BRÅKET

Information om seminarier och högre undervisning i matematiska ämnen i Stockholmsområdet

NR 11 **FREDAGEN DEN 20 MARS 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 26 mars kl. 13.00.

Disputation i numerisk analys

Marco Kupiainen skall disputera vid KTH på avhandlingen *Compressible Turbulent Flows: LES and Embedded Boundary Methods* torsdagen den 2 april kl. 13.00. Se sidan 7.

Naturvetarpriset

Se sidan 4.

SEMINARIER

Fr 03–20 kl. 13.15–14.15. Graduate Student Seminar. Björn Winckler, Matematik, KTH: *An introduction to computer assisted proof in analysis.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 10 sidan 7.

Fr 03–20 kl. 15.15–16.15. Matematiska kollokviet i Uppsala. *(Observera lokalen!)* **Michael Rathjen,** University of Leeds: *The art of ordinal analysis.* Sal Å2005, Ångströmlaboratoriet, Uppsala universitet. Kaffe/te serveras utanför föreläsningssalen kl. 14.55. Se Bråket nr 10 sidan 9.

Ti 03–24 kl. 14.00–15.00. Institut Mittag-Leffler Seminar. Lars Holst, KTH: *On records.* Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 4.

Ti 03–24 kl. 15.15. Plurikomplexa seminariet. *(Observera tiden!)* **Alexander Berglund,** Københavns Universitet: *Algebraic topology of complex subspace arrangements.* Rum 306, hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 3.

Ti 03–24 kl. 15.30–16.30. Institut Mittag-Leffler Seminar. Joel Spencer, New York University: *Finding Lovász's needle in an exponential haystack.* Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 3.

Fortsättning på nästa sida.

Disputation i matematisk statistik

Andreas Lindell skall disputera vid SU på avhandlingen *Theoretical and Practical Applications of Probability: Excursions in Brownian Motion, Risk Capital Stress Testing, and Hedging of Power Derivatives* fredagen den 3 april kl. 13.00. Se sidan 5.

Seminarier (fortsättning)

On 03–25 kl. 11.00–12.00. KTH/Nordita/SU Seminar in Theoretical Physics. Bernard Nienhuis, University of Amsterdam: *Critical percolation and qKZ equations.* Sal FA31, Roslagstullsbacken 21, AlbaNova universitetscentrum. Se sidan 4.

On 03–25 kl. 13.15–14.15. Seminarium i analys och dynamiska system. Denis Gaidashev, Uppsala: *Hyperbolic dynamics for the "universal" area-preserving maps associated with period doubling.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 5.

On 03–25 kl. 13.15–15.00. Algebra and Geometry Seminar. Helge Maakestad: *Jet bundles on flag varieties.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 6.

On 03–25 kl. 14.30–15.30. KCSE (KTH Computational Science and Engineering Centre) Seminar. Anders Szepessy, Numerisk analys, KTH, och Matematik, KTH: *A stochastic phase-field model determined from molecular dynamics.* Rum RB15, Roslagstullsbacken 15, AlbaNova universitetscentrum. Se Bråket nr 10 sidan 9.

On 03–25 kl. 16.00. KTH/SU Mathematics Colloquium. Professor Joel Spencer, Courant Institute, New York University: *78 Years of Ramsey* $R(3, k)$. 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 Bråket nr 10 sidan 6.

To 03–26 kl. 13.15–14.15. DNA-seminariet Uppsala-KTH (Dynamical systems, Number theory, Analysis). Jean-Pierre Conze, Université de Rennes 1: *Asymptotic laws for some sequential dynamical systems.* Sal 64119, Ångströmlaboratoriet, Uppsala universitet. Se Bråket nr 10 sidan 8.

To 03–26 kl. 14.00–15.00. Institut Mittag-Leffler Seminar. Anders Johansson, Högskolan i Gävle: *Factors in random graphs and hypergraphs.* Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 5.

To 03–26 kl. 14.15. Seminarium i matematikens filosofi. Michael Rathjen, University of Leeds och SCAS: *Contemporary perspectives on Hilbert's Second Problem and the Gödel Incompleteness Theorems.* Thunbergssalen vid Kollegiet för samhällsforskning (SCAS), Linneanum, Thunbergsvägen 2, Uppsala universitet.

To 03–26 kl. 15.30–16.30. Institut Mittag-Leffler Seminar. Malwina Luczak, London School of Economics: *Title to be announced.* Institut Mittag-Leffler, Auravägen 17, Djursholm.

On 04–01 kl. 13.15–14.15. Seminarium i analys och dynamiska system. Alan Sola, KTH: *Title to be announced.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

To 04–02 kl. 13.15–14.15. DNA-seminariet Uppsala-KTH (Dynamical systems, Number theory, Analysis). Giorgos Costakis, University of Crete: *Dynamics of linear operators in finite and infinite dimensions.* Seminariet skall äga rum vid KTH. Sal meddelas senare.

Fortsättning på nästa sida.

Seminarier (fortsättning)

To 04–02 kl. 15.15 – 16.15. AlbaNova and Nordita Colloquium in Physics. Professor James R. Drake, Alfvénlaboratoriet, KTH: *ITER and the development of fusion energy.* Oskar Kleins auditorium, Roslagstullsbacken 21, AlbaNova universitetscentrum. Se sidan 6.

Fr 04–03 kl. 13.15 – 14.15. Graduate Student Seminar. Dan Petersen, Matematik, KTH: *Title to be announced.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

PLURIKOMPLEXA SEMINARIET

Alexander Berglund:
Algebraic topology of complex subspace arrangements

Abstract: Deligne, Griffiths, Morgan and Sullivan showed that any smooth projective complex manifold M is *formal* in the sense that the dg-algebra of differential forms $\Omega^*(M)$ is quasi-isomorphic to the cohomology algebra $H^*(M;\mathbb{R})$. Moreover, if M is formal, then the torsion free part of the homotopy groups $\pi_i(M)$ can be calculated by algebraic methods from knowledge of the cohomology algebra $H^*(M;\mathbb{R})$.

In this talk, we will consider complements $X = \mathbb{C}^n \setminus \bigcup_i A_i$ of finite arrangements $\{A_1, \ldots, A_n\}$ of linear subspaces in $\mathbb{C}^n$. The topology of such spaces has been studied intensely and, apart from their independent interest, they appear in toric topology as representatives of homotopy types of so-called moment-angle complexes. Now, X does not look very much like a smooth manifold, so if you are interested in computing its homotopy groups, it seems as if you could not use smooth differential forms and cohomology.

I will explain how one can instead use Sullivan's 'polynomial differential forms' $A^*_{PL}(X)$ — analogous to the de Rham complex but defined for any topological space — together with what I call 'Koszul models' to obtain information of the homotopy groups $\pi_i(X)$, even in the non-formal case.

Tid och plats: Tisdagen den 24 mars kl. 15.15 i rum 306, hus 6, Matematiska institutionen, SU, Kräftriket.

INSTITUT MITTAG-LEFFLER SEMINAR

Joel Spencer:
Finding Lovász's needle in an exponential haystack

Abstract: The Lovász Local Lemma, roughly, tells us that given a large number of bad events B_α which are "mostly" independent, $\bigwedge \overline{B_\alpha} \neq \emptyset$. Among its (many) applications, given an appropriate family of sets A_α, it implies the existence of a colouring χ for which no A_α is monochromatic. In theory. However, oftentimes a random χ has but exponentially small chance of succeeding. Very recently Robin Moser (ETH) has made a breakthrough, giving an amazingly simple randomized algorithm to *find* the colouring and a not quite so simple proof that the algorithm indeed works. We shall rephrase Moser's argument and give the entire argument.

Tid och plats: Tisdagen den 24 mars kl. 15.30 – 16.30 vid Institut Mittag-Leffler, Auravägen 17, Djursholm.

INSTITUT MITTAG-LEFFLER SEMINAR

Lars Holst: On records

Abstract: In a sequence of i.i.d. continuous random variables the number of record-record, record-nonrecord-record, etc., are counted. By embedding in a marked Poisson process, we show that these counts are independent and Poisson distributed. We also discuss the number of triple records and a more general record model.

Tid och plats: Tisdagen den 24 mars kl. 14.00 – 15.00 vid Institut Mittag-Leffler, Auravägen 17, Djursholm.

KTH/NORDITA/SU SEMINAR IN THEORETICAL PHYSICS

Bernard Nienhuis: Critical percolation and qKZ equations

Abstract: Based on the work of Razumov and Stroganov it was noted that many exact expressions for certain correlation functions for critical bond percolation could be found for arbitrary system sizes and distances involved. These results were obtained by the study of the Perron-Frobenius eigenvector of the transfer matrix for the cylinder or strip. It turned out far more difficult to obtain similar results for the site percolation model on the triangular lattice.

Here we present an approach to both site and bond percolation, applicable to arbitrary rhombus tilings and to isoradial lattices respectively. It makes use of relations known as q-Knizhnik-Zamolodchikov equations (qKZ). These relations are satisfied by the correlations in the models. In some geometries these equations can be solved, yielding the correlation functions. For some specific correlation functions, these results can be extrapolated to arbitrary sizes.

Tid och plats: Onsdagen den 25 mars kl. 11.00 – 12.00 i sal FA31, Roslagstullsbacken 21, AlbaNova universitetscentrum.

NATURVETARPRISET

Tre matematikpristagare vid Stockholms universitet

Naturvetarpriset, vilket instiftades för tolv år sedan av Saco-förbundet Naturvetarna, delas varje år ut till den bästa doktorsavhandlingen och det bästa examensarbetet inom en naturvetenskaplig disciplin. I år har turen åter kommit till matematiken, och en jury bestående av ledamöter från KVA:s klass för matematik har valt att ge priset för bästa avhandling på 50 000 kronor till *Alexander Berglund,* som disputerade vid Stockholms universitet den 3 juni 2008 (se Bråket 2008 nr 20 sidan 12). Årets pris för bästa examensarbete delas mellan *Erland Ekheden* och *Tommy Nyberg* vid Stockholms universitet, vilka får 12 500 kronor var. Prisutdelning sker i samband med lunchen under konferensen Stockholm Meeting 2009 (http://www.stockholmmeeting.se/) den 24 mars 2009.

Alexander Berglund arbetar numera som postdoc vid Københavns Universitet. Han skall tala vid plurikomplexa seminariet den 24 mars (se sidan 3). På grund av prisutdelningen är seminariet flyttat till kl. 15.15.

Låt oss hjärtligt gratulera Alexander, Erland och Tommy till denna fina utmärkelse!

Mikael Passare

SEMINARIUM I ANALYS OCH DYNAMISKA SYSTEM

Denis Gaidashev:
Hyperbolic dynamics for the "universal" area-preserving maps associated with period doubling

Abstract: We will start by describing a set of universal phenomena for area preserving two-dimensional maps whose orbits undergo period doubling bifurcations. We will discuss existence of hyperbolic and "stable" sets for such maps, and demonstrate how the renormalization setting helps to construct such sets.

We will also describe a set of computational and analytic tools that enable one to compute the Hausdorff dimension of such sets. Finally, we will touch on the issue of rigidity of these sets for this class of area-preserving maps.

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

INSTITUT MITTAG-LEFFLER SEMINAR

Anders Johansson:
Factors in random graphs and hypergraphs

Abstract: Let H be a fixed graph on ν vertices and let n be divisible by ν. I will talk about the problem of finding an H-factor in the random graph $G(n,p)$, i.e. finding a collection of n/ν vertex disjoint copies of H. The results determine the threshold function for the property of having an H-factor, and the method and results generalize to factors in random hypergraphs as well.

Tid och plats: Torsdagen den 26 mars kl. 14.00 – 15.00 vid Institut Mittag-Leffler, Auravägen 17, Djursholm.

DISPUTATION I MATEMATISK STATISTIK

Andreas Lindell

skall disputera på avhandlingen

Theoretical and Practical Applications of Probability:
Excursions in Brownian Motion, Risk Capital Stress Testing, and Hedging of Power Derivatives

fredagen den 3 april 2009 kl. 13.00 i sal 14, hus 5, Matematiska institutionen, SU, Kräftriket. Till opponent har utsetts *professor Mogens Steffensen,* Københavns Universitet.

Abstract of the thesis

The thesis treats three different areas; (i) Ranked increments of stable processes and ranked excursions of Brownian motion, (ii) Sufficient capital levels for banks, and (iii) Trading strategies for reduction of the fluctuations of revenues for power plants. The first part is a theoretical investigation involved with the calculation of distribution functions concerning special properties of stable processes. The second part is a description of a framework in which the sufficiency of capital levels for banks can be evaluated. The third part is a typical example of how financial mathematics can be used to derive practical methods applicable in risk management of energy derivatives and real options. Altogether, five papers are presented.

ALGEBRA AND GEOMETRY SEMINAR

Helge Maakestad:
Jet bundles on flag varieties

Abstract: Let E^* in $F = C^n$ be a flag in an n-dimensional vector space F over a field C of characteristic zero. Let P in $SL(F)$ be the parabolic subgroup fixing E^*. It follows that $FL(E^*) = SL(F)/P$ is a smooth projective variety — the flag variety parametrizing flags of type E^* in F. There is an equivalence of categories between the category of rational representations of P and the category of $SL(F)$-linearized vector bundles on $FL(E^*)$. I will study this equivalence for $J(k, L)$ — the k'th jet bundle of an $SL(F)$-linearized line bundle L in $\mathrm{Pic}(FL(E^*))$ and describe the P-module of $J(k, L)$.

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

ALBANOVA AND NORDITA COLLOQUIUM IN PHYSICS

James R. Drake:
ITER and the development of fusion energy

Abstract: Controlled thermonuclear fusion is on the European Strategic Energy Technology Plan roadmap (also known as SET Plan) as a technology which offers the prospect of an intrinsically safe, virtually inexhaustible energy source. From a global perspective, there is a need for massive base load electricity production. Can fusion be developed to become economically competitive? When will fusion be contributing to electricity production? The next step in the development of a fusion reactor is the ITER experiment under construction at Cadarache France. ITER is an international collaboration between the EU, Japan, USA, Russian Federation, China, South Korea and India. The International ITER Agreement was signed in October 2006. The mission is as follows:

- Start operation 2018.
- Demonstrate capability of steady state fusion power production.
- Optimize burning plasma confinement under reactor conditions.
- Have dimensions comparable to a power station and produce about 500 MW of fusion power (10 times more power than needed to run it).
- Demonstrate or develop new technologies and materials required for fusion power stations.

The initial phase of the project has included a design review and an update of the scope, schedule and cost which takes consideration of new developments and recent progress in fusion research. Procurement is underway for long leadtime components.

Tid och plats: Torsdagen den 2 april kl. 15.15 – 16.15 i Oskar Kleins auditorium, Roslagstullsbacken 21, AlbaNova universitetscentrum.

DISPUTATION I NUMERISK ANALYS

Marco Kupiainen

skall disputera på avhandlingen

Compressible Turbulent Flows:
LES and Embedded Boundary Methods

torsdagen den 2 april 2009 kl. 13.00 i sal F3, KTH, Lindstedtsvägen 26, b.v. Till opponent har utsetts *Ph. Dr. Bill Henshaw.*

Abstract of the thesis

This thesis considers numerical approximations to solutions of the compressible Navier-Stokes and Large-Eddy Simulation (LES) equations.

An embedded boundary method for representing geometries within the computational domain is considered. Test examples indicate that the discretization errors from the embedded boundary manifest as numerical 'roughness' when the flow is turbulent and numerically unresolved. For low-Reynolds number configurations, however, the errors made on the embedded boundary are of the same order of magnitude as the errors made by the internal discretization scheme.

The computation grid is Cartesian. This imposes a hard limit on the viable resolving power of boundary layers on the method for high-Reynolds number configurations, even in the presence of local grid refinement. To mitigate this severe limitation wall-models can be used. They in effect model the near-wall-behaviour instead of resolving the thin boundary-layer associated with high-Reynolds number flows. We have tested one wall-model for LES in this thesis and we conclude that the models do not yield perfect results.