BRÅKET

Information om seminarier och högre undervisning i matematiska ämnen i Stockholmsområdet

NR 38 **FREDAGEN DEN 26 NOVEMBER 2004**

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 2 december kl. 13.00.

Disputation i matematisk statistik

Fredrik Armerin disputerar vid KTH på avhandlingen *Aspects of Cash Flow Valuation* fredagen den 10 december kl. 10.00. Se sidan 3.

Göran Gustafsson Lectures in Mathematics

Dessa kommer att äga rum under maj 2005. Se sidan 4.

SEMINARIER

Må 11–29 kl. 13.15 – 14.15. DNA-seminariet Uppsala-KTH (Dynamics, Number theory, and Analysis). Thomas Guhr, Matematisk fysik, LTH, Lunds universitet: *Random Matrices in physics and supersymmetric methods.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 37 sidan 6.

Må 11–29 kl. 14.15 – 15.00. Seminarium i numerisk analys. Jesper Oppelstrup, Nada, KTH: *Title to be announced.* Rum 4523, Nada, KTH, Lindstedtsvägen 5, plan 5.

Observera att Jesper Oppelstrups seminarium har flyttats till den 29 november. I Bråket nr 37 anges fel dag för seminariet.

Må 11–29 kl. 14.45 – 15.45. DNA-seminariet Uppsala-KTH (Dynamics, Number theory, and Analysis). *(Observera lokalen!)* **Kurt Johansson,** Matematik, KTH: *Determinantal processes and number variance saturation.* Sal E36, KTH, Lindstedtsvägen 3, entréplanet. Se Bråket nr 37 sidan 6.

Må 11–29 kl. 16.15 – 17.00. Seminarium i finansiell matematik. *(Observera tiden!)* **Simon Oljans** presenterar sitt examensarbete: *A Liability Matching Approach Involving Structured Products — An analysis of a model which could be used by a financial advisor when estimating a client's pension liabilities.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 37 sidan 5.

Ti 11–30 kl. 10.15. Plurikomplexa seminariet. Bo Berndtsson, Göteborg: *Subharmonicity properties of the Bergman kernel and other functions associated to pseudoconvex domains.* Rum 306, hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 3.

Fortsättning på nästa sida.

Seminarier (fortsättning)

Ti 11–30 kl. 13.15. Plurikomplexa seminariet. Jan-Erik Björk, SU: *Residues on complex manifolds.* Rum 306, hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 4.

Ti 11–30 kl. 14.00–15.00. Mittag-Leffler Seminar. Michele Pagano, University of Pisa: *Efficient estimation of Gaussian overflow probabilities.* Institut Mittag-Leffler, Auravägen 17, Djursholm.

Ti 11–30 kl. 14.00–16.00. Kollokvium i filosofi. *(Observera lokalen!)* **Fred Feldman,** University of Massachusetts: *Moore's open question argument.* Rum D207, Filosofiska institutionen, SU.

Ti 11–30 kl. 14.00–16.00. Seminar in Statistical Genetics and Bioinformatics. Professor Jens Lagergren, Stockholm Bioinformatics Center, SU och KTH: *Probabilistic analysis of gene families from multiple species.* Rum 306 (Cramérrummet), hus 6, Matematiska institutionen, SU, Kräftriket. Se Bråket nr 37 sidan 4.

Ti 11–30 kl. 15.30–16.30. Mittag-Leffler Seminar. Olle Häggström, Chalmers tekniska högskola, Göteborg: *An introduction to correlation inequalities for discrete systems.* Institut Mittag-Leffler, Auravägen 17, Djursholm.

On 12–01 kl. 13.00. Seminarium i statistik. Mathias Villani: *Bayesiansk statistik II.* (Fortsättning från seminariet den 17 november.) Sal B705, Statistiska institutionen, SU, Universitetsvägen 10B, plan 7, Frescati.

On 12–01 kl. 13.15–15.00. Logikseminariet Stockholm-Uppsala. Gunnar Berg: *Var intuitionismen revolutionär?* Sal MIC 3513, Matematiska institutionen, Polacksbacken, Uppsala universitet. Se sidan 5.

On 12–01 kl. 13.15–15.00. Algebraseminarium. Sandra Di Rocco: *Toric varieties with positive dual defect.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 6.

On 12–01 kl. 15.15–16.15. Kollokvium. Pär Kurlberg: *Number theory related to quantum chaos.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 7.

On 12–01 kl. 15.15. Seminarium i matematisk statistik. Professor Ørnulf Borgan, Universitetet i Oslo: *Using martingale residuals to assess goodness-of-fit for nested case-control studies.* Rum 306 (Cramérrummet), hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 5.

To 12–02 kl. 13.00–14.00. Presentation av examensarbete i matematik. Sven F. Berglund: *Fast computation of attenuated Radon transform.* Sal 37, hus 5, Matematiska institutionen, SU, Kräftriket. Se sidan 7.

To 12–02 kl. 14.00–15.00. Mittag-Leffler Seminar. Ilze Ziedins, University of Auckland: *Multicasting and phase transitions in tree loss networks.* Institut Mittag-Leffler, Auravägen 17, Djursholm.

Fr 12–03 kl. 15.00. Licentiatseminarium i matematik. Joakim Arnlind presenterar sin licentiatavhandling: *Eigenvalue Dynamics and Membrane Solutions.* Opponent: **Professor Martin Bordemann.** Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 5.

Fortsättning på nästa sida.

Seminarier (fortsättning)

Ti 12–07 kl. 10.15. Mathematical Physics Seminar. Professor Evgeny Akhmedov, ICTP Trieste: *Neutrino tomography of the Earth.* Seminarierummet, Roslagstullsbacken 11, AlbaNova universitetscentrum.

Ti 12–07 kl. 14.00–16.00. Seminar in Statistical Genetics and Bioinformatics. Dr Patrik Rydén, Institutionen för klinisk mikrobiologi, Umeå universitet: *Microarray data analysis: A statistical challenge or a nightmare.* Rum 306 (Cramérrummet), hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 6.

On 12–08 kl. 13.00. Seminarium i statistik: *Eleverna från sannolikhetsteorikursen presenterar Buffons nålproblem.* Sal B705, Statistiska institutionen, SU, Universitetsvägen 10B, plan 7, Frescati.

To 12–09 kl. 13.15. Mathematical Physics Seminar. Professor Evgeny Akhmedov, ICTP Trieste: *Three-flavour effects in neutrino oscillations.* Seminarierummet, Roslagstullsbacken 11, AlbaNova universitetscentrum.

PLURIKOMPLEXA SEMINARIET

Bo Berndtsson:
Subharmonicity properties of the Bergman kernel and other functions associated to pseudoconvex domains

Abstract: Let D be a pseudoconvex domain in $\mathbb{C}^{n+k}$ and D_t its n-dimensional "disks" obtained by freezing the variable t in $\mathbb{C}^k$. Let f be a plurisubharmonic function in D, and f_t its restriction to D_t. Finally, let $K_t(z,z)$ denote the Bergman kernel for D_t with weight e^{-f_t}.

Theorem: $K_t(z,z)$ is plurisubharmonic in D.

I will discuss the proof of the theorem together with some variants and applications.

Tid och plats: Tisdagen den 30 november kl. 10.15 i rum 306, hus 6, Matematiska institutionen, SU, Kräftriket.

DISPUTATION I MATEMATISK STATISTIK

Fredrik Armerin

disputerar på avhandlingen

Aspects of Cash Flow Valuation

fredagen den 10 december kl. 10.00 i sal E1, KTH, Lindstedtsvägen 3, b.v.. Till fakultetsopponent har utsetts *professor Bjarne Astrup Jensen,* Copenhagen Business School.

Abstract of the thesis

This thesis consists of five papers. In the first two papers we consider a general approach to cash flow valuation, focusing on dynamic properties of the value of a stream of cash flows. The third paper discusses immunization theory, where old results are shown to hold in general deterministic models, but often fail to be true in stochastic models. In the fourth paper we comment on the connection between arbitrage opportunities and an immunized position. Finally, in the last paper we study coherent and convex measures of risk applied to portfolio optimization and insurance.

PLURIKOMPLEXA SEMINARIET

Jan-Erik Björk:
Residues on complex manifolds

Abstract: This talk is devoted to the construction of residue currents using various meromorphic continuations. For example, let $f_1, \dots, f_p$ be a p-tuple of holomorphic functions on some n-dimensional complex manifold X which form a complete intersection. We prove that the (n,p)-current valued function

$$\Gamma(\lambda_1, \dots, \lambda_p) = \bigwedge_{\nu=1}^{p} \bar\partial(f_\nu^{-1}|f|^{\lambda_\nu})$$

is holomorphic in a half-space $\cap\, \mathrm{Re}(\lambda - \nu) > -q$ for some positive rational number q. The constant term at the origin yields the Coleff-Herrera residue current $\mathcal{R}(f_\bullet) = \bigwedge_{\nu=1}^{p} \bar\partial(f_\nu^{-1})$. We also prove that equality holds between $\mathcal{R}(f_\bullet)$ and the current defined by the Bochner-Martinelli kernel of the p-tuple $f_\bullet$. Using some $\mathcal{D}$-module theory we also prove that if V is a pure dimensional analytic set of some codimension p, then the regular holonomic right $\mathcal{D}_X$-module $\mathcal{H}^p_{[V]}(\omega_X)$ is isomorphic to the sheaf $\mathbf{CH}_V$ whose sections are (n,p)-currents τ satisfying

$$\bar I_V \cdot \tau = \bar\partial(\tau) = 0 \text{ and } \tau = \tau_{\mathrm{stand}}$$

where the last equality means that $\tau = \mathrm{Lim}_{\delta \to 0}\{|h| > \delta\} \cdot \tau$ for every $h \in \mathcal{O}(X)$ such that $V \setminus h^{-1}(0)$ is dense in V.

Tid och plats: Tisdagen den 30 november kl. 13.15 i rum 306, hus 6, Matematiska institutionen, SU, Kräftriket.

Göran Gustafsson Lectures in Mathematics

The Göran Gustafsson Foundation has generously decided to support a new lecture series named after its founder. The first speaker is *Peter Sarnak* of New York University and Princeton University. He will first give a lecture aimed at a general mathematical audience:

Lecture 1: *Zeta functions and random matrix theory*

on Friday, May 20, 2005. This lecture will be followed by two lectures:

Lecture 2: *Quantum chaos and spectra of locally symmetric spaces I*
Lecture 3: *Quantum chaos and spectra of locally symmetric spaces II*

on Monday, May 23, and Tuesday, May 24.

The intention is that the Gustafsson Lectures should return annually and cover all areas of mathematics.

We have formed a committee at the Department of Mathematics at KTH consisting of Michael Benedicks, Carel Faber, Anders Forsgren and Kurt Johansson to pursue this aim. The members of the committee now asks you for *suggestions of names for lecturers for 2006 and on.* We hope that the Gustafsson Lectures will be an exciting annual event for the mathematical community at KTH and in Stockholm and perhaps even in Sweden as a whole and in the Nordic countries.

For the committee

Michael Benedicks

LOGIKSEMINARIET STOCKHOLM-UPPSALA

Gunnar Berg:
Var intuitionismen revolutionär?

Sammanfattning: Man har länge diskuterat om och i vilken utsträckning Thomas Kuhns tankar kring "Scientific Revolutions" går att tillämpa på matematiken. Jag skall tala om detta med utgångspunkt i en artikel av Bruce Pourciau med titeln "Intuitionism as a (Failed) Revolution in Mathematics".

Tid och plats: Onsdagen den 1 december kl. 13.15 – 15.00 i sal MIC 3513, Matematiska institutionen, Polacksbacken, Uppsala universitet.

SEMINARIUM I MATEMATISK STATISTIK

Ørnulf Borgan:
Using martingale residuals to assess goodness-of-fit for nested case-control studies

Abstract: Cox regression and other relative risk regression models are much used to assess the influence of exposure variables and other covariates on mortality or morbidity. Estimation in these models requires ascertainment of covariate values for all individuals in a cohort, even when only a small fraction of these get diseased or die ("fail"). This may be very costly, or even logistically impossible, in large epidemiological studies. Nested case-control studies, where covariate information is collected for all failing individuals ("cases"), but only for a sample of the non-failing ones ("controls") then offer useful alternatives. In the talk I will review how it is convenient to formulate nested case-control studies in a counting process framework, and I will show how this formulation readily provides us with martingale residual processes that can be used to assess the model fit for nested case-control data.

Tid och plats: Onsdagen den 1 december kl. 15.15 i rum 306 (Cramérrummet), hus 6, Matematiska institutionen, SU, Kräftriket.

LICENTIATSEMINARIUM I MATEMATIK

Joakim Arnlind

presenterar sin licentiatavhandling:

Eigenvalue Dynamics and Membrane Solutions

Opponent: **Professor Martin Bordemann**

Abstract: By finding $N(N-1)/2$ suitable conserved quantities, the time-evolution of real symmetric $N \times N$ matrices $X(t)$ satisfying $\ddot{X} = 0$, with arbitrary initial conditions, is reduced to non-linear equations involving only the eigenvalues of X.

Matrix equations arising from a reduction of discrete membrane equations are discussed and new solutions are presented. Some $N \to \infty$ limits of these solutions are related to minimal surfaces in spheres, and to 3-manifolds with vanishing mean curvature in Minkowski space(s).

Tid och plats: Fredagen den 3 december kl. 15.00 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

ALGEBRASEMINARIUM

Sandra Di Rocco:
Toric varieties with positive dual defect

Abstract: Let X be an algebraic variety embedded in projective space. The dual variety X^* parametrizes the hyperplanes tangent to X at some smooth point. Generally it is very difficult to characterize X^* for a given X, even when the variety is assumed to be non-singular and defined over the field of complex numbers. A simple dimension count shows that X^* is expected to be a hypersurface in the dual projective space. If the dimension is lower than the variety, it is said to have positive dual defect. We will present a classification of non-singular complex toric embeddings with positive dual defect. There is a one-to-one correspondence between toric embeddings and convex integral polytopes. The non-singular toric embeddings with positive dual defect correspond to a class of polytopes that we call defect polytopes. The geometrical understanding of toric embeddings with positive dual defect is very helpful in describing defect polytopes. In particular we can show that they are characterized by the vanishing of a combinatorial invariant and completely describe their combinatorial structure.

In the first part of the seminar the necessary background on toric varieties and projective duality will be explained.

Tid och plats: Onsdagen den 1 december kl. 13.15 – 15.00 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

SEMINAR IN STATISTICAL GENETICS AND BIOINFORMATICS

Patrik Rydén:
Microarray data analysis: A statistical challenge or a nightmare

Abstract: DNA microarray technologies, such as cDNA array and oligonucleotide array, have the potential to revolutionize biological research. The technologies permit simultaneous detection of mRNA expression levels for every gene in an organism. One of the most common applications of the technology is to compare two treatments, for example infected and uninfected cells. The goal is to identify genes that are differentially expressed in the samples of interest. A microarray experiment involves a large number of complex procedures, for example RNA preparation, hybridization, and scanning. As a result the raw measurements are generally influenced by systematic experimental variation. In addition, the technology is cost and labour expensive, allowing the scientist to use only a limited number (often < 10) of arrays in an experiment. At the end of the day the scientist wishes to test around 20 000 hypotheses, one for each gene, using noisy and biased measurements from less than 10 arrays, in order to identify the differentially expressed genes. Clearly the analysis of microarray data offers challenging statistical problems. Over the last couple of years hundreds of algorithms have been suggested in order to improve the analysis of DNA microarray data. I will give an overview of the DNA microarray technology and some of the suggested analysis methods. Throughout the presentation data from spiked arrays (i.e. arrays with artificial clones with known expression levels) will be used to illustrate the performance of the discussed methods.

Tid och plats: Tisdagen den 7 december kl. 14.00 – 16.00 i rum 306 (Cramérrummet), hus 6, Matematiska institutionen, SU, Kräftriket.

KOLLOKVIUM

Pär Kurlberg:
Number theory related to quantum chaos

Abstract: Quantum chaos is concerned with how chaos in classical systems manifests itself quantum mechanically, e.g., in terms of the behaviour of eigenvalues and eigenfunctions of "quantized Hamiltonians". For instance, can classical chaos be detected by looking at the spacings between eigenvalues? Another problem is whether classical ergodicity forces eigenfunctions to be equidistributed in a certain sense. We will give a short introduction to quantized Hamiltonians, and then show that the study of the above-mentioned questions for some simple dynamical systems gives rise to interesting problems in number theory.

Tid och plats: Onsdagen den 1 december kl. 15.15 – 16.15 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

PRESENTATION AV EXAMENSARBETE I MATEMATIK

Sven F. Berglund:
Fast computation of attenuated Radon transform

Abstract: The subject of this thesis is an algorithm for fast computation of a large set of line integrals, primarily in two-dimensional space. The algorithm in question is previously known and is here documented, analysed and extended.

The Radon transform of a function with domain $\mathbb{R}^2$ is given by the function integrated on straight one-dimensional lines of all locations and orientations. Given discrete data sampled from a function with compact support, this algorithm can approximate the Radon transform with an, under reasonable conditions, arbitrary accuracy.

The algorithm has been extended to computation of attenuated line integrals, i.e. with the integrand weighted by a function belonging to a certain class. The attenuated Radon transform arises as a model in tomography, where fast computation has applications in numerical inversion methods.

Furthermore, the algorithm has been generalized to arbitrary dimensions. In more than two dimensions it can be regarded as a discrete approximation of the X-ray transform (since the Radon transform in n-dimensional space integrates a function on $(n-1)$-dimensional hyperplanes whereas this algorithm, like the X-ray transform, sticks with integration along one-dimensional lines).

Coordinates and parametrizations are given so that the algorithm can be defined as a composition of discrete operators. In this context an alteration of the algorithm enables computation of the adjoint operator as well.

Tid och plats: Torsdagen den 2 december kl. 13.00 – 14.00 i sal 37, hus 5, Matematiska institutionen, SU, Kräftriket.
