to their customers. The objective in this thesis is to, through modelling, produce a statement in the form of an interval that incorporates the concepts of conservative and robust estimation. A conservative interval of measurement will be an interval that based on any one laboratory's measurement is of that length that it will contain a measurement from any other laboratory with a certain probability.

The methods of estimating the key components of that interval are robust. This for the purpose of keeping the conservative concept in the statement made. A model is chosen to represent the monthly bilateral comparisons between authorized laboratories during the year 2005. The results produced are the estimates of reproducibility, systematic error and a conservative interval of measurement.

Kl. 11.00 ges följande presentation (masterarbete):

Lei Sun:
An analysis of the dynamics of a social network

Handledare: **Åke Svensson.**

Abstract: The internet community pussokram.com can be considered as a social network, which developed in time. Data on times when contacts between members took or received are available. We will use two process models to study the dynamic properties of the network. A pure birth process model is used to describe the time between contacts. A probability model for the order, which new contacts are established, is also applied. In the analysis, ML-estimates and profile log-likelihood confidence intervals are calculated.

PRESENTATION AV EXAMENSARBETE I MATEMATIK

Christian Helanow:
Spherical harmonics: a theoretical and graphical study

Handledare: **Andreas Axelsson.**

Abstract: The topic of harmonic polynomials is briefly discussed to show that every polynomial on $\mathbb{R}^n$ can be decomposed into harmonic polynomials. Using this property it is proved that every function that is square integrable on the hypersphere can be represented by a series of spherical harmonics (harmonic polynomials restricted to the hypersphere), and that the series is converging with respect to the norm in this space. Explicit formulas for these functions and series are calculated for three-dimensional euclidean space and used for graphical illustrations. By applying stereographic projection, a way of graphically illustrating spherical harmonics in the plane and how a given function is approximated by a sum of spherical harmonics is presented.

Tid och plats: Måndagen den 26 oktober kl. 10.00 – 11.00 i sal 21, hus 5, Matematiska institutionen, SU, Kräftriket.

SEMINARIUM I MATEMATISK STATISTIK

Dmitrii Silvestrov:
Nonlinearly Perturbed Stochastic Processes

Abstract: The lecture presents methods of asymptotic analysis for nonlinearly perturbed stochastic processes and systems developed in the recent book, [1], written by the author in co-operation with Professor Mats Gyllenberg (University of Helsinki). New methods of asymptotic analysis for nonlinearly perturbed processes and systems developed in the book are based on the exponential asymptotic expansions for nonlinearly perturbed renewal equations. These methods are applied to nonlinearly perturbed regenerative processes, semi-Markov processes, and continuous time Markov chains with absorption. The asymptotic results include: mixed ergodic theorems (for the state of the process) and limit theorems (for the lifetimes) that describe transition phenomena; mixed ergodic and large deviation theorems that describe pseudo- and quasi-stationary phenomena; exponential expansions in mixed ergodic and large deviation theorems; theorems on convergence of quasi-stationary distributions; and asymptotic expansions for quasi-stationary distributions. Applications to the analysis of quasi-stationary phenomena in various models of nonlinearly perturbed stochastic systems considered in the book pertain to models of highly reliable queuing systems, M/G queuing systems with quick service, stochastic systems of birth-death type, including epidemic and population dynamics models, metapopulation dynamic models, and perturbed risk processes. The book contains an extended bibliography of works in the area. New directions for the research in the area are commented in the book and they will also be discussed in the lecture as well as some latest new results in the area.

Reference:

[1] Gyllenberg, M., Silvestrov, D. S., *Quasi-Stationary Phenomena in Nonlinearly Perturbed Stochastic Systems.* De Gruyter Expositions in Mathematics, 44, Walter de Gruyter, Berlin, 2008, XII + 579 pages.

Tid och plats: Onsdagen den 28 oktober kl. 15.15 i rum 306 (Cramérrummet), hus 6, Matematiska institutionen, SU, Kräftriket.

KOMBINATORIKSEMINARIUM

Petter Brändén:
Infinite log-concavity and zeros of polynomials

Abstract: During Björner's birthday conference Richard Stanley told me about a conjecture stating that if $\{a_k\}$ is a nonnegative sequence with the property that its generating function is a polynomial with only real zeros, then the same is true for the sequence $\{a_k^2 - a_{k-1}a_{k+1}\}$. At the time I could neither prove nor disprove it. A few months ago I played with the conjecture again and realized that the key to the solution is a strange symmetric function identity involving the Catalan numbers. The other ingredient is Grace's coincidence theorem. I will prove this conjecture due to Stanley, McNamara-Sagan and Fisk, respectively, and also discuss related topics such as infinite log-concavity and iterated Túran inequalities.

Tid och plats: Onsdagen den 28 oktober kl. 10.15 – 12.00 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

SEMINARIUM I ANALYS OCH DYNAMISKA SYSTEM

Tomas Johnson:
Oscillatory motion for the universal area-preserving map associated with period doubling

Abstract: The detection of oscillatory motion, i.e., orbits that approach infinity and then return to a bounded domain, is important for many applications, e.g., in celestial mechanics. During this talk I will describe how to use the area-preserving period doubling renormalization operator to construct oscillating orbits for the universal area-preserving map associated with period doubling. The construction uses two ingredients in an essential way: a computational shadowing technique called covering relations, and the invariance of the map under period doubling.

This is joint work with Denis Gaidashev (Uppsala).

Tid och plats: Onsdagen den 28 oktober kl. 13.15 – 14.15 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

KTH/NORDITA/SU SEMINAR IN THEORETICAL PHYSICS

Göran Lindblad:
Hidden Markov chains:
models of quantum dynamics with memory

Abstract: Most mathematical models used to describe relaxation processes in open quantum systems are of the Markov type: the evolution is defined by a semigroup of completely positive maps. Introducing models with more realistic dynamics, including memory effects, has proved difficult and controversial. In this talk I will describe a class of simple models where the non-Markovian properties can be clearly seen, e.g. in graphs of numerical simulations.

Tid och plats: Onsdagen den 4 november kl. 11.00 – 12.00 i rum 122:026, AlbaNova universitetscentrum.

INSTITUT MITTAG-LEFFLER SEMINAR

Ralf Schindler:
Woodin's axiom (*), bounded forcing axioms, and related issues. Part II

Abstract: The P-max extension of $L(R)$ does not satisfy BMM, and in fact under (*), BPFA is equivalent to BMM++. The forcing which verifies natural Π-2 statements under BMM + "NS is precipitous" is semi-proper if and only if all stationary set preserving forcings are semi-proper.

Tid och plats: Torsdagen den 29 oktober kl. 14.00 – 15.00 vid Institut Mittag-Leffler, Auravägen 17, Djursholm.

INSTITUT MITTAG-LEFFLER SEMINAR

Daisuke Ikegami:
Blackwell determinacy

Abstract: Blackwell games are infinite games with imperfect information, which originally come from game theory, while Gale-Stewart games are infinite games with perfect information. Blackwell determinacy was introduced as an extension of von Neumann's minimax theorem and has been investigated by several people in set theory and game theory, but much less than the determinacy of Gale-Stewart games.

In 1998, Martin proved that the Axiom of Determinacy (AD) implies the Axiom of Blackwell Determinacy (Bl-AD) and conjectured the converse, which is still not known to be true. In this talk, I will introduce Blackwell games and Blackwell determinacy, give some ideas of the proofs of the consequences of Bl-AD and the Axiom of Real Blackwell Determinacy (Bl-$\mathrm{AD_R}$), and discuss the problem how far one can be close to the Axiom of Real Determinacy ($\mathrm{AD_R}$) from Bl-$\mathrm{AD_R}$.

Tid och plats: Torsdagen den 29 oktober kl. 15.30 – 16.30 vid Institut Mittag-Leffler, Auravägen 17, Djursholm.

SEMINARIUM I FINANSIELL MATEMATIK

Yuwei Zhao

presenterar sitt examensarbete:

Numerical algorithms for a class of obstacle problems

Abstract: This thesis concerns the nonsmooth Newton method and its applications in solving obstacle problems. A detailed description of the nonsmooth Newton method and its corresponding convergence theorem is presented. We show that Howard's algorithm generates the same sequence as the nonsmooth Newton method does in solving obstacle problems. We also consider a nonsmooth Newton method based on the so-called Fischer-Burmeister (FB) function. The penalty approximations are used to solve obstacle problems with the nonsmooth Newton method. Obstacle problems that arise in financial mathematics background, such as pricing American options, pricing American warrants and portfolio selection problems, are taken as examples to examine the algorithms, and numerical tests are performed.

Tid och plats: Måndagen den 2 november kl. 15.15 – 16.00 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

SEMINARIUM I ANALYS OCH DYNAMISKA SYSTEM

Henrik Shahgholian:
Obstacle type problems: An overview and some recent results

Abstract: In this talk I will present recent developments of the obstacle type problems, with various applications ranging from: Industry to Finance, local to nonlocal operators, and one to multi-phases. The theory has evolved from a single equation

$$\Delta u = \chi_{u>0}, \quad u \geq 0$$

to embrace a more general (two-phase) form

$$\Delta u = \lambda_+ \chi_{u>0} - \lambda_- \chi_{u<0}$$

with $\lambda_\pm$ reasonably smooth functions (down to Dini continuous).

Astonishing results of Yuval Peres and his collaborators have shown remarkable relationships between obstacle problem and various forms of random walks, including Smash sum of Diaconis-Fulton (Lattice sets), and there is more to come.

The two-phase form (and its multi-phase form) has been under investigation in the last 10 years, and interesting recoveries have been made about the behaviour of the free boundaries in such problems. Existing methods have so far only allowed us to consider $\lambda_\pm > 0$.

The above problem changes drastically if one allows $\lambda_\pm$ to have the incorrect sign (that appears in the composite membrane problem)! In part of my talk I will focus on the simple *unstable* case

$$\Delta u = -\chi_{u>0}$$

and present very recent results (Andersson, Shahgholian, Weiss) that classify the set of singular points ($\{u = \nabla u = 0\}$) for the above problem. The techniques developed recently by our team also show an unorthodox approach to such problems, as the classical technique fails.

At the end of my talk I will explain the technique in a heuristic way.

Tid och plats: Onsdagen den 4 november kl. 13.15 – 14.15 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

KTH/SU MATHEMATICS COLLOQUIUM

Nils Dencker:
The spectral instability of differential operators

Abstract: The spectral instability of non-normal operators is a phenomenon which has recently attracted increasing interest in applications. It gives an obstruction to the accurate computation of eigenvalues of large non-normal matrices and has applications in a wide field, from random matrix theory, the stability of flows to things as mundane as brake squeal. In this talk, we shall review the spectral instability of semiclassical differential operators.

Tid och plats: Onsdagen den 4 november kl. 16.00 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Kaffe/te serveras kl. 15.30 i pausrummet, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 4.

COURSE IN COMPUTER SCIENCE

Johan Håstad: Theoreticians Toolkit

The theoretician in mind should be interested in theoretical computer science in the form of efficient algorithms.

I will cover some algorithms and combinatorial constructions that I find useful and some simply because I like them.

The lectures will be given in English. A closer presentation of the course can be found at http://www.nada.kth.se/~johanh/verktyg09/info.html. Follow the link "overview" for a list of topics.

Course requirements will be a combination of homeworks and student lectures.

The material of the course will be some new lecture notes, some lectures notes for the course given in 2005, and some material from the web.

We meet for a first lecture and the planning of the course at 13.15 on Monday, November 2, in room 1537, level 5, at Lindstedtsvägen 3.

Anybody interested is of course welcome.

Johan Håstad

SEMINARIUM I MATEMATISK STATISTIK

Dmitrii Silvestrov:
Optimal Stopping and Convergence for American Type Options

Abstract: The lecture presents a survey of the latest results on optimal option pricing for modulated price processes achieved by the author and his collaborators. These results are: discovery of multi-threshold structure of optimal stopping strategies for American option models with general convex payoffs and formulation of conditions, which implicate multi- and one-threshold structures for optimal stopping strategies; introduction and investigation of new models of multivariate price processes modulated by semi-Markov market indices; obtaining of skeleton approximations, uniform with respect to a perturbation parameter, for continuous- and discrete-time option pricing models; finding of new effective general conditions for convergence of optimal expected reward functionals for American type options for multivariate price processes modulated by semi-Markov market indices; constructing new Monte Carlo algorithms for pricing of options based on information about structure of optimal stopping domains and effective binomial-trinomial approximation algorithms for evaluation of optimal reward functionals for American type options for exponential multivariate diffusion price processes. The latest achievements are connected with stochastic models for reselling of options and optimal option pricing for mean-reverse models used to describe stochastic dynamics of energy prices. New directions for further research studies in the area will also be discussed.

Tid och plats: Onsdagen den 25 november kl. 15.15 i rum 306 (Cramérrummet), hus 6, Matematiska institutionen, SU, Kräftriket.

MONEY, JOBS

Se punkterna 1 – 10 och 12 – 13 på sidan 8 i Bråket nr 33.
