BRÅKET

Information om seminarier och högre undervisning i matematiska ämnen i Stockholmsområdet

NR 38 **FREDAGEN DEN 28 NOVEMBER 2003**

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 4 december kl. 13.00.

Disputation i matematisk statistik

Maria Deijfen disputerar vid SU på avhandlingen *Stochastic models for spatial growth and competition* fredagen den 19 december kl. 13.15. Se sidan 6.

SEMINARIER

Må 12–01 kl. 10.15. Seminarium i numerisk analys. *(Observera dagen, tiden och lokalen!)* **Dr Peter Cotton,** Morgan Stanley, New York: *Trading correlation.* Sal E2, KTH, Lindstedtsvägen 3, b.v. Se sidan 3.

Må 12–01 kl. 14.15. Seminarium i teoretisk datalogi. Lars Engebretsen: *More efficient queries in PCP's for NP and improved approximation hardness of maximum CSP (joint work with Jonas Holmerin).* Rum 1537, Nada, KTH, Lindstedtsvägen 3, plan 5. Se Bråket nr 37 sidan 3.

Ti 12–02 kl. 10.15. Plurikomplexa seminariet. Christer Kiselman och **Ola Weistrand:** *Subharmonic functions on discrete structures.* Sal 2215, Matematiska institutionen, Polacksbacken, Uppsala universitet. Se sidan 3.

Ti 12–02 kl. 13.15. Plurikomplexa seminariet. August Tsikh: *Amoebas and multidimensional linear difference equations.* Sal 2215, Matematiska institutionen, Polacksbacken, Uppsala universitet. Se sidan 3.

Ti 12–02 kl. 14.00–15.00. Mittag-Leffler Seminar. Ken Brown, Glasgow: *Symplectic reflection algebras — the basics.* Institut Mittag-Leffler, Auravägen 17, Djursholm.

On 12–03 kl. 10.30. Logikseminariet Stockholm-Uppsala. Olof Lindroth: *A random formula lower bound for ordered-DLL extended with local symmetries. Part 2.* Sal 2215, Matematiska institutionen, Polacksbacken, Uppsala universitet.

On 12–03 kl. 13.00. Seminarium i statistik. Michael Carlson, Statistiska institutionen SU: *Röjanderisker vid användning av mikrodata — en tillämpning från RFV.* Sal B705, Statistiska institutionen, SU, Universitetsvägen 10B, plan 7, Frescati.

Fortsättning på nästa sida.

Seminarier (fortsättning)

On 12–03 kl. 13.15 – 14.15. Seminarium i analys och dynamiska system. Professor Gaven Martin, Auckland, New Zealand: *The identification of the two generator arithmetic lattices of hyperbolic 3-space.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 4.

On 12–03 kl. 13.15 – 15.00. Algebra- och geometriseminarium. Nathalie Wahl: *Title to be announced.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

On 12–03 kl. 16.00 – 17.00. Stockholms matematiska kollokvium. Professor Gaven Martin, Auckland, New Zealand: *Title to be announced.* Lokal meddelas senare på http://www.math.kth.se/~haakanh/Analysseminariet.html.

Fr 12–05 kl. 12.00 – 13.00. GRU-seminarium i matematik: *Nästa års bemanning.* Sammanträdesrum 3424 (innanför pausrummet), Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 4. Se nedan.

Må 12–08 kl. 13.15 – 14.15. Seminar in Analysis and its Applications. Fariba Bahrami, Tarbiat Modares University in Teheran: *Existence of steady vortex flows over a seamount.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 4.

Må 12–08 kl. 14.15 – 15.00. Seminarium i numerisk analys. *(Observera dagen och lokalen!)* **Fred G. Gustavson,** IBM T. J. Watson Research Center, Yorktown Heights, USA: *New generalized data structures for matrices lead to a variety of high performance algorithms.* Rum D4329 (seminarierummet på Medialab), Nada, KTH. Se sidorna 4 – 5.

On 12–10 kl. 13.00. Seminarium i statistik. Margareta Puu, Umeå universitet: *Design av experiment med multinominalt respons.* Sal B705, Statistiska institutionen, SU, Universitetsvägen 10B, plan 7, Frescati.

On 12–10 kl. 13.15 – 14.15. Seminarium i analys och dynamiska system. Professor Tadeusz Iwaniec, Syracuse University: *What is new for the Beltrami equation?* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

Ti 12–16 kl. 11.00 – 12.00. Docentföreläsning i matematik. Dmitry Kozlov: *Ämnen i topologisk kombinatorik.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 5.

GRU-SEMINARIUM I MATEMATIK

Nästa års bemanning

Sammanfattning: Det är dags att börja tänka på bemanningen för nästa läsår. Vem skall undervisa på vilka kurser? Har ni några önskemål? Och hur tycker ni allmänt att bemanningen skall gå till? På höstens sista GRU-seminarium diskuterar vi frågor relaterade till detta. Alla undervisande lärare och doktorander vid institutionen är välkomna. Den som anmäler sig till Lars Filipsson, e-post lfn@math.kth.se, senast dagen före seminariet får en lunchsmörgås.

Tid och plats: Fredagen den 5 december kl. 12.00 – 13.00 i sammanträdesrum 3424 (innanför pausrummet), Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 4.

SEMINARIUM I NUMERISK ANALYS

Peter Cotton: Trading correlation

Abstract: Explosion in correlation markets. Baskets, indexes, tranched indexes, credit default options (CDO), asset backed baskets. Demonstration of three ways of looking at correlation: Intensity models, copula models, structural models. Trading correlation. What is implied correlation?

The invited lecture is part of the course "2D4282 Hedging your portfolio", organized in collaboration with the Summer University of Southern Stockholm and the Swedish Net-university (more information is given at http://www.lifelong-learners.com/opt/nu/).

Tid och plats: Måndagen den 1 december kl. 10.15 i sal E2, KTH, Lindstedtsvägen 3, b.v.

PLURIKOMPLEXA SEMINARIET

Christer Kiselman och **Ola Weistrand:**
Subharmonic functions on discrete structures

Abstract: This subject has come up in work on the shape description problem: to describe in tractable terms the shape of a three-dimensional object. A step in the description is to define spherical coordinates on an object which is homeomorphic to a sphere. One is then led to solving the Laplace equation on a graph. The solution turns out to have near-constant values in certain regions, and it is desirable to widen these (to dissolve the clusters). We shall discuss the possibilities to do so. It is natural first to sketch a general theory of (pluri)(sub)-harmonic functions on graphs, directed graphs, and, more generally, on discrete structures. Simple and less simple examples where clusters appear will be presented.

Tid och plats: Tisdagen den 2 december kl. 10.15 i sal 2215, Matematiska institutionen, Polacksbacken, Uppsala universitet.

PLURIKOMPLEXA SEMINARIET

August Tsikh:
Amoebas and multidimensional linear difference equations

Abstract: In the univariate theory of linear difference equations, the fundamental Poincaré theorem claims that if all characteristic roots $\lambda_1, \dots, \lambda_m$ of a limited homogeneous difference equation have different modules, then for any solution $f(x)$ the ratio $f(x+1)/f(x)$ tends to one of the roots λ_i as $x \to \infty$. For the characteristic polynomial P in n variables the previous condition on the roots can be reformulated as follows: The complement of the amoeba of P (recall that amoeba of P is the image of the zero set $P = 0$ under the logarithmic mapping) has the maximal number of connected components (this number coincides with the number of integer points in the Newton polytope of P). Under this condition on the limited characteristic variety of the homogeneous difference equation, we prove that the limit of the vector

$$(f(x+e_1)/f(x), \dots, f(x+e_n)/f(x)), \quad e_i = (0, \dots, 1, \dots, 0),$$

exists and belongs to the characteristic variety $P = 0$ as $x \in \mathbb{Z}_+^n$ tends to infinity along any ray.

Tid och plats: Tisdagen den 2 december kl. 13.15 i sal 2215, Matematiska institutionen, Polacksbacken, Uppsala universitet.

SEMINARIUM I ANALYS OCH DYNAMISKA SYSTEM

Gaven Martin:
The identification of the two generator arithmetic lattices of hyperbolic 3-space

Abstract: Mathematicians have long explored the deep connections between arithmetic and geometry. We give a brief survey of recent directions is this area as they pertain to three-dimensional hyperbolic geometry and then turn to an interesting problem concerning two generator arithmetic lattices. Despite a well-known conjecture to the contrary, there turn out to be only finitely many such groups which are torsion generated (analogues of Fuchsian triangle groups). Among these groups appear to be all the small co-volume lattices (at least the smallest half dozen or so) and so present the most highly symmetric 3-manifolds as quotients. We present progress so far in identifying all these groups.

Tid och plats: Onsdagen den 3 december kl. 13.15 – 14.15 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

SEMINAR IN ANALYSIS AND ITS APPLICATIONS

Fariba Bahrami:
Existence of steady vortex flows over a seamount

Abstract: We will discuss ideal flow at a localized topographic feature in the ocean, such as a seamount. We will prove existence of a stationary flow containing a bounded vortex, approaching a uniform flow at infinity, and passing over the seamount. The domain of the fluid is the upper half plane, and the data prescribed is the rearrangement class of the vorticity field.

There will be a short (15 minutes) presentation of the physical problem by Jonas Nycander from the Department of Meteorology at Stockholm University.

Tid och plats: Måndagen den 8 december kl. 13.15 – 14.15 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

SEMINARIUM I NUMERISK ANALYS

Fred G. Gustavson:
New generalized data structures for matrices lead to a variety of high performance algorithms

Abstract: We describe new data structures for full and packed storage of dense symmetric/ triangular arrays that generalize both. Using the new data structures, one is led to several new algorithms that save "half" the storage for symmetric matrices and outperform the current blocked based level 3 algorithms in LAPACK. We concentrate on the simplest forms of the new algorithms and show that they are a direct generalization of LINPACK. This means that level 3 BLAS's are *not* required to obtain level 3 performance. The replacement for Level 3 BLAS are so-called kernel routines and on IBM platforms they are producible from simple textbook type codes, by the XLF Fortran compiler. In the sequel I will label these "vanilla" codes.

(Continued on the next page.)

On Power3 with a peak performance of 800 MFlops, the results for Cholesky factorization at order $n \geq 200$ is over 720 MFlops and then reaches 735 MFlops at $n = 400$. Using conventional full format LAPACK DPOTRF with ESSL BLAS's one first gets to 600 MFlops at $n \geq 600$ and only reaches a peak of 620 MFlops. For this result we used simple square blocked full matrix data formats where the blocks themselves are stored in column major (Fortran) order or row major (C) order. The simple algorithms of LU factorization with partial pivoting for this new data format is a direct generalization of the LINPACK algorithm DGEFA. Again, no conventional level 3 BLAS's are required; the replacements are again so-called kernel routines. Programming for squared blocked full matrix format can be accomplished in standard Fortran through the use of three- and four-dimensional arrays. Thus, no new compiler support is necessary.

Also we mention that other more complicated algorithms are possible; e.g., recursive ones. The recursive algorithms are also easily programmed via the use of tables that address where the blocks are stored in the two-dimensional recursive block array. Finally, we describe block hybrid formats. Doing so allows one to use *no* additional storage over conventional (full and packed) matrix storage. This means that the new algorithms are *completely portable.* I will describe some old and recent work that proves that these data formats are optimal.

I will also describe an unexpected new result: One can represent a symmetric and/or a triangular matrix as two full format rectangular arrays. This means that some 250 or LAPACK routines for full and/or packed format symmetric and/or triangular arrays can be replaced by some say 75 routines that all use half the storage and run at level 3 speeds.

Tid och plats: Måndagen den 8 december kl. 14.15 – 15.00 i rum D4329 (seminarierummet på Medialab), Nada, KTH.

DOCENTFÖRELÄSNING I MATEMATIK

Dmitry Kozlov:
Ämnen i topologisk kombinatorik

Resumé: I detta föredrag kommer jag att beskriva några exempel från ett fascinerande område som ligger mellan kombinatorik å ena sidan och geometri och algebraisk topologi å den andra.

Inledningsvis presenterar jag de tänkesätt inom topologisk kombinatorik som, enligt min mening, ger den drivande kraften till områdets utveckling.

Sedan berättar jag om hur man kan hitta obstruktioner till graffärgningar genom att studera kohomologigrupper, och även särskilda karakteristiska kohomologiklasser av speciella komplex som konstrueras direkt från grafer.

I den andra delen tänker jag tala om kombinatorisk forskning från de senaste åren kring så kallade DeConcini-Procesi-upplösningar. Jag kommer att konstruera kombinatoriska modeller för dessa upplösningar samt använda dem för att förenkla gruppverkan av en ändlig grupp på en reell differentierbar mångfald.

Jag kommer att ta upp delar av mina gemensamma arbeten med Eric Babson samt med Eva-Maria Feichtner.

Tid och plats: Tisdagen den 16 december kl. 11.00 – 12.00 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

DISPUTATION I MATEMATISK STATISTIK

Maria Deijfen

disputerar på avhandlingen

Stochastic models for spatial growth and competition

fredagen den 19 december kl. 13.15 i sal 14, hus 5, Matematiska institutionen, SU, Kräftriket. Till fakultetsopponent har utsetts *docent Sven Erick Alm,* Uppsala universitet.

Abstract of the thesis

One of the simplest models for spatial growth and competition is the Richardson model. The original version describes the growth of an infectious phenomenon on $\mathbb{Z}^d$, but the mechanism can also be extended to comprise two phenomena, making it a model for competition on $\mathbb{Z}^d$. In this thesis, continuum counterparts of both the one-type and the two-type Richardson model are introduced. These models describe growth and competition respectively on $\mathbb{R}^d$ instead of $\mathbb{Z}^d$. The results are to be found in three separate papers. In the first one the continuum one-type model is defined. The main result is a shape theorem where the rotational invariance with $\mathbb{R}^d$ allows for a stronger conclusion than in the discrete case. The second paper deals with the two-type continuum model and the main result is roughly that two infection types with unequal intensities cannot simultaneously grow to occupy infinite parts of $\mathbb{R}^d$. Also, the shape theorem from the first paper is generalized in that the assumptions are relaxed. In the third paper the discrete model with two infection types is considered. It is shown that whether mutual unbounded growth for the infection types has positive probability or not does not depend on the initial state of the model.