



BRÅKET



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

NR 30

FREDAGEN DEN 28 SEPTEMBER 2007

BRÅKET

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

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Red. för Bråket
Institutionen för matematik
KTH
100 44 Stockholm

Sista manustid för nästa nummer:
Torsdagen den 4 oktober kl. 13.00.

Disputation i matematik

Lars Halvard Halle disputerar vid KTH på avhandlingen *Stable reduction of curves and tame ramification* fredagen den 12 oktober kl. 13.00. Se sidan 10.

Money, jobs: Se sidorna 11–12.

SEMINARIER

Fr 09–28 kl. 11.00–11.30. Optimization and Systems Theory Seminar. Javier Cano Cancela, Universidad Rey Juan Carlos, Madrid: *Improving directions of negative curvature for constrained problems in an efficient manner*. Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 5.

Fr 09–28 kl. 11.00. Mittag-Leffler (Post)Graduate Seminar. Pavel Bubak: *On the uniqueness of the invariant measure for 'almost' non-degenerate infinite-dimensional diffusions*. Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 4.

Fr 09–28 kl. 13.15–14.15. Graduate Student Seminar. Tomas Sjödin, Matematik, KTH: *Some basic properties of vector lattices*. Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 5.

Fr 09–28 kl. 15.15–17.00. Seminar in Graduate Course on Research: Theory, Method, Practice. Johan Hoffman, KTH CSC: *d'Alembert's paradox: a subjective report on recent struggles with an ancient problem*. Rum 4523, KTH CSC, Lindstedtsvägen 5, plan 5. Se Bråket nr 29 sidan 9.

Fortsättning på nästa sida.

Disputation i matematisk statistik

Anders Björkström disputerar på avhandlingen *Regression methods in multidimensional prediction and estimation* fredagen den 28 september kl. 13.00 i sal 14, hus 5, Matematiska institutionen, SU, Kräftriket. Se Bråket nr 28 sidan 12.

Mittag-Leffler Reading Group and (Post)Graduate Seminars, Fall 2007

Dessa startar vid Institut Mittag-Leffler. Se sidan 4.

Seminarier (fortsättning)

- Må 10–01 kl. 11.00. Mittag-Leffler Reading Group. Jan Pospisil:** *The first one or two chapters of Da Prato & Zabczyk: Stochastic Equations in Infinite Dimensions.* Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 4.
- Må 10–01 kl. 15.15–16.00. Seminarium i matematisk statistik. Johannes Thoms** presenterar sitt examensarbete: *Adaptive Markov Chain Monte Carlo Algorithms for improved Sampling.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 29 sidan 9.
- Ti 10–02 kl. 10.15. Plurikomplexa seminariet. Elin Götmark och Håkan Samuelsson,** båda från Göteborg: *Weighted Koppelman formulas for holomorphic line bundles over Grassmannians.* Rum 306, hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 6.
- Ti 10–02 kl. 13.15. Seminarium i teoretisk datalogi. Cyrille Artho,** AIST, Japan: *Model checking network applications.* Rum 4523, KTH CSC, Lindstedtsvägen 5, plan 5. Se Bråket nr 29 sidan 10.
- Ti 10–02 kl. 14.00–15.00. Mittag-Leffler Seminar. Björn Birnir,** University of California at Santa Barbara, USA: *Uniqueness, an invariant measure and Kolmogorov's theory of turbulence, for the stochastic Navier-Stokes equation.* Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 7.
- On 10–03 kl. 10.15–12.00. Kombinatorikseminarium. Anders Björner:** *Connectivity of polytope boundaries and rigidity of posets.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 7.
- On 10–03 kl. 10.30. Logikseminariet Stockholm-Uppsala. Fredrik Dahlgren:** *Is the structure theorem for the space of compactly supported distributions effective?* Sal 11167, Ångströmlaboratoriet, Uppsala universitet. Se sidan 7.
- On 10–03 kl. 11.00. Common SU KoF/KTH Theoretical Physics Seminar. Hans Ringström,** Matematik, KTH: *Future global non-linear stability of cosmological models with accelerated expansion.* Sal FA31, Roslagstullsbacken 21, AlbaNova universitetscentrum.
- On 10–03 kl. 13.00–14.45. Algebra and Geometry Seminar. Iana Anguelova,** CRM, Montréal: *Vertex algebras: super, generalized and quantum.* Rum 306, hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 9.
- On 10–03 kl. 13.15–14.15. Seminarium i analys och dynamiska system. Martin Andersson,** IMPA, Rio de Janeiro: *Physical measures in partially hyperbolic dynamical systems.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 8.
- On 10–03 kl. 15.15. Seminarium i numerisk analys. Minh Do-Quang,** Mekanik, KTH: *Introduction to femLego, a problem solving environment and its applications on phase change and turbulent flow.* Rum 4523, KTH CSC, Lindstedtsvägen 5, plan 5. Se sidan 6.
- To 10–04 kl. 14.00–15.00. Mittag-Leffler Seminar. Jiang-Lun Wu,** Swansea University, UK: *An optimal control problem for SDE's associated with general Lévy generators.* Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 5.

Fortsättning på nästa sida.

Seminarier (fortsättning)

- To 10–04 kl. 15.15–16.15. AlbaNova and Nordita Colloquium in Physics.** Melvyn B. Davies, Lunds observatorium: *The astrophysics of stellar clusters*. Oskar Kleins auditorium, Roslagstullsbacken 21, AlbaNova universitetscentrum. Se Bråket nr 29 sidan 8.
- To 10–04 kl. 15.15. Discussion Seminar in Graduate Course on Research: Theory, Method, Practice.** Seminariet inleds av: **Henrik Eriksson**, KTH CSC: *The Science Wars*. Rum 1535, KTH CSC. Se sidan 6.
- To 10–04 kl. 15.30–16.30. Mittag-Leffler Seminar.** Tadahisa Funaki, Tokyo University, Japan: *Scaling limits for weakly pinned Gaussian random walks*. Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 9.
- Fr 10–05 kl. 13.15–14.15. Graduate Student Seminar.** Joakim Arnlind, Matematik, KTH: *Representation theory, graphs and dynamical systems*. Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 9.
- Fr 10–05 kl. 13.15–15.00. Seminarium, arrangerat av Avdelningen för säkerhetsforskning, KTH.** Lars Olsson, Geostatistik AB: *Risker i byggande*. V:s seminarierum 156, KTH, Teknikringen 78 A, 1 tr. Se Bråket nr 29 sidan 10.
- Må 10–08 kl. 13.15. Seminarium i teoretisk datalogi.** Per Austrin, Teorigruppen, KTH CSC: *Beating Semidefinite Programming means beating the Unique Games Conjecture*. Rum 1537, KTH CSC, Lindstedtsvägen 3, plan 5. Se sidan 11.
- On 10–10 kl. 10.15. Kombinatorikseminarium.** Faina I. Solov'eva, Sobolev Institute, Novosibirsk: *On transitive partitions of the n -cube into binary codes*. Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 10.
- On 10–10 kl. 13.15. Algebra- och geometriseminarium.** Henrik Strohmayer: *Title to be announced*. Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.
- On 10–10 kl. 14.30–15.30. KCSE (KTH Computational Science and Engineering Centre) Seminar.** Mohammad Motamed, NADA, KTH: *Computation of creeping waves on smooth objects*. Rum 4523, KTH CSC, Lindstedtsvägen 5, plan 5. Se sidan 8.
- On 10–10 kl. 16.00. KTH/SU Mathematics Colloquium.** Björn Birnir, University of California at Santa Barbara, USA: *Title to be announced*. 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.
- On 10–10 kl. 18.00–19.00. Offentlig föreläsning på Kungl. Vetenskapsakademien.** Föreläsningen består av två delar om vardera 30 minuter. **Professor Svante Janson**, Uppsala universitet: *Slumpgrafer och Internet*. **Professor Anders Björner**, KTH: *Matematiken bakom Google*. Beijersalen, Kungl. Vetenskapsakademien, Lilla Frescativägen 4A, Stockholm. Se sidan 11.
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**MITTAG-LEFFLER READING GROUP
AND (POST)GRADUATE SEMINARS, FALL 2007**

We are a group of PhD and Postdoc students who participate at the program about Stochastic Partial Differential Equations (SPDE's) at Institut Mittag-Leffler. We plan to run a Reading Group about SPDE's and we meet every Monday. We also plan to give a (Post)-Graduate Seminar every Friday. We would like to encourage all students from local universities interested in the subject to join us. Please send a message to Harald Oberhauser, e-mail ho239@cam.ac.uk, if you are interested.

The Reading Group meets on Mondays at 11.00. The (Post)Graduate Seminars are held on Fridays at 11.00. The place for both the Reading Group and the (Post)Graduate Seminars is the Seminar Room at Institut Mittag-Leffler, Auravägen 17, Djursholm.

For information about the Reading Group and the (Post)Graduate Seminars, see the web page <http://www.math.kth.se/~teitur/seminars/ML.html>.

Reading Group

Purpose: The idea is that we work successively through the book *Stochastic Equations in Infinite Dimensions* by G. DA PRATO & JERZY ZABCZYK during the time of the program, and each week one of us presents a chapter. However, since many parts of the book are rather technical, people presenting are encouraged also to use additionally other sources to bring in examples, compare different approaches, etc.

The next meeting will be held on Monday, October 1, at 11.00. Jan Pospisil will talk about the first one or two chapters of the above-mentioned book.

(Post)Graduate Seminar

Pavel Bubak:

**On the uniqueness of the invariant measure
for 'almost' non-degenerate infinite-dimensional diffusions**

Abstract: A class of infinite-dimensional diffusions will be studied with the covariance operator possibly depending on some external Markov process. I will explain how the by-parts integration formula of the Malliavin calculus can be combined together with the so-called asymptotic strong-Feller property in order to prove the uniqueness of the invariant measure of the given diffusion, provided its covariance operator being non-degenerate for a 'majority of the times' (with respect to the underlying Markov process) on a certain finite-dimensional subspace of the state space, whereas the dynamics of the diffusion on its (possibly infinite-dimensional) complement being dissipative. This result applies to a broad class of stochastic PDE's arising in physics, and I will illustrate it on the example of the stochastic 2-dimensional incompressible Navier-Stokes equation.

The talk is based on joint work with Martin Hairer (Warwick).

Tid och plats: Fredagen den 28 september kl. 11.00 vid Institut Mittag-Leffler, Auravägen 17, Djursholm.

OPTIMIZATION AND SYSTEMS THEORY SEMINAR

Javier Cano Cancela:

Improving directions of negative curvature for constrained problems in an efficient manner

Abstract: In order to converge to second-order KKT points, second derivative information has to be taken into account. Therefore, methods for minimization satisfying convergence to second-order KKT points must, at least implicitly, compute a direction of negative curvature of an indefinite matrix. An important issue is to determine the quality of the negative curvature direction. This problem is closely related to the symmetric eigenvalue problem. More specifically we want to develop algorithms that improve directions of negative curvature with relatively little effort. This seminar presents some methods to compute “good” directions of negative curvature and we present numerical experiments that illustrate its practical efficiency.

Tid och plats: Fredagen den 28 september kl. 11.00–11.30 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

GRADUATE STUDENT SEMINAR

Tomas Sjödin:

Some basic properties of vector lattices

Abstract: We will introduce the theory of vector lattices and define some of the most basic concepts in these (such as completeness and order-convergence for instance).

Lattices come up in several areas such as potential theory and Choquet theory, and we will try to give several examples.

Apart from the basic theory, we will focus on those parts which generalize the construction of the Daniell integral, and try to get to the Daniell-Kantorovich theorem which says that if we have a positive linear and order-continuous mapping from a sublattice H of a σ -complete lattice E into a regular lattice F , then this mapping can be extended to a positive linear and order-continuous mapping from a sublattice of E which contains H and is closed under dominated order-convergence.

No prior knowledge of the theory will be assumed.

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

MITTAG-LEFFLER SEMINAR

Jiang-Lun Wu:

An optimal control problem for SDE's associated with general Lévy generators

Abstract: We consider optimal control of stochastic differential equations associated with Lévy generators, which contain SDE's driven by stable-like processes as an important special case. Sufficient maximum principle and existence of a unique viscosity solution to the associated HJB integro-variational inequality will be presented.

Tid och plats: Torsdagen den 4 oktober kl. 14.00–15.00 vid Institut Mittag-Leffler, Aura-vägen 17, Djursholm.

PLURIKOMPLEXA SEMINARIET

**Elin Götmark och Håkan Samuelsson:
Weighted Koppelman formulas**

for holomorphic line bundles over Grassmannians

Abstract: This is joint work with Henrik Seppänen. We present explicit weighted Koppelman formulas for the tautological vector bundle and all holomorphic line bundles over Grassmannians. To find such formulas, we use a method due to the first speaker, with which one can find weighted Koppelman formulas for complex manifolds X such that there exists a holomorphic vector bundle over $X \times X$ with a holomorphic section which defines the diagonal. As an application, we prove vanishing theorems for some Dolbeault cohomology groups of the line bundles. We also discuss connections with the Bergman kernels associated with the positive holomorphic line bundles.

Tid och plats: Tisdagen den 2 oktober kl. 10.15 i rum 306, hus 6, Matematiska institutionen, SU, Kräftriket.

SEMINARIUM I NUMERISK ANALYS

Minh Do-Quang:

**Introduction to femLego, a problem solving environment
and its applications on phase change and turbulent flow**

Abstract: femLego is a problem solving environment for parallel adaptive computations. It uses symbolic computations to automatically generate finite element programs for simulations in 1, 2 and 3 dimensions. It has been successfully applied on many problems in heat and mass transfer, materials science, turbulent and free boundaries. This talk will give you an overview about this tool, the key features and its applications.

Tid och plats: Onsdagen den 3 oktober kl. 15.15 i rum 4523, KTH CSC, Lindstedtsvägen 5, plan 5.

**DISCUSSION SEMINAR
IN GRADUATE COURSE ON RESEARCH:
THEORY, METHOD, PRACTICE**

Seminariet inleds av:

Henrik Eriksson: The Science Wars

Abstract: Fifty years ago, there was much concern over the gap between the “two cultures” of modern society, the sciences and the humanities. In the 1990’s, the gap had widened into warfare between “realists” and “postmodernists”. We will look briefly at the basis for these battles, the scientific methodologies known as “positivism” and “hermeneutics”, but mainly discuss some of the battles in this war, such as the Sokal hoax and the Eva Lundgren affair.

I will try to present both sides of the conflict fairly, but I hope that the discussion will attract some supporters of antipositivist views. Not to add another battle to the science wars but to promote mutual understanding. Make love, not war!

Tid och plats: Torsdagen den 4 oktober kl. 15.15 i rum 1535, KTH CSC.

Anmärkning: Seminariet ingår i en doktorandkurs (DD3001) med professor Stefan Arnborg som lärare.

MITTAG-LEFFLER SEMINAR

Björn Birnir:

Uniqueness, an invariant measure
and Kolmogorov's theory of turbulence,
for the stochastic Navier-Stokes equation

Abstract: The existence and uniqueness of solutions of the Navier-Stokes equation driven with additive noise in three dimensions is proven, in the presence of unidirectional mean flow. The existence of a unique invariant measure is established and the properties of this measure are described. The invariant measure is used to prove Kolmogorov's theory of 3-dimensional turbulence, including the celebrated $-5/3$ power law for the decay of the power spectrum of a turbulent 3-dimensional flow.

Tid och plats: Tisdagen den 2 oktober kl. 14.00–15.00 vid Institut Mittag-Leffler, Auravägen 17, Djursholm.

KOMBINATORIKSEMINARIUM

Anders Björner:

Connectivity of polytope boundaries and rigidity of posets

Abstract: Several kinds of connectivity will be reviewed: k -connectivity of graphs, topological k -connectivity of spaces, and k -Cohen-Macaulay connectivity of simplicial complexes. Also, we introduce yet another form of connectivity, called k -rigidity. It applies to finite posets, and (via the face poset) to regular cell complexes. It is proved that if any set of at most k vertices is removed from the boundary complex of a d -dimensional convex polytope, then the remaining induced subcomplex is topologically $(d - k - 1)$ -connected. This extends a result on polytope graphs of Balinski (the $k = d - 1$ case) and sharpens a result of Fløystad (the homology version).

Results of this nature are obtained via rigidity of homotopy Cohen-Macaulay lattices. The technique applies also to face lattices of some other cell complexes, to basis graphs of matroids and buildings, and to geometric lattices. Finally, an application to finite Coxeter groups is given.

Tid och plats: Onsdagen den 3 oktober kl. 10.15–12.00 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

LOGIKSEMINARIET STOCKHOLM-UPPSALA

Fredrik Dahlgren:

Is the structure theorem for the space
of compactly supported distributions effective?

Abstract: In this talk we investigate the effective content of the structure theorem for the space of distributions with compact support. We show that each of the characterizations of the space of compactly supported distributions in the structure theorem gives rise to an effective domain representation of the space. To show that the structure theorem has effective content, we study the reducibility properties of the resulting domain representations.

Tid och plats: Onsdagen den 3 oktober kl. 10.30 i sal 11167, Ångströmlaboratoriet, Uppsala universitet.

SEMINARIUM I ANALYS OCH DYNAMISKA SYSTEM

Martin Andersson:

Physical measures in partially hyperbolic dynamical systems

Abstract: The theory of differentiable dynamical systems has had great success by viewing these systems from a stochastic perspective. The most important question is whether these systems have physical measures, and if so, how these measures are affected by small external perturbations. A measure μ is said to be physical for $f : M \mapsto M$ if there is a set $B(\mu)$ of positive Lebesgue measure such that

$$\frac{1}{n} \sum_{k=0}^{n-1} \varphi(f^k(x)) \rightarrow \int \varphi d\mu$$

for all $x \in B(\mu)$ and all continuous functions $\varphi : M \mapsto \mathbb{R}$. It is known since a long time that hyperbolic (Axiom A) systems have a finite number of physical measures, which together describe the statistics of iterations $x, f(x), f^2(x), \dots$ for Lebesgue almost every x . Furthermore these depend continuously on C^2 perturbations in the system (stochastic stability).

The existence of physical measures has not been proved for typical partially hyperbolic dynamical systems. In this seminar we will discuss an open set of partially hyperbolic dynamical systems with so-called mostly contracting central direction, for which physical measures do indeed exist. In this connection we run into some new phenomena such as bifurcations of physical measures. In particular these systems do not have to be statistically stable, but we shall see that most are anyway.

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

KCSE SEMINAR

Mohammad Motamed:

Computation of creeping waves on smooth objects

Abstract: Wave scattering problems have a vast number of applications, including radar and sonar technology, seismic tomography and medical imaging. In such problems, the scattering of an incident wave with some object or inhomogeneity is studied. The underlying equation is usually a time-independent formulation of the wave equation, known as the Helmholtz equation. At high frequencies, direct numerical methods for solving the Helmholtz equation are computationally very expensive. In such cases, asymptotic methods based on constructing asymptotic expansions of the solution are used. Most asymptotic techniques are based on geometrical optics (GO) and geometrical theory of diffraction (GTD).

One type of diffracted waves of GTD are creeping waves, which can give an important contribution to the solution of medium to high frequency scattering problems. They are generated at the light-shadow boundary on the illuminated scatterer by grazing incident waves and propagate along geodesics on the scatterer surface, continuously shedding diffracted waves in their tangential direction.

In this talk we show how to efficiently compute the creeping waves. We consider an application to mono-static radar cross section problems where creeping waves from all illumination angles must be computed.

Tid och plats: Onsdagen den 10 oktober kl. 14.30–15.30 i rum 4523, KTH CSC, Lindstedtsvägen 5, plan 5.

ALGEBRA AND GEOMETRY SEMINAR

Iana Anguelova:

Vertex algebras: super, generalized and quantum

Abstract: I will explain what are these objects, and what is our definition of an H_D -quantum vertex algebra (joint with Maarten Bergvelt, UIUC). I will show how to use the bicharacter construction of vertex algebras (which was first introduced by Borcherds) to handle examples. I will explain how it allows one to construct explicit formulas for the normal ordered products and the operator product expansions of fields, as well as the braiding and translation maps. We extend the bicharacter construction of quantum vertex algebras to the case of braided groups (Hopf algebras in braided categories). That allows us to work with fields on the anyonic Fock space. I will discuss also a project involving construction of anyonic correspondences and Jack symmetric polynomials.

Tid och plats: Onsdagen den 3 oktober kl. 13.00–14.45 i rum 306, hus 6, Matematiska institutionen, SU, Kräftriket.

MITTAG-LEFFLER SEMINAR

Tadahisa Funaki:

Scaling limits for weakly pinned Gaussian random walks

Abstract: We study scaling limits for d -dimensional Gaussian random walks perturbed by an attractive force toward the origin, especially under the critical situation that the rate functional of the corresponding large deviation principle admits two minimizers. We obtain different types of limits, in a positive recurrent regime, depending on the dimension d of the space and the conditions imposed at the final time under the presence or absence of a wall. The motivation comes from the study of polymers or $(1+1)$ -dimensional interfaces with δ -pinning.

This is a joint work with E. Bolthausen and T. Otake.

Tid och plats: Torsdagen den 4 oktober kl. 15.30–16.30 vid Institut Mittag-Leffler, Auravägen 17, Djursholm.

GRADUATE STUDENT SEMINAR

Joakim Arnlind:

Representation theory, graphs and dynamical systems

Abstract: This talk will be an overview of some work on the representation theory of certain algebras defined by non-linear relations. By introducing the directed graph of a matrix, one can sometimes obtain a classification of representations in terms of their corresponding graphs. Furthermore, for these algebras there is an associated map $s: \mathbb{R}^2 \rightarrow \mathbb{R}^2$ whose behaviour under iteration (e.g. periodic orbits) one has to understand in order to find representations of a given dimension. This problem exhibits a nice interplay between representation theory, graph theory and dynamical systems.

Tid och plats: Fredagen den 5 oktober kl. 13.15–14.15 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

KOMBINATORIKSEMINARIUM

Faina I. Solov'eva:

On transitive partitions of the n -cube into binary codes

Abstract: The methods to construct transitive partitions of the n -cube into binary codes are presented. The existence of transitive partitions of the n -cube, $n = 2^k - 1$, $k > 2$, into perfect binary codes is shown.

Tid och plats: Onsdagen den 10 oktober kl. 10.15 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

DISPUTATION I MATEMATIK

Lars Halvard Halle

disputerar på avhandlingen

Stable reduction of curves and tame ramification

fredagen den 12 oktober 2007 kl. 13.00 i sal F3, KTH, Lindstedtsvägen 26, b.v. Till opponent har utsetts *professor Bas Edixhoven*, Mathematisch Instituut, Universiteit Leiden, Nederländerna.

Abstract of the thesis

This thesis treats various aspects of stable reduction of curves, and it consists of two separate papers.

In Paper I of this thesis, we study stable reduction of curves in the case where a tamely ramified base extension is sufficient. If X is a smooth curve defined over the fraction field of a strictly henselian discrete valuation ring, there is a criterion, due to T. Saito, that describes precisely, in terms of the geometry of the minimal model with strict normal crossings of X , when a tamely ramified extension suffices in order for X to obtain stable reduction. For such curves we construct an explicit extension that realizes the stable reduction, and we furthermore show that this extension is minimal. We also obtain a new proof of Saito's criterion, avoiding the use of ℓ -adic cohomology and vanishing cycles.

In Paper II, we study group actions on regular models of curves. If X is a smooth curve defined over the fraction field K of a complete discrete valuation ring R , every tamely ramified field extension K'/K with Galois group G induces a G -action on the extension $X_{K'}$ of X to K' . We study the extension of this G -action to certain regular models of $X_{K'}$. In particular, we are interested in the induced action on the cohomology groups of the structure sheaf of the special fiber of such a regular model. We obtain a formula for the Brauer trace of the endomorphism induced by a group element on the alternating sum of the cohomology groups. Inspired by this global study, we also consider similar group actions on the cohomology of the structure sheaf of the exceptional locus of a tame cyclic quotient singularity, and obtain an explicit polynomial formula for the Brauer trace of the endomorphism induced by a group element on the alternating sum of the cohomology groups.

We apply these results to study a natural filtration of the special fiber of the Néron model of the Jacobian of X by closed, unipotent subgroup schemes. We show that the jumps in this filtration only depend on the fiber type of the special fiber of the minimal regular model with strict normal crossings for X over $\text{Spec}(R)$, and in particular are independent of the residue characteristic. Furthermore, we obtain information about where these jumps can occur. We also compute the actual jumps for each of the finitely many possible fiber types for curves of genus 1 and 2.

SEMINARIUM I TEORETISK DATALOGI

Per Austrin:

Beating Semidefinite Programming means beating the Unique Games Conjecture

Abstract: During the last few years, there have been several results of the form “if the Unique Games Conjecture is true, then problem X cannot be approximated better than what is achieved by algorithm Y , based on semidefinite programming”, indicating a strong connection between the UGC and the limitations of SDP-based approximation algorithms.

For 2-CSP problems in particular this connection has been very evident, with the optimal parameters for the hardness reductions for Max Cut and Max 2-Sat coming directly from the analysis of the best SDP-based approximation algorithms for the problems.

We generalize these results, by considering an arbitrary boolean 2-CSP (or more generally, an arbitrary nonnegative objective function on two boolean variables), and show that a set of “obstructions” towards obtaining a good rounding procedure for the SDP relaxation can be translated into a matching UG-hardness result. We also show that, under a certain conjecture on the nature of worst-case angles for the SDP relaxation, this result is tight. This conjecture is supported by all previous results for specific 2-CSP’s.

The talk will be 45 minutes long, and it will be held in English.

Tid och plats: Måndagen den 8 oktober kl. 13.15 i rum 1537, KTH CSC, Lindstedtsvägen 3, plan 5.

OFFENTLIG FÖRELÄSNING PÅ KUNGL. VETENSKAPSAKADEMIEN

Svante Janson: Slumpgrafer och Internet

Sammanfattning: Internet kan ses som en mycket stor graf. Denna graf kan i praktiken inte beskrivas exakt, och för att studera olika egenskaper hos Internet, t.ex. sårbarhet för avsiktliga eller oavsiktliga störningar, är det naturligt att studera slumpmässiga modeller. Existensen av Internet har därför stimulerat konstruktionen och studiet av en rad nya modeller för slumpgrafer, vilket har lett till en nyutveckling inom den matematiska teorin för slumpgrafer. I föredraget beskrivs några sådana modeller och teoretiska resultat om deras struktur.

Anders Björner: Matematiken bakom Google

Sammanfattning: Den huvudsakliga ingrediensen bakom sökmotorn Googles framgångar är systemet PageRank, som bestämmer i vilken ordning sökträffarna skall listas. Denna aspekt är givetvis av avgörande betydelse, eftersom de flesta användare i regel bara tittar på de 5–10 träffar som står först i listan. Grunden för PageRank-systemet är ett listigt utnyttjande av matematik från slutet av 1800-talet, närmare bestämt Frobenius-Perrons teori för egenvärden till icke-negativa matriser. I föredraget kommer denna bakgrund att skisseras och tillämpningen hos Google att förklaras.

Tid och plats: Onsdagen den 10 oktober kl. 18.00–19.00 i Beijersalen, Kungl. Vetenskapsakademien, Lilla Frescativägen 4A, Stockholm.

MONEY, JOBS

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

(Continued on the next page.)

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.
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>.
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

Money to apply for

11. Stiftelsen för internationalisering av högre utbildning och forskning (STINT) har inrättat ett nytt program: STINT Institutional Grants for Younger Researchers. Programmet riktar sig till yngre forskare som tidigt i sin karriär — inom sju år från disputationen — vill bygga upp internationellt samarbete med andra yngre forskare. Sista ansökningsdag är den 15 oktober. Web-info: <http://www.stint.se/index.php?articleId=137>.

Jobs to apply for

12. Göteborgs universitet söker en doktorand i matematik med inriktning mot algebraiska strukturer i fysiken. Sista ansökningsdag är den 15 november. Web-info: <http://ledig-anstallning.adm.gu.se/#>.
13. Göteborgs universitet söker en doktorand i matematik med inriktning mot numerisk analys av atomära beräkningar. Sista ansökningsdag är den 15 november. Web-info: <http://ledig-anstallning.adm.gu.se/#>.
14. Lunds universitet söker en doktorand i matematisk statistik. Sista ansökningsdag är den 26 oktober. Web-info: <http://www3.lu.se/info/lediga/admin/document/PA%202007-3454.pdf>.

Old information

Jobs to apply for

15. Örebro universitet söker en universitetslektor i matematik med inriktning mot matematikens didaktik. Sista ansökningsdag är den 8 oktober. Web-info: <http://www.oru.se/templates/oruextAdViewer.aspx?id=2303&adPageID=43383>.
 16. Uppsala universitet söker två doktorander i matematisk biologi. Sista ansökningsdag är den 28 september. Web-info: <http://www.personalavd.uu.se/ledigaplatser/2030dorand.html>.
 17. 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.
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