



# BRÅKET



*Information om seminarier och högre undervisning  
i matematiska ämnen i Stockholmsområdet*

NR 28

FREDAGEN DEN 14 SEPTEMBER 2007

## BRÅKET

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

Redaktör: Gunnar Karlsson

Telefon: 08-790 84 79

Adress för e-post:

gunnarkn@math.kth.se

Bråket på Internet: <http://www.math.kth.se/braaket.html> eller  
<http://www.math.kth.se/braket/>

Postadress:

Red. för Bråket

Institutionen för matematik

KTH

100 44 Stockholm

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Sista manustid för nästa nummer:  
Torsdagen den 20 september  
kl. 13.00.

### Disputation i teoretisk fysik

Åsa Ericsson disputerar på avhandlingen *Exploring the Set of Quantum States* måndagen den 17 september kl. 13.00 i sal FB42, Roslagstullsbacken 21, AlbaNova universitetscentrum. Se Bråket nr 26 sidan 6.

Money, jobs: Se sidorna 13–14.

## SEMINARIER

Fr 09–14 kl. 11.00–12.00. Optimization and Systems Theory Seminar. Luca Schenato, University of Padova, Italy: *Some results on optimal estimation and control for lossy networked control*. Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 26 sidan 5.

Fortsättning på nästa sida.

### Disputation i numerisk analys

Erik von Schwerin disputerar på avhandlingen *Adaptivity for Stochastic and Partial Differential Equations with Applications to Phase Transformations* måndagen den 17 september kl. 13.00 i sal F3, KTH, Lindstedtsvägen 26, b.v. Se Bråket nr 27 sidorna 6–7.

### Disputation i matematik

Patrik Hellgren disputerar på avhandlingen *G-structures and Families of Isotropic Submanifolds in Complex Contact Manifolds* tisdagen den 18 september kl. 13.00 i sal 14, hus 5, Matematiska institutionen, SU, Kräftriket. Se Bråket nr 27 sidan 8.

### Disputation i matematisk statistik

Anders Björkström disputerar vid SU på avhandlingen *Regression methods in multidimensional prediction and estimation* fredagen den 28 september kl. 13.00. Se sidan 12.

### PDE meeting

Detta äger rum tisdagen den 18 september vid Institutionen för matematik, KTH. Se sidan 5.

### Presentation av Wallenbergprojektet

Denna äger rum vid KTH den 19 september. Se sidan 10.

### Seminarier (fortsättning)

- Fr 09–14 kl. 13.15–14.15. Graduate Student Seminar. Teitur Arnarson**, Matematik, KTH: *Free boundary regularity close to initial state and applications to finance*. Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 27 sidan 4.
- Må 09–17 kl. 15.15. Seminar in Digital Geometry. Shiva Samieinia**, Stockholm: *Chord properties of digital straight line segments*. Centre of Image Analysis, Building 2, Polacksbacken, Uppsala universitet. Se sidan 4.
- Ti 09–18 kl. 10.15. Plurikomplexa seminariet. Thomas Ernst**, Uppsala: *q-complex numbers, a natural consequence of umbral calculus*. Rum 306, hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 6.
- Ti 09–18 kl. 14.00–15.00. Mittag-Leffler Seminar. Sergey Lototsky**, University of Southern California, USA: *Stochastic integration with respect to Gaussian processes and fields*. Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 4.
- Ti 09–18 kl. 15.15. Seminar at Electrical Engineering. ACCESS Distinguished Lecture Series. Professor Andrew Odlyzko**, University of Minnesota: *Internet economics, Internet evolution, and misleading networking myths*. Sal E2, KTH, Lindstedtsvägen 3, b.v. Se sidan 7.
- On 09–19 kl. 9.00. Presentation av examensarbete i matematisk statistik. Kristoffer Lundberg**: *The Lithuanian Social Insurance Model*. Rum 306 (Cramérrummet), hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 8.
- On 09–19 kl. 10.00. Presentation av examensarbete i matematisk statistik. Helen Teclu**: *Hur bra överensstämmer Lee-Carter med verkligheten?* Rum 306 (Cramérrummet), hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 8.
- On 09–19 kl. 10.15–12.00. Kombinatorikseminarium. Alexander Berglund**, SU: *Golodness of Stanley-Reisner rings*. Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 6.
- On 09–19 kl. 10.30. Logikseminariet Stockholm-Uppsala. Richard Garner**: *2-dimensional models of type theory*. Sal 11167, Ångströmlaboratoriet, Uppsala universitet. Se sidan 5.
- On 09–19 kl. 11.00. Presentation av examensarbete i matematisk statistik. Mikael Johansson**: *En prognosmodell för ärendeflöde vid Rättsmedicinalverket*. Rum 306 (Cramérrummet), hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 9.
- On 09–19 kl. 13.00–14.45. Algebra and Geometry Seminar. Torsten Ekedahl**: *On the motivic class of an algebraic stack*. Rum 306, hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 4.
- On 09–19 kl. 13.15–14.15. Seminarium i analys och dynamiska system. Richard Miles**, KTH: *Algebraic dynamical systems*. Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 27 sidan 9.
- To 09–20 kl. 14.00–15.00. Mittag-Leffler Seminar. Martin Hairer**, University of Warwick, UK: *Ergodic theory for a class of non-Markovian processes*. Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 6.

**Fortsättning på nästa sida.**

### Seminarier (fortsättning)

- To 09–20 kl. 15.30–16.30. Mittag-Leffler Seminar.** Chris Burdzy, University of Washington, Seattle, USA: *Pathwise uniqueness for reflected Brownian motion*. Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 8.
- Fr 09–21 kl. 11.00–12.00. Optimization and Systems Theory Seminar.** Hisaya Fujioka, Department of Applied Analysis and Complex Dynamical Systems, Kyoto University, Japan: *Stability analysis for a class of networked/embedded control systems: continuous- and discrete-time approaches*. Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 27 sidan 6.
- Fr 09–21 kl. 13.15–14.15. Graduate Student Seminar.** Björn Winckler, Matematik, KTH: *Introduction to renormalization*. Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 7.
- Ti 09–25 kl. 10.15. Licentiatseminarium i matematik.** Shiva Samieinia presenterar sin licentiatavhandling: *Digital straight line segments and curves*. Opponent: Damien Jamet, Nancy. Examinator: Hans Rullgård. Rum 306, hus 6, Matematiska institutionen, SU, Kräftriket. Se sidorna 11–12.
- Ti 09–25 kl. 13.15. Plurikomplexa seminariet.** Damien Jamet, Nancy: *On the number of balanced words of given length and height over a two-letter alphabet*. Rum 306, hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 13.
- Ti 09–25 kl. 14.15. Seminarium i numerisk analys.** Daniel Appelö, Lawrence Livermore National Laboratory: *A general formulation of perfectly matched layers for mixed hyperbolic-parabolic systems and its application to simulations of viscous compressible flows*. Rum 4523, KTH CSC, Lindstedtsvägen 5, plan 5. Se sidan 11.
- On 09–26 kl. 13.15–14.15. Seminarium i analys och dynamiska system.** Nicolae Ciurdea, KTH: *Title to be announced*. Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.
- On 09–26 kl. 14.30–15.30. KCSE Seminar.** Erik Lindahl, Stockholm Bioinformatics Center: *Thermodynamical properties of biological molecules through loosely coupled or distributed simulations: protein folding and insertion in biomembranes*. PDC:s seminarierum, KTH, Teknikringen 14, plan 3. Se sidan 10.
- KCSE = KTH Computational Science and Engineering Centre.*
- On 09–26 kl. 15.00. Seminarium i matematisk statistik.** Thore Egeland, Department of Medical Genetics, University of Oslo: *On identification problems requiring linked autosomal markers*. Rum 306 (Cramérrummet), hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 9.
- To 09–27 kl. 15.15. Seminarium i matematisk statistik.** (*Observera dagen, tiden och lokalen!*) Professor Philip J. Brown, University of Kent: *Bayesian modelling and feature selection of proteomic functional data*. Sal 31, hus 5, Matematiska institutionen, SU, Kräftriket. Se sidan 13.
- Professor Brown är opponert vid Anders Björkströms disputation. Se sidan 12.*
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## SEMINAR IN DIGITAL GEOMETRY

**Shiva Samieinia:**

### **Chord properties of digital straight line segments**

*Abstract:* We treat digital straight line segments in two different cases, in the 8-connected plane and in the Khalimsky plane. We investigate them using a new classification, dividing them into a union of horizontal and diagonal segments. Then we study necessary and sufficient conditions for straightness in both cases, using vertical distances for certain points. We also establish necessary and sufficient conditions in the 8-connected plane as well as in the Khalimsky plane by transforming their chain codes. Using this technique we can transform Khalimsky lines to the 8-connected case.

*Tid och plats:* Måndagen den 17 september kl. 15.15 i Centre of Image Analysis, Building 2, Polacksbacken, Uppsala universitet.

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## MITTAG-LEFFLER SEMINAR

**Sergey Lototsky:**

### **Stochastic integration with respect to Gaussian processes and fields**

*Abstract:* While stochastic integral with respect to a standard Brownian motion is a well-studied object, integration with respect to other Gaussian processes is currently an area of active research, and the fractional Brownian motion is receiving most of the attention. The objective of this talk is to define and investigate stochastic integrals with respect to arbitrary Gaussian processes and fields using chaos expansion. Examples of the corresponding stochastic differential equations will also be discussed.

*Tid och plats:* Tisdagen den 18 september kl. 14.00–15.00 vid Institut Mittag-Leffler, Auravägen 17, Djursholm.

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## ALGEBRA AND GEOMETRY SEMINAR

**Torsten Ekedahl:**

### **On the motivic class of an algebraic stack**

*Abstract:* Point counting over finite fields has been a powerful method for obtaining information on algebraic varieties. When the result is particularly simple it is natural to ask if there is a geometric reason for this and surprisingly often this is the case. This can usually be formalized by considering the so-called scissors congruence group of algebraic varieties. In many situations, however, the point counting is performed with a variety which is the quotient of an algebraic variety by an algebraic group, and this makes it seemingly more difficult to give geometric reasons for point counting arguments.

The right setup for dealing with this problem is that of algebraic stacks. I shall introduce a scissors congruence group for algebraic stacks, investigate its relation to the scissors congruence group of algebraic varieties and perform some sample computations. Finally I will discuss a somewhat curious question that arises naturally: What is the class in this scissors congruence group of the class of the classifying space of a finite group?

*Tid och plats:* Onsdagen den 19 september kl. 13.00–14.45 i rum 306, hus 6, Matematiska institutionen, SU, Kräftriket.

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## PDE MEETING

The meeting will take place at the Department of Mathematics, KTH, on Tuesday, September 18, 2007, in seminar room 3721, Lindstedtsvägen 25, floor 7.

### *Schedule*

- 9.30–10.20 **Erik Lindgren:** *Some partial regularity of the free boundary for the  $p$ -obstacle problem when  $p \approx 2$ .*  
*Abstract:* Through a careful limiting process as  $p \rightarrow 2$  we obtain some partial regularity results for the free boundary for the  $p$ -obstacle problem when  $p$  is close to 2.
- 10.20–10.30 Coffee.
- 10.30–11.20 **Catherine Bandle:** *Optimization problems for weighted Sobolev constants.*  
*Abstract:* We look at Sobolev constants with weights and ask for the domains of given mass which yield the smallest constants. We shall discuss the existence and the regularity of the optimal domains in the simplest cases. The main goal is to derive Rayleigh-Faber-Krahn type inequalities which play an important role in pde's, e.g. a priori bounds, estimates for the heat kernel, . . . . Several open problems will be formulated.
- 11.20–13.00 Lunch.
- 13.00–13.50 **Norman Dancer:** *Finite Morse index solutions of partial differential equations.*  
*Abstract:* We give a definition of a finite Morse index solution of some nonlinear partial differential equations and show that these ideas can be used to answer or partially answer some old questions on problems with small diffusion and problems on large solutions for some nonlinear boundary value problems. We also mention a number of open problems.
- 13.50–14.00 Coffee.
- 14.00–14.50 **Björn Gustafsson:** *Hele-Shaw flow on Riemannian manifolds.*  
*Abstract:* I will set up the equations for Hele-Shaw flow (Laplacian growth) on a Riemannian manifold. Locally the theory is much the same as in the Euclidean setting, but globally new topological questions arise. I will discuss some known results, e.g. by Etingof-Varchenko on surfaces of revolution in  $R^3$  and by Hedenmalm-Shimorin on hyperbolic surfaces.

## LOGIKSEMINARIET STOCKHOLM-UPPSALA

**Richard Garner:**

### **2-dimensional models of type theory**

*Abstract:* Between the intensional and extensional models of type theory there lie a range of other models which, though slightly idiosyncratic from a logical perspective, are very natural from the point of view of their categorical models.

We examine the simplest such intermediate model — whose determining property is that every identity type has an extensional equality — and explore the corresponding categorical structure, which turns out to be a 2-dimensional analogue of the notion of locally cartesian closed category.

*Tid och plats:* Onsdagen den 19 september kl. 10.30 i sal 11167, Ångströmlaboratoriet, Uppsala universitet.

## PLURIKOMPLEXA SEMINARIET

**Thomas Ernst:**

### ***q*-complex numbers, a natural consequence of umbral calculus**

*Abstract:* We first present the  $q$ -umbral calculus of the author, which consists of two dual  $q$ -additions in the infinite alphabet  $A$  of letters or umbrae. The Nalli-Ward-AlSalam  $q$ -addition (NWA) is a commutative monoid. The Carlitz-Gould operator can be described by the Jackson-Hahn-Cigler (JHC)  $q$ -addition. Then we define two different extensions of  $\mathbb{C}$ ,  $\mathbb{C}_{\oplus_q}$  and  $\mathbb{C}_{\oplus_q}^*$ . If  $f(z) \in \mathbb{C}[[z]]$ ,  $z \in \mathbb{C}_{\oplus_q}$  we define the complex  $q$ -derivative. The so-called  $q$ -holomorphic functions are  $\mathbb{C}[[z]]$ . The  $q$ -Cauchy-Riemann equations and the corresponding Laplace equation for  $q$ -harmonic functions are found. There are at least two meromorphic continuations to the umbrae defined by the two dual  $q$ -additions; extension to  $n$  variables is also possible.

*Tid och plats:* Tisdagen den 18 september kl. 10.15 i rum 306, hus 6, Matematiska institutionen, SU, Kräftriket.

## KOMBINATORIKSEMINARIUM

**Alexander Berglund:**

### **Golodness of Stanley-Reisner rings**

*Abstract:* Golodness of a Stanley-Reisner ring  $k[\Delta]$  over a field  $k$  has not yet been fully characterized in terms of the combinatorics of the simplicial complex  $\Delta$ . It has been proved by Herzog, Reiner and Welker that if the Alexander dual  $\Delta^\vee$  is sequentially Cohen-Macaulay over  $k$  then  $k[\Delta]$  is Golod, but the converse is false.

In this talk, we will introduce a combinatorial condition on a simplicial complex, called the *strong gcd-condition*, that implies Golodness of the associated Stanley-Reisner ring. The condition is reminiscent of shellability, and in fact one can show that if  $\Delta^\vee$  is (non-pure) shellable, then  $\Delta$  satisfies the strong gcd-condition. For flag complexes, the strong gcd-condition turns out to be equivalent to Golodness.

This is joint work with Michael Jöllenbeck.

*Tid och plats:* Onsdagen den 19 september kl. 10.15–12.00 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

## MITTAG-LEFFLER SEMINAR

**Martin Hairer:**

### **Ergodic theory for a class of non-Markovian processes**

*Abstract:* We consider evolution equations driven by noise that is not white in time, so that the resulting process does not have the Markov property. We show that there is an analogue in this setting to the well-known Doob-Khasminskii ergodicity criterion, provided that the driving noise satisfies a certain “quasi-Markov” property. This can be verified in many cases, including for example SDE’s driving by fractional Brownian motion, which exhibit long-range memory.

*Tid och plats:* Torsdagen den 20 september kl. 14.00–15.00 vid Institut Mittag-Leffler, Auravägen 17, Djursholm.

**SEMINAR AT ELECTRICAL ENGINEERING.  
ACCESS DISTINGUISHED LECTURE SERIES**

**Andrew Odlyzko:**

**Internet economics, Internet evolution,  
and misleading networking myths**

*Abstract:* The evolution of the Internet will depend heavily on the interaction between what users want and what technology can deliver, and economics will play a major role. Unfortunately the networking community continues to be guided by a collection of misleading dogmas that impede proper direction of research, development, and deployment. The roles of voice communication, of content, and of streaming real-time transmission versus file transfers are widely misunderstood, which leads to plans that are likely to be seriously flawed.

*Biography of Andrew Odlyzko:* Andrew Odlyzko is Director of the interdisciplinary Digital Technology Center, holds an ADC Professorship, and is a Professor in the School of Mathematics at the University of Minnesota. Prior to assuming that position in 2001, he devoted 26 years to research and research management at Bell Telephone Laboratories, AT&T Bell Labs, and AT&T Labs, as that organization evolved and changed its name.

He has written over 150 technical papers in computational complexity, cryptography, number theory, combinatorics, coding theory, analysis, probability theory, and related fields, and has three patents. He has an honorary doctorate from Université Marne la Vallée and serves on editorial boards of over 20 technical journals, as well as on several advisory and supervisory bodies.

He has managed projects in diverse areas, such as security, formal verification methods, parallel and distributed computation, and auction technology. In recent years he has also been working on electronic publishing, electronic commerce, and economics of data networks.

*Tid och plats:* Tisdagen den 18 september kl. 15.15 i sal E2, KTH, Lindstedtsvägen 3, b.v.

**GRADUATE STUDENT SEMINAR**

**Björn Winckler:**

**Introduction to renormalization**

*Abstract:* Consider the following experiment. You have access to a narrow tap where you can exert fine control over the flow of water by turning a knob. Start with no flow and gradually turn the knob to increase the flow of water. Initially, the tap will be dripping water at a certain frequency. At first the frequency will not change as the knob is turned, until suddenly the frequency will double. This sudden period-doubling will occur a couple of times until finally the water flows continuously. The above phenomenon is an example of the ‘onset of chaos’ in a dynamical system. It occurs in seemingly unrelated systems, but they all exhibit a certain universality. In this talk I will explain what I mean by ‘universality’ and how it can be explained by studying a so-called renormalization operator on a space of interval maps. During the course of the presentation I will give a brief introduction to the various aspects of dynamical systems theory that will be needed in order to understand this operator.

*Tid och plats:* Fredagen den 21 september kl. 13.15–14.15 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

## MITTAG-LEFFLER SEMINAR

**Chris Burdzy:**

### **Pathwise uniqueness for reflected Brownian motion**

*Abstract:* I will start by discussing a specific problem about reflected Brownian motion — whether the SDE defining it has a unique strong solution. If time permits, I will address a more general problem of how a pair of reflected Brownian motions driven by the same noise behave relative to each other.

*Tid och plats:* Torsdagen den 20 september kl. 15.30–16.30 vid Institut Mittag-Leffler, Auravägen 17, Djursholm.

## PRESENTATIONER AV EXAMENSARBETEN I MATEMATISK STATISTIK

Onsdagen den 19 september kommer tre examensarbeten i matematisk statistik att presenteras vid Matematiska institutionen, SU. Lokalen för alla presentationerna är rum 306 (Cramérrummet), hus 6, Matematiska institutionen, SU, Kräftriket.

De tre examensarbetena kommer inom kort att finnas på sidan <http://www.math.su.se/matstat/reports/serieb>.

**Kristoffer Lundberg:**

### **The Lithuanian Social Insurance Model**

*Abstract:* This Masters assignment presents the Lithuanian Social Insurance budget model, used by the Ministry of Social Security and Labour in the Republic of Lithuania for policy evaluation and to test different medium and long term assumptions. The model is deterministic, and combines actual data with assumptions, scenarios, about the future. This paper evaluates the introduction of the funded second pillar under the baseline assumptions set by the European Commission and analyses the consequences of this reform in this setting.

*Tid:* Onsdagen den 19 september kl. 9.00.

**Helen Teclu:**

### **Hur bra överensstämmer Lee-Carter med verkligheten?**

*Sammanfattning:* Under större delen av 1900-talet har man i Sverige utjämnat dödligheten med Makehamsfunktionen. I praktiken brukar den observerade dödligheten ges i form av den ettåriga dödlighetssannolikheten  $q_x$ , medan man vid användande av Makehamsfunktioner utjämnar dödlighetsintensiteten  $\mu_x$  i stället,  $x$  representerar olika åldrar. Men nu har man använt en ny metod för att skatta dödligheten, den så kallade Lee-Carter-modellen.

Med hjälp av Lee-Carter-modellen med poisson-fördelade dödsfall har man prognostiserat den svenska befolkningens dödlighet fram till 2050. Dödlighetsestimeringen bygger på extrapolation, d.v.s. man tar hänsyn till historiska data för att kunna prediktera kommande dödlighet. Syftet med det här examensarbetet är att skaffa en uppfattning om felen i prognoser av framtida dödlighet. Fördenskull har vi studerat historiska data med Lee-Carter-modellen och sedan jämfört detta med det verkliga utfallet.

Slutsatsen av denna studie är att ju längre periods prognos man gör över dödligheten, desto mer ökar osäkerheten. Som max bör man göra 20 års prognos med Lee-Carter-modellen. 10 års prognos ger bästa prognosen.

*Tid:* Onsdagen den 19 september kl. 10.00.

(Fortsättning på nästa sida.)



**Mikael Johansson:**

**En prognosmodell för ärendeflöde vid Rättsmedicinalverket**

*Sammanfattning:* Ett av Rättsmedicinalverkets uppgifter är att på domstols begäran undersöka om personer som begått brott led av en allvarlig psykisk störning vid tiden för brottet eller ej. Finner utredningsenheten att personen är allvarligt psykiskt störd (enligt lagstiftningens-brottsbalkens krav), så kan personen inte dömas till fängelse. Det finns två typer av undersökningar för att utreda om psykisk sjukdom föreligger eller ej. En mindre §7-undersökning där man bestämmer behovet för en större rättspsykiatrisk undersökning (RPU). RPU är resurskrävande både vad gäller inläggningsplatser och behovet av personal. Detta har lett till att den rättspsykiatriska enheten behöver prognostisera behovet av RPU, upp till två månader framåt i tiden. I detta arbete kommer en sådan modell att utformas så att framtida RPU kan förutses. Modellen bygger dels på beräkningar som gjorts på ett utsnitt av RMVs stora databas, dels aktuell information om den senaste tidens §7-undersökningar.

*Tid:* Onsdagen den 19 september kl. 11.00.

**SEMINARIUM I MATEMATISK STATISTIK**

**Thore Egeland:**

**On identification problems requiring linked autosomal markers**

*Abstract:* This talk addresses identification problems based on DNA. The emphasis will be on mathematical and statistical aspects, but some historical comments will be made, and there will be a brief review of the fundamental early contributions from the Swede Erik Essen-Möller and his paper from 1938.

The topics are general, but are exemplified in a simple context: There is DNA available from two persons. There is uncertainty about the relationship between the two individuals, and a number of hypotheses describing the possible relationship are available. The task is to determine the most likely pedigree. This problem is fairly standard. However, there are some problems that cannot be solved using DNA from independently segregating loci. For example, the likelihoods for (i) grandparent-grandchild, (ii) uncle-niece and (iii) half-sibs coincide for such DNA data and so these relations cannot be distinguished on the basis of markers normally used for forensic identification problems. Generally, the mentioned problems can be solved using linked autosomal markers. To study the problem in detail and understand how the recombination fraction bears on the problem, we derive explicit formulae when only independent pairs of linked markers are involved. While this approach adds to the understanding, it is shown to be insufficient to obtain satisfactory results. More generally calculations are done based on the Lander-Green algorithm. Simulation experiments are presented based on a range of scenarios, and we conclude that useful result can be obtained using available freeware (MERLIN and R).

The main message of this talk is that linked autosomal markers deserve greater attention in forensic genetics and that statistical analyses can be performed based on existing technology.

*Tid och plats:* Onsdagen den 26 september kl. 15.00 i rum 306 (Cramérummet), hus 6, Matematiska institutionen, SU, Kräftriket.

### Presentation av Wallenbergprojektet

Institutionen för matematik, avdelningen för matematik, KTH, har fått ett stort anslag från Knut och Alice Wallenbergs Stiftelse. Detta är avsett att stödja vår forskning och forskarutbildning.

Ledningsgruppen vill informera om projektet och presentera det för institutionens medlemmar. I första hand gäller detta avdelningen för matematik, men alla intresserade är välkomna.

Presentationen äger rum på eftermiddagen onsdagen den 19 september i sal F3, KTH, Lindstedtsvägen 26, b.v.

#### *Program*

- 14.30 – 14.40 Introduktion.
- 14.40 – 15.20 Presentation av postdocs.
- 15.20 – 15.35 Algebra och Geometri.
- 15.35 – 15.50 Dynamiska System och Talteori.  
Paus.
- 16.00 – 16.15 Harmonisk Analys.
- 16.15 – 16.30 Kombinatorik.
- 16.30 – 16.45 PDE.
- 16.45 – 17.00 Spektralteori.
- 17.00 – . . . . Fest med buffé i institutionens pausrum.

Alla hälsas hjärtligt välkomna!

För ledningsgruppen  
Anders Björner

### KCSE SEMINAR

**Erik Lindahl:**

**Thermodynamical properties of biological molecules  
through loosely coupled or distributed simulations:  
protein folding and insertion in biomembranes**

*Abstract:* High performance computing applications have increased tremendously the last decade or two, and it is now quite possible to simulate many processes that were completely impossible only a few years ago. Yet, many of the most important practical problems occur on scales of length and time that are several orders of magnitude beyond this, particularly in biochemistry/biology.

I will present some of the approaches we have used to overcome these limitations, and which have enabled us not only to simulate and model events that previously were considered “impossible”, but also doing it with standard hardware instead of supercomputers. This will be illustrated with examples from our recent work on folding of small globular proteins in water as well as understanding the entire process of how amino acids are inserted into bilayers to form membrane proteins, but many of the underlying modelling ideas are universally applicable.

*Tid och plats:* Onsdagen den 26 september kl. 14.30 – 15.30 i PDC:s seminarierum, KTH, Teknikringen 14, plan 3.

## SEMINARIUM I NUMERISK ANALYS

Daniel Appelö:

### A general formulation of perfectly matched layers for mixed hyperbolic-parabolic systems and its application to simulations of viscous compressible flows

*Abstract:* This seminar will start with a review of the development of Perfectly Matched Layers (PML's) for hyperbolic systems. Starting with Berenger's, by now classic, paper on PML's for Maxwell's equations, we will point out some results in the literature which have been important for the development of PML's for other hyperbolic systems. The focus of our discussion will be on the stability and wellposedness of general linear hyperbolic Cauchy problems, on domains truncated by a PML, but we will also make some remarks on the stability of the PML truncation of wave-guide problems in elasticity. For these later problems, a new type of instability has been observed (see Adams et al. in Wave Motion).

In the second part of the seminar we will present some new results on the development of a PML model for mixed hyperbolic-parabolic systems. The new model is a straightforward extension of our (Hagstrom, Kreiss & A) general model for hyperbolic systems. By explicitly constructing solutions of a related transmission problem, we prove that the new model is perfectly matched. The importance of the perfect matching property will be clearly illustrated by numerical experiments performed for two linear applications: an advection-diffusion equation and the linearized Navier-Stokes equations. We end by presenting the non-linear version of our PML and its application to the compressible Navier-Stokes equations; numerical experiments for this application will also be presented.

*Tid och plats:* Tisdagen den 25 september kl. 14.15 i seminarierum 4523, KTH CSC, Lindstedtsvägen 5, plan 5.

## LICENTIATSEMINARIUM I MATEMATIK

Shiva Samieinia

presenterar sin licentiatavhandling:

### Digital straight line segments and curves

*Opponent:* **Damien Jamet**, Nancy.

*Examinator:* **Hans Rullgård**.

*Abstract:* The thesis consists of two papers:

#### Paper A. Chord properties of digital straight line segments

This paper treats digital straight line segments in two different cases, in the 8-connected plane and in the Khalimsky plane. We investigate them using a new classification, dividing them into a union of horizontal and diagonal segments. Then we study necessary and sufficient conditions for straightness in both cases, using vertical distances for certain points. We also establish necessary and sufficient conditions in the 8-connected plane as well as in the Khalimsky plane by transforming their chain codes. Using this technique we can transform Khalimsky lines to the 8-connected case.

(Continued on the next page.)

**Paper B. The number of Khalimsky-continuous functions on intervals**

This paper deals with Khalimsky-continuous functions. We consider these functions when they have two, three or four points in their codomain. In the case of two points in the codomain, we see a new example of the classical Fibonacci sequence. In the study of functions with three and four points in their codomain, we find some new sequences, the asymptotic behaviour of which we investigate. Finally, we consider Khalimsky-continuous functions with one fixed endpoint. In this case, we get a sequence which has the same recursion relation as the Pell numbers but different initial values. We also obtain a new example of the Delannoy numbers.

*Tid och plats:* Tisdagen den 25 september kl. 10.15 i rum 306, hus 6, Matematiska institutionen, SU, Kräftriket.

**DISPUTATION I MATEMATISK STATISTIK**

**Anders Björkström**

disputerar på avhandlingen

**Regression methods in multidimensional prediction and estimation**

fredagen den 28 september 2007 kl. 13.00 i sal 14, hus 5, Matematiska institutionen, SU, Kräftriket. Till opponent har utsetts *professor Philip J. Brown*, Institute of Mathematics and Statistics, University of Kent, United Kingdom.

***Abstract of the thesis***

In regression with near collinear explanatory variables, the least squares predictor has large variance. Ordinary least squares regression (OLSR) often leads to unrealistic regression coefficients. Several regularized regression methods have been proposed as alternatives. Well-known are principal components regression (PCR), ridge regression (RR), and continuum regression (CR). The latter two involve a continuous metaparameter, offering additional flexibility.

For a univariate response variable, CR incorporates OLSR, PLSR, and PCR as special cases, for special values of the metaparameter. CR is also closely related to RR. However, CR can in fact yield regressors that vary discontinuously with the metaparameter. Thus, the relation between CR and RR is not always one-to-one. We develop a new class of regression methods, LSRR, essentially the same as CR, but without discontinuities, and prove that any optimization principle will yield a regressor proportional to a RR, provided only that the principle implies maximizing some function of the regressor's sample correlation coefficient and its sample variance. For a multivariate response vector we demonstrate that a number of well-established regression methods are related, in that they are special cases of basically one general procedure. We try a more general method based on this procedure, with two meta-parameters. In a simulation study we compare this method to ridge regression, multivariate PLSR and repeated univariate PLSR. For most types of data studied, all methods do approximately equally well. There are cases where RR and LSRR yield larger errors than the other methods, and we conclude that one-factor methods are not adequate for situations where more than one latent variable are needed to describe the data. Among those based on latent variables, none of the methods tried is superior to the others in any obvious way.

## SEMINARIUM I MATEMATISK STATISTIK

**Philip J. Brown:**

### **Bayesian modelling and feature selection of proteomic functional data**

*Abstract:* We describe the use of Bayesian hierarchical modelling of functional data arising from mass spectroscopy used in proteomics. The data contain both experimental factors and covariates but a desire is to provide interpretation and to discriminate between two or more groups. The functional modelling uses wavelets to accommodate the spikey behaviour. We also look at Bayesian forms of prior distribution which facilitate feature selection in the spirit of the lasso.

*Tid och plats:* Torsdagen den 27 september kl. 15.15 i sal 31, hus 5, Matematiska institutionen, SU, Kräftriket.

## PLURIKOMPLEXA SEMINARIET

**Damien Jamet:**

### **On the number of balanced words of given length and height over a two-letter alphabet**

*Abstract:* We exhibit a recurrence on the number of discrete line segments joining two integer points using an encoding as balanced words of given length and height over the two-letter alphabet  $\{0, 1\}$ . As a particular case, we focus on the symmetrical discrete segments which are encoded by balanced palindromes and provide generating functions in this case. We end by studying the asymptotical behaviour of the previous recurrences.

*Tid och plats:* Tisdagen den 25 september kl. 13.15 i rum 306, hus 6, Matematiska institutionen, SU, Kräftriket.

## MONEY, JOBS

*Columnist:* Johannes Lundqvist, Department of Mathematics, SU. E-mail: johannes@math.su.se.

Info = information. This will be given and repeated until obsolete. Rely on other sources as well.

BBKTH = Bulletin Board at the Department of Mathematics, KTH.

BBSU = Bulletin Board at the Department of Mathematics, SU.

The following information, with links, is also available at <http://www.math.su.se/~johannes/mj.html.en>.

Unless stated otherwise, a given date is the last date (e.g. for applications), and the year is 2007. A number without an explanation is a telephone number.

### **Standard information channels**

1. A channel to information from Vetenskapsrådet: <http://www.vr.se/naturteknik/index.asp>.
2. A channel to information from the European Mathematical Society: <http://www.emis.de>.
3. A channel to information from the American Mathematical Society: <http://www.ams.org>.
4. KTH site for information on funds: <http://www.kth.se/aktuellt/stipendier>.
5. Stockholm University site for information on funds: <http://www2.su.se/forskning/stipendier/databas.php3>.
6. Umeå site for information on funds: [http://www.umu.se/umu/aktuellt/stipendier\\_fond\\_anslag.html](http://www.umu.se/umu/aktuellt/stipendier_fond_anslag.html).
7. Job announcement site: <http://www.maths.lth.se/nordic/Euro-Math-Job.html>. This is run by the European Mathematical Society.
8. Stiftelsen för internationalisering av högre utbildning och forskning (STINT) site for information on funds: <http://www.stint.se>.

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9. Nordisk Forskerutdanningsakademi (NorFA) site for information on funds: <http://www.norfa.no>.
10. Svenska institutet (SI) site for information on funds: <http://www.si.se>.

### **New information**

#### *Jobs to apply for*

11. Lunds universitet söker en biträdande universitetslektor i matematisk statistik med inriktning mot Monte Carlo-metoder för inferens i stokastiska processer. Sista ansökningsdag är den 17 september. Web-info: <http://www3.lu.se/info/lediga/admin/document/PA%202007-2228.pdf>.
  12. Lunds Tekniska Högskola söker en universitetslektor i matematik med inriktning mot tillämpad matematik. Sista ansökningsdag är den 17 september. Web-info: <http://www3.lu.se/info/lediga/admin/document/PA%202007-3051.pdf>.
  13. Lunds Tekniska Högskola söker en eller två universitetslektorer i matematik. Sista ansökningsdag är den 17 september. Web-info: <http://www.lth.se/omlth/ledigatjanster/?aid=463&type=98>.
  14. Lunds universitet söker en universitetsadjunkt i matematik. Sista ansökningsdag är den 19 september. Web-info: <http://www3.lu.se/info/lediga/admin/document/PA%202007-2378.pdf>.
  15. Uppsala universitet söker två doktorander i matematisk biologi. Sista ansökningsdag är den 28 september. Web-info: <http://www.personalavd.uu.se/ledigaplatser/2030dorand.html>.
  16. Högskolan i Kalmar söker en universitetslektor/-adjunkt i matematik med inriktning mot matematikens didaktik. Sista ansökningsdag är den 8 oktober. Web-info: [http://www.hik.se/jobs/cgi-bin/Free\\_Jobs.exe](http://www.hik.se/jobs/cgi-bin/Free_Jobs.exe).
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