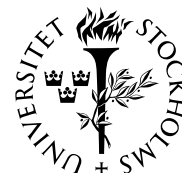




BRÅKET



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

NR 24

FREDAGEN DEN 15 AUGUSTI 2008

BRÅKET

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

Redaktör: Gunnar Karlsson

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<http://www.math.kth.se/braket/>

Postadress:

Red. för Bråket
Institutionen för matematik
KTH
100 44 Stockholm

Sista manustid för nästa nummer:
Torsdagen den 21 augusti kl. 13.00.

Professor Gregory Beylkin

besöker KTH och skall hålla två
seminarier. Se sidan 3.

Kurser

Chris Byrnes: The Generalized
Moment Problem and Rational
Measures. Se sidorna 4–5.

Svante Linusson: Graph Theory.
Se sidan 8.

SEMINARIER

Ti 08–19 kl. 14.00. Seminarium i matematik. Todd
Quinto, Tufts University: *Microlocal analysis and
slant hole SPECT*. Rum 306, hus 6, Matematiska
institutionen, SU, Kräftriket.

On 08–20 kl. 13.15–14.15. Seminarium i analys och
dynamiska system. (*Observera lokalen!*) Profes-
sor Gregory Beylkin, Bolder, Colorado: *Discrete
transforms for band-limited functions in a disk*. Sal
D3, KTH, Lindstedtsvägen 5, b.v. Se sidan 3.

On 08–20 kl. 16.00–17.00. KTH/SU Mathematics
Colloquium. (*Observera lokalen!*) Professor
Gregory Beylkin, Bolder, Colorado: *Separated
representations and algorithms for multidimen-
sional operators*. Sal D3, KTH, Lindstedtsvägen
5, b.v. Kaffe/te serveras kl. 15.30 i pausrummet,
Institutionen för matematik, KTH, Lindstedts-
vägen 25, plan 4. Se sidan 3.

Fortsättning på nästa sida.

Nordic-Russian Symposium in honour of Vladimir Maz'ya on the occasion of his 70th birthday

Detta skall äga rum i Stockholm den 25–27 augusti 2008. Se
sidan 5.

Geometry and Analysis

En konferens med denna titel skall äga rum vid KTH den
25–29 augusti 2008. Se sidorna 6–7.

The Philosophy of Logical Consequence

En workshop med denna titel skall äga rum i Uppsala den 31
oktober – 2 november 2008. Se sidan 7.

Seminarier (fortsättning)

Fr 08–22 kl. 11.00–12.00. Optimization and Systems Theory Seminar. Amol Sasane, London School of Economics: *Completing to an isomorphism in a Wiener algebra used in control theory*. Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se nedan.

Ti 08–26 kl. 13.15–14.15. DNA-seminariet Uppsala-KTH (Dynamical systems, Number theory, Analysis). Bertrand Deroin, Université de Paris-Sud, Orsay: *Polynomial ODEs in the complex domain; a probabilistic approach*. Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se nedan.

To 08–28 kl. 10.30. Seminar in Fluid Mechanics. Fulvio Martinelli, Politecnico di Milano: *Application of Wiener filtering theory to state estimation in wall bounded flows*. Seminarierummet, Institutionen för mekanik, KTH, Teknikringen 8. Se sidan 8.

To 08–28 kl. 14.15. Presentation av examensarbete i matematik. Dan Petersen: *Equivariant point counts of involutorial hyperelliptic curves*. Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 9.

OPTIMIZATION AND SYSTEMS THEORY SEMINAR

Amol Sasane:

Completing to an isomorphism in a Wiener algebra used in control theory

Abstract: We will address the question of whether a left invertible matrix with entries in a certain Banach algebra A can be completed to an invertible matrix with entries in A . The Banach algebra A we consider arises naturally in control theory as a class of stable transfer functions, and the relevance of the problem of completion to an isomorphism in control theory will also be explained.

Tid och plats: Fredagen den 22 augusti kl. 11.00–12.00 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

DNA-SEMINARIET UPPSALA-KTH (DYNAMICAL SYSTEMS, NUMBER THEORY, ANALYSIS)

Bertrand Deroin:

Polynomial ODEs in the complex domain; a probabilistic approach

Abstract: I will survey a joint work with V. Kleptsyn. This is about the study of the Brownian motion along the solutions of a polynomial differential equation in the complex domain. We will see how such Markov processes are unable to understand some dynamical/geometrical aspects of these differential equations, for which many simple questions remain open.

Tid och plats: Tisdagen den 26 augusti kl. 13.15–14.15 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

Professor Gregory Beylkin visits KTH

Professor Gregory Beylkin, Bolder, Colorado, visits KTH from August 11 to August 21, 2008.

Gregory Beylkin is a world prominent mathematician in the areas of numeric and harmonic analysis.

He is an invited speaker at the conference Integral Geometry and Tomography at the Department of Mathematics, Stockholm University, August 12–15.

Besides his conference talk at SU (Friday, August 15, at 12.00–12.50), Gregory Beylkin will also give two talks at the Department of Mathematics, KTH, on Wednesday, August 20. See below on this page.

Professor Beylkin's visit to Stockholm is supported by CIAM, the Wenner-Gren Foundation, and possibly also by the Wallenberg Foundation.

Jan-Olov Strömberg

SEMINARIUM I ANALYS OCH DYNAMISKA SYSTEM

Gregory Beylkin:

Discrete transforms for band-limited functions in a disk

Abstract: We describe Slepian functions for mapping a square in space to a disk in the Fourier domain and associated Fast Discrete Fourier Transforms and their adjoints. Since these transforms are not unitary, we develop a fast inversion algorithm and derive corresponding estimates that allow us to avoid iterative methods typically used for inversion.

In the process, we construct polar grids which provide quadratures and interpolation with controlled accuracy for functions, band-limited within a disk in the Fourier domain. For rapid computation of trigonometric sums we use the Unequally Spaced Fast Fourier Transform, thus yielding fast algorithms for all new transforms.

Tid och plats: Onsdagen den 20 augusti kl. 13.15–14.15 i sal D3, KTH, Lindstedtsvägen 5, b.v.

KTH/SU MATHEMATICS COLLOQUIUM

Gregory Beylkin:

Separated representations and algorithms for multidimensional operators

Abstract: Separated representation of multidimensional integral operators with radially symmetric kernels leads to fast algorithms for their application. This approach is also applicable to singular and hypersingular operators ubiquitous in physics. Such approximations and algorithms are already used in quantum chemistry and have a strong potential to address computational problems in other applications. The talk is an overview of the approach and some of its applications.

Tid och plats: Onsdagen den 20 augusti kl. 16.00–17.00 i sal D3, KTH, Lindstedtsvägen 5, b.v. Kaffe/te serveras kl. 15.30 i pausrummet, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 4.

GRADUATE COURSE IN OPTIMIZATION AND SYSTEMS THEORY

Chris Byrnes:

The Generalized Moment Problem and Rational Measures

This is the second announcement of a Ph.D. course with the above-mentioned title, given by *Professor Chris Byrnes* and sponsored by CIAM and ACCESS.

Professor Chris Byrnes from Washington University in St. Louis, USA, will visit the Optimization and Systems Theory division at KTH during August 2008. He is a charismatic lecturer and a most renowned expert in automatic control, nonlinear systems and signal processing. Next follows the abstract of the course, which is then followed by a schedule of the classes.

Lectures on Moment Problems in Signals, Systems and Control

Abstract: Beginning with Chebychev's use of power moments to prove the Central Limit Theorem in the 19th century, the moment problem has matured from its various special forms to a general class of problems that continues to exert profound influence on the development of analysis and its applications to a wide variety of fields. The crossroads of signals, systems and control are no exception, where moment methods have historically been used in circuit theory, model reduction, optimal control, robust control, signal processing, spectral estimation, and stochastic realization theory. Indeed, the moment problem as formulated by Krein et al. is a beautiful generalization of several important classical moment problems, including the power moment problem, the trigonometric moment problem, and the moment problem arising in Nevanlinna-Pick interpolation.

In this course, we first explore an array of examples, starting with Chebychev's calculations and with the classical use of moments for a form of model reduction. This naturally leads to the interpretation of a broad range of interpolation problems within the context of the generalized moment problem, in the sense of Krein and Nudel'man. We also review the moment problem as formulated by Markov and its application to time optimal control. Each of these formulations involve a natural constraint on the required form of the solution of the corresponding moment problem, but both make essential use of convexity.

Motivated by classical applications and examples, in both finite- and infinite-dimensional system theory, we recently formulated another version of the moment problem that we call the moment problem for positive rational measures. The formulation reflects the importance of rational functions in engineering applications. While this version of the problem is decidedly nonlinear, the basic tools still rely on convexity. In particular, we present a solution to this problem in terms of a convex optimization problem that generalizes the maximum entropy approach used in several classical special cases. We conclude with several applications to problems in signals, systems and control.

The course will be held as an intensive course over 6 lectures during the last two weeks in August, that is from August 18 to 29.

The lectures will be given in the seminar rooms at the Department of Mathematics, KTH, Lindstedtsvägen 25, floor 7, at the time 10–12 on the following days.

Monday, August 18, in seminar room 3733,
 Wednesday, August 20, in seminar room 3721,
 Thursday, August 21, in seminar room 3721,
 Monday, August 25, in seminar room 3721,
 Wednesday, August 27, in seminar room 3721,
 Thursday, August 28, in seminar room 3721.

(Continued on the next page.)

Further information will be available (soon) on the homepages from both ACCESS and CIAM, and you are welcome to contact me (e-mail: penqvist@kth.se) if you have further questions.

Welcome to the course!
Per Enqvist

**Nordic-Russian Symposium
in honour of Vladimir Maz'ya
on the occasion of his 70th birthday**

The symposium will take place in Stockholm during August 25 – 27, 2008.

Vladimir Maz'ya is Professor Emeritus at Linköping University, Professor of the Ohio State University and Liverpool University, and member of the Royal Swedish Academy of Sciences.

Professor Maz'ya is widely regarded as a truly outstanding mathematician, whose illustrious work spans for 50 years and covers many areas of mathematics. He has authored and coauthored more than 400 papers and 20 books containing fundamental results and powerful novel techniques.

Besides being remarkably deep and innovative, his work is also incredibly diverse. This is amply illustrated by a mere enumeration of the areas in which he has produced significant results: equivalence of isoperimetric and integral inequalities, counterexamples related to the 19th and 20th Hilbert problems, theory of capacities and nonlinear potentials, boundary behaviour of solutions to elliptic equations, non-elliptic singular integral and pseudodifferential operators, degenerating oblique derivative problem, estimates for general differential operators, the method of boundary integral equations, linear theory of surface waves, the Cauchy problem for the Laplace equation, theory of multipliers in spaces of differentiable functions, characteristic Cauchy problem for hyperbolic equations, boundary value problems in domains with piecewise smooth boundaries, asymptotic theory of differential and difference equations with operator coefficients, maximum modulus principle for elliptic and parabolic systems, iterative procedures for solving ill-posed boundary value problems, asymptotic theory of singularly perturbed boundary value problems, numerical analysis and approximation theory . . .

Organizing Committee: Christer Kiselman, Grigori Rozenblioum, and Henrik Shahgholian.

Speakers: A. Björn (Linköping), J. Björn (Linköping), B. Fuglede (Copenhagen), B. Gustafsson (Stockholm), H. Hedenmalm (Stockholm), R. Hurri-Syrjänen (Helsinki), T. Kilpeläinen (Jyväskylä), P. Koskela (Jyväskylä), N. Kruglyak (Luleå), A. Laptev (London/Stockholm), S. Maad (Stockholm), L. Maligranda (Luleå), O. Martio (Helsinki), A. Nazarov (St. Petersburg), J. Peetre (Lund), L.-E. Persson (Luleå/Uppsala), S. Poborchi (St. Petersburg), G. Seregin (St. Petersburg), T. Shaposhnikova (Linköping), S. Shimorin (Stockholm), P. Sjölin (Stockholm), A. Szulkin (Stockholm), N. Uraltseva (St. Petersburg), and G. S. Weiss (Tokyo).

A complete schedule with abstracts can be found on the homepage of the symposium: <http://www.math.kth.se/mazya/>.

GEOMETRY AND ANALYSIS

Lecture hall E1, KTH, August 25 – 29, 2008

This conference brings together leading specialists on nonlinear wave equations, geometric analysis and general relativity. Among the topics to be covered are nonlinear wave equations, black hole uniqueness and stability, conformal geometry, curvature flows as well as aspects of the constraint equations and the initial value problem for the Einstein equations. The conference is sponsored by the **Göran Gustafsson Foundation**, the **Swedish Research Council**, the **Wenner-Gren Foundations**, and the **National Science Foundation**.

Organizers: **Lars Andersson**, **Piotr Chruściel**, and **Hans Ringström**.

For more information, see <http://www.math.kth.se/ag08/>. All the lectures will be given in the lecture hall E1, KTH, Lindstedtsvägen 3, ground floor. A preliminary schedule is given below. *Everyone is very welcome!*

Monday, August 25

- 9.30 – 10.30 **Alice Chang**, Princeton: *Boundary regularity of Bach flat metrics.*
- 11.00 – 12.00 **Heinz-Otto Kreiss**, KTH: *Initial boundary value problems for second order systems.*
- 14.00 – 15.00 **Helmut Friedrich**, Albert Einstein Institute: *Asymptotic staticity and regularity at null infinity.*
- 15.30 – 16.30 **Sergiu Klainerman**, Princeton: *A breakdown criterion in general relativity.*

Tuesday, August 26

- 9.30 – 10.30 **Alan Rendall**, Albert Einstein Institute: *Cosmological perturbation theory.*
- 11.00 – 12.00 **Håkan Andreasson**, Göteborg: *The formation of black holes in spherically symmetric gravitational collapse of Vlasov matter.*
- 14.00 – 15.00 **Bruce Kleiner**, Yale: *Title to be announced.*
- 15.30 – 16.30 **Igor Rodnianski**, Princeton: *Waves and the problem of black hole stability.*

Wednesday, August 27

- 9.30 – 10.30 **Daniel Tataru**, Berkeley: *Title to be announced.*
- 10.30 – 11.30 **Serge Alinhac**, Paris: *Energy multipliers for perturbations of Schwarzschild metric.*
- 12.00 – 13.00 **Jan Metzger**, Albert Einstein Institute: *Marginally trapped surfaces and apparent horizons.*

Thursday, August 28

- 9.30 – 10.30 **Gerhard Huisken**, Albert Einstein Institute: *The isoperimetric inequality in general relativity.*
- 11.00 – 12.00 **Dan Lee**, Duke University: *The Riemannian Penrose inequality in dimensions less than 8.*
- 14.00 – 15.00 **Frank Pacard**, Paris: *Extremal domains for the first eigenvalue of the Laplacian.*
- 15.30 – 16.30 **Hans Ringström**, KTH: *Future stability of solutions to the Einstein non-linear scalar field system corresponding to initial data on the n -torus.*

(Continued on the next page.)

Friday, August 29

- 9.30–10.30 **Joachim Krieger**, University of Pennsylvania: *New results on singularity formation for critical wave equations.*
- 11.00–12.00 **Piotr Bizon**, Krakow: *Scattering, blowup, and criticality for semilinear wave equations with power nonlinearities.*
- 14.00–15.00 **Frank Merle**, Paris: *Sharp condition for global existence for energy critical nonlinear wave equation.*
- 15.30–16.30 **Alexandru Ionescu**, Wisconsin: *Global Schrödinger maps: small data in the critical Sobolev spaces.*

WORKSHOP

The Philosophy of Logical Consequence

Denna workshop skall äga rum under tiden 31 oktober – 2 november 2008 i Thunbergsalen, Kollegiet för Samhällsforskning (SCAS) Thunbergsvägen 2, Uppsala. Den arrangeras av Nationalkommittén för logik, metodologi och filosofi (KVA) i samarbete med Kollegiet för Samhällsforskning (SCAS) och institutionerna för filosofi och matematik vid Uppsala universitet.

Inbjudna talare: John Cantwell (KTH), Matti Eklund (Cornell), Sten Lindström (SCAS/Umeå), Per Martin-Löf (Stockholm), Sara Negri (Helsingfors), Peter Pagin (Stockholm), Erik Palmgren (Uppsala), Dag Prawitz (Stockholm), Stephen Read (St. Andrews), Tor Sandqvist (KTH), Gabriel Sandu (Helsingfors/Paris), Peter Schroeder-Heister (Tübingen), Sören Stenlund (Uppsala), Göran Sundholm (Leiden) och Dag Westerståhl (Göteborg).

Abstract: There is a traditional picture of logic that may be spelled out as follows: Logic is concerned with the principles for correct reasoning and valid arguments; its principles are universal, necessary, apriori and formal; logically valid arguments are necessarily truth-preserving and have a fundamental epistemic significance; and finally, logic is in some sense a normative discipline. This traditional picture gives rise to many questions. The notions of universality, logical necessity, apriority, and formality are difficult to analyse. In what sense, if any, is logic normative? Is there a principled way of distinguishing between logical and non-logical concepts?

While continuing to face these foundational questions, logic has developed into an advanced mathematical discipline — mathematical logic — where the informal notions of logical proof, validity and logical consequence are given mathematical explications. In mathematical logic, there are two major approaches to these notions: model-theoretic and proof-theoretic ones. Both are faced with philosophical problems: To what extent do they correspond to our pre-theoretic requirements on logical consequence? Which requirements should we expect an explication of logical consequence to meet? Is there only one satisfactory explication of the notion of logical consequence, or are there several equally good ones? Do the two approaches compete or rather complement each other? These and related questions will be discussed during the workshop.

Organisationskommitté: Sten Lindström, Erik Palmgren, Rysiek Sliwinski och Dag Westerståhl.

Kontaktperson, information, frågor: Professor Sten Lindström, telefon 070-213 0178, e-post Sten.Lindstrom@philos.umu.se.

Alla intresserade är välkomna!

SEMINAR IN FLUID MECHANICS

Fulvio Martinelli:

Application of Wiener filtering theory to state estimation in wall bounded flows

Abstract: State estimation based on limited wall measurements is key to the practical realizability of flow control systems for wall bounded flows. In particular, applications of linear Kalman filtering theory have been subject of recent research, with encouraging results. The seminar will briefly review the state-of-the-art linear time-invariant estimation techniques, as applied to wall bounded turbulent flows. Moreover, a possible extension of the Kalman approach to take into account the time structure of a coloured noise on the state equations will be discussed. It will be shown that such classical state-space approach, based on the design of a proper noise shaping filter, is computationally unfeasible. An alternative formulation of the entire estimation problem, based on Wiener filtering theory, greatly reduces the computational cost; this formulation will be discussed in detail and compared to the Kalman approach.

Tid och plats: Torsdagen den 28 augusti kl. 10.30 i seminarierummet, Institutionen för mekanik, KTH, Teknikringen 8.

GRADUATE COURSE IN MATHEMATICS

Svante Linusson: Graph Theory

First lecture: Thursday, September 4, at 10.15–12.00 (we plan to meet once a week on this time) in seminar room 3733, Department of Mathematics, KTH, Lindstedtsvägen 25, floor 7. If you want to follow the course but cannot come to the first lecture, please contact me at e-mail linusson@math.kth.se.

Literature: REINHARD DIESTEL, *Graph Theory*, (3rd edition), GTM, Springer-Verlag. The contents of the book are freely available on the following website: <http://www.math.uni-hamburg.de/home/diestel/books/graph.theory/>.

Course homepage: <http://www.math.kth.se/~linusson/Graphs/>.

The course will be problem oriented, which means that we will start from interesting problems which will then force us to learn useful and relevant techniques to solve these problems. The students will be expected to read the chapters and solve problems before the classes. Most of the lectures will be devoted to students presenting the solutions to the problems and to special interesting theorems from the book.

At the course start we will have a list of areas to go through, but this could be altered if some students have a special interest. We think that this course could be of interest also to Ph.D. students from other departments.

There are no formal prerequisites for the course. We only need some basics from linear algebra, topology and probability at some places throughout the course. But a genuine interest in graph theory and a willingness to work hard is assumed.

Welcome!

Svante Linusson

PRESENTATION AV EXAMENSARBETE I MATEMATIK

Dan Petersen:

Equivariant point counts of involutorial hyperelliptic curves

Abstract: We are interested in the locus of bielliptic curves inside $\mathcal{M}_{2,n}$, the moduli space of curves of genus two with n marked points; in particular, we are interested in the number of points on this locus over any finite field. The bielliptic curves are exactly those with an extra involution apart from the hyperelliptic one. Thus we can generalize to the study of hyperelliptic curves with an extra involution. We describe how a method due to J. Bergström, originally for making (equivariant) point counts of the moduli space of n -pointed hyperelliptic curves, can be extended to the case of an extra involution as well. The method gives recursive equations in the genus for the number of points over any finite field. By expressing the point counts for curves of genus zero and one in terms of known cohomological data, we find explicit formulae for the number of points for $n \leq 5$. As the number of points over finite fields is related to cohomology, this allows us to conjecturally calculate the S_n -equivariant Hodge-Euler characteristic of this space for n up to five.

Tid och plats: Torsdagen den 28 augusti kl. 14.15 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.
