BRÅKET

Information om seminarier och högre undervisning i matematiska ämnen i Stockholmsområdet

NR 26 **FREDAGEN DEN 31 AUGUSTI 2007**

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 6 september kl. 13.00.

Disputation i teoretisk fysik

Åsa Ericsson disputerar vid SU på avhandlingen *Exploring the Set of Quantum States* måndagen den 17 september kl. 13.00. Se sidan 6.

Workshops vid Institut Mittag-Leffler

Den första av två workshops äger rum den 10 – 14 september. Se Bråket nr 24 sidan 6.

SEMINARIER

Fr 08–31 kl. 11.00 – 12.00. Optimization and Systems Theory Seminar. Per-Olof Gutman, Technion University, Israel, och KTH: *MRAC of linear systems with input and state delays.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 3.

Må 09–03 kl. 15.15 – 16.00. Seminarium i finansiell matematik. Christoffer Jevring presenterar sitt examensarbete: *The t-distribution in latent variable models for credit risk.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 2.

Ti 09–04 kl. 10.15. Plurikomplexa seminariet. Jan-Erik Björk, SU: *Positive Riesz measures in* **C** *whose Cauchy transforms satisfy an algebraic equation.* Rum 306, hus 6, Matematiska institutionen, SU, Kräftriket. Se Bråket nr 25 sidan 6.

On 09–05 kl. 10.15 – 12.00. Kombinatorikseminarium. Axel Hultman, KTH: *Connections between inversion arrangements and Bruhat intervals.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 3.

On 09–05 kl. 10.30. Logikseminariet Stockholm-Uppsala. Erik Palmgren: *Remarks on domain representability and formal topology.* Sal 11167, Ångströmlaboratoriet, Uppsala universitet. Se sidan 4.

On 09–05 kl. 11.00 – 12.00. Common SU KoF/KTH Theoretical Physics Seminar. Soucheng Zhang, Stanford University: *Quantum spin Hall effect.* Sal FA31, Roslagstullsbacken 21, AlbaNova universitetscentrum.

Fortsättning på nästa sida.

Kurs

Torbjörn Kolsrud: Stokastisk analys. Se sidan 4.

Seminarier (fortsättning)

On 09–05 kl. 13.15 – 14.15. Seminarium i analys och dynamiska system. Brett D. Wick, Vanderbilt och KTH: *Multiparameter Riesz commutators.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 5.

To 09–06 kl. 14.00 – 15.00. Mittag-Leffler Seminar. Mark Freidlin, University of Maryland: *Averaging for deterministic and stochastic perturbations.* Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 3.

To 09–06 kl. 15.30 – 16.30. Mittag-Leffler Seminar. Michael Scheutzow, Technical University Berlin: *Chaining techniques and their application to stochastic flows.* Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 4.

Fr 09–07 kl. 13.15 – 14.15. Graduate Student Seminar. Alan Sola, Matematik, KTH: *Title to be announced.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

Må 09–10 kl. 13.15. Seminarium i teoretisk datalogi. Christian Schulte, Institutionen för elektronik-, dator- och programvarusystem, KTH-Kista: *Generating propagators for finite set constraints.* Rum 1537, KTH CSC, Lindstedtsvägen 3, plan 5. Se sidan 6.

On 09–12 kl. 11.00 – 12.00. Common SU KoF/KTH Theoretical Physics Seminar. Z. Tesanovich, Johns Hopkins University: *d-wave duality, gauge theories and the physics of high temperature superconductors.* Sal FA31, Roslagstullsbacken 21, AlbaNova universitetscentrum.

On 09–12 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.

To 09–13 kl. 15.00 – 16.00. AlbaNova and Nordita Colloquium in Physics. Bertrand Duplantier, CEA Saclay, France: *Einstein and Brownian Motion.* Oskar Kleins auditorium, Roslagstullsbacken 21, AlbaNova universitetscentrum.

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 sidan 5.

SEMINARIUM I FINANSIELL MATEMATIK

Christoffer Jevring

presenterar sitt examensarbete:

The t-distribution in latent variable models for credit risk

Abstract: This thesis generalizes the Credit Metrics model by introducing the multivariate t-distribution as the distribution for the underlying assets. The behaviour of the model is examined and arguments for its use are presented. By considering a well diversified homogeneous portfolio of loans, the so-called Basel formula for capital requirement is generalized to this setting.

Tid och plats: Måndagen den 3 september kl. 15.15 – 16.00 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

OPTIMIZATION AND SYSTEMS THEORY SEMINAR

Per-Olof Gutman:
MRAC of linear systems with input and state delays

Abstract: State feedback Lyapunov-based design of direct model reference adaptive control (MRAC) for a class of linear systems with input and state delays, based only on the lumped delays without so-called distributed-delay (DD) blocks, are developed. The design procedure is based on the concept of reference trajectories prediction and formulation of an augmented error. We propose of a controller parametrization which attempts to anticipate the future states. The appropriate Lyapunov-Krasovskii type functional is introduced. A simulation example illustrates the new controller.

This is joint work with Boris Mirkin and Eugene L. Mirkin.

Index terms: Adaptive control, time-delay systems.

Tid och plats: Fredagen den 31 augusti kl. 11.00 – 12.00 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

KOMBINATORIKSEMINARIUM

Axel Hultman:
Connections between inversion arrangements and Bruhat intervals

Abstract: With a permutation w of the set $\{1, \ldots, n\}$ we may associate an arrangement of hyperplanes in $\mathbb{R}^n$ by including the hyperplanes given by $x_i = x_j$ whenever (i, j) is an inversion of w. A conjecture of A. Postnikov asserts that the number of regions in the complement of this *inversion arrangement* is at most the number of elements weakly below w in the Bruhat order. He also conjectured a characterization of the permutations for which the two numbers are equal; intriguingly these permutations already have appeared in seemingly non-related work of Sjöstrand and Reiner-Gasharov.

In the talk, I will sketch a proof of Postnikov's conjecture. Generalizations beyond symmetric groups, and byproducts such as inequalities relating Betti numbers of complexified inversion arrangements and Schubert varieties will be touched upon.

This is joint work with S. Linusson, J. Shareshian and J. Sjöstrand.

Tid och plats: Onsdagen den 5 september kl. 10.15 – 12.00 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

MITTAG-LEFFLER SEMINAR

Mark Freidlin:
Averaging for deterministic and stochastic perturbations

Abstract: Although the averaging principle for small deterministic perturbations goes back for a couple of centuries, rigorous mathematical results, especially for systems with many degrees of freedom, appeared much later, and many problems are still open. I will explain that, actually, to justify averaging for deterministic perturbations, one should consider them together with stochastic perturbations. Even in the pure determinstc case, the result of averaging can be a stochastic process.

Tid och plats: Torsdagen den 6 september kl. 14.00 – 15.00 vid Institut Mittag-Leffler, Auravägen 17, Djursholm.

KURS I MATEMATIK

Torbjörn Kolsrud: Stokastisk analys, 5 p

Med anledning av höstens verksamhet vid Institut Mittag-Leffler kommer jag att föreläsa cirka en gång per vecka under höstterminen. Ingen särskild kursbok, ingenting om finans. Material i urval hämtas från böcker av Dellacherie-Meyer, Emery, Fukushima, Ikeda-Watanabe, Malliavin (Montreal Lecture Notes), Protter, Revuz-Yor, ...

Ämnen som skall behandlas är bl.a. Dirichletrum (Beurling och Deny), Markovprocesser, främst diffusioner, martingaler, stokastiska integraler, transformationsformler, symmetrier och konserveringslagar, diffusioner i mångfalder.

Jag vill också koppla samman med klassisk analys, harmoniska funktioner, konformalitet, maximalolikheten, m.m., samt ODE.

Tid och plats: Måndagar kl. 15.15 – 17.00 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7, med början den 3 september. Totalt omfattar kursen cirka femton föreläsningar.

Välkomna!

Torbjörn Kolsrud
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LOGIKSEMINARIET STOCKHOLM-UPPSALA

Erik Palmgren:
Remarks on domain representability and formal topology

Abstract: The theory of domain representations due to Stoltenberg-Hansen and Tucker gives a method for introducing notions of computability on abstract mathematical structures. The method has been applied successfully to different classes of topological spaces. In this talk we shall start from the observation that formal topology includes a constructive theory of domains. Then we show that every formal topology $\mathcal{S}$, canonically, gives a domain representation of its space of points $X = \mathrm{Pt}(\mathcal{S})$.

There are, however, clear limitations to the formal topology method, as it only applies to sober spaces. The purpose here is merely to demonstrate one basic connection between the two methods for representing spaces.

Tid och plats: Onsdagen den 5 september kl. 10.30 i sal 11167, Ångströmlaboratoriet, Uppsala universitet.

MITTAG-LEFFLER SEMINAR

Michael Scheutzow:
Chaining techniques and their application to stochastic flows

Abstract: We review some chaining techniques and demonstrate how they can be applied to obtain upper bounds on the diameter of the image of a bounded set under a stochastic flow on a Euclidean space.

Tid och plats: Torsdagen den 6 september kl. 15.30 – 16.30 vid Institut Mittag-Leffler, Auravägen 17, Djursholm.

SEMINARIUM I ANALYS OCH DYNAMISKA SYSTEM

Brett D. Wick:
Multiparameter Riesz commutators

Abstract: An important question in analysis is to determine the behaviour of an operator associated to a symbol purely from data about the symbol. For example, a multiplication operator is bounded if and only if the symbol is bounded. We will be interested in determining necessary and sufficient conditions on the symbol which will imply that a commutator between a multiplication operator and a singular integral operator is bounded. This commutation allows for cancellation to play a role and is a significant feature in determining conditions on the symbol. In addition to the history behind this problem, connections with real and complex analysis in one and several variables and interpretations of these results in operator theory and function theory will be highlighted. Finally, recent results will be discussed.

This is joint work with Michael Lacey, Stefanie Petermichl and Jill Pipher.

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

OPTIMIZATION AND SYSTEMS THEORY SEMINAR

Luca Schenato:
Some results on optimal estimation and control for lossy networked control

Abstract: The rapid convergence of sensing, computing and wireless communication technologies on cost effective, low power, miniature devices, is enabling a host of new applications. In particular, wireless sensor networks have the ability to inexpensively gather data over a network at a very fine temporal and spatial granularity. So far sensor networks have been employed for static monitoring applications, but their ability to process data in real-time could enable a number of new control applications. However, control applications running over these distributed networks have to deal with important issues such as communication delay, data loss, time-synchronization, power management, scaling, just to name a few.

In this talk I will describe some problems related the effect of packets loss and random delay on the design and performance of networked control. In particular, I will try to show that communication and control are tightly coupled and they cannot be addressed independently. For example, where should we place my controller?; near the sensors, near the actuators or somewhere in the middle? What is the impact of packet loss on the closed loop performance? Which features should communication protocols have to reduce performance degradation due to packet loss? If sensors and actuators are provided with computational resources, can we use them to improve performance? From a closed-loop performance perspective, is it better to have protocols with small packet delay and high packet loss or protocols with low packet loss and longer delay? If actuators have no computational resources, what should we do when a control packet is loss: use the previous control values (hold-input) or do nothing (zero-input)? These are some of the questions addressed in the presentation. I will propose some possible solutions and comment on their implications on the design of general networked control systems.

Tid och plats: Fredagen den 14 september kl. 11.00 – 12.00 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

SEMINARIUM I TEORETISK DATALOGI

Christian Schulte:
Generating propagators for finite set constraints

Abstract: Constraint programming is a successful and widely used method for solving combinatorial optimization problems. An essential ingredient for any constraint programming system are propagators implementing constraints performing strong constraint propagation.

Ideally, programming propagators as implementations of constraints should be an entirely declarative specification process for a large class of constraints: a high-level declarative specification is automatically translated into an efficient propagator.

This talk introduces the use of existential monadic second-order logic as declarative specification language for finite set propagators. The approach taken is to automatically derive projection propagators (involving a single variable only) implementing constraints described by formulas. By this, we transfer the ideas of indexicals to finite set constraints, while considerably increasing the level of abstraction available with indexicals. We show soundness and completeness of the derived propagators and present a runtime analysis, including techniques for efficiently executing projectors for n-ary constraints.

The talk is based on joint work with Guido Tack and Gert Smolka, both working at Programming Systems Lab, Saarland University, Germany.

Tid och plats: Måndagen den 10 september kl. 13.15 i rum 1537, KTH CSC, Lindstedtsvägen 3, plan 5.

DISPUTATION I TEORETISK FYSIK

Åsa Ericsson

disputerar vid SU på avhandlingen

Exploring the Set of Quantum States

måndagen den 17 september 2007 kl. 13.00 i sal FB42, Roslagstullsbacken 21, AlbaNova universitetscentrum. Till opponent har utsetts *Christopher Fuchs,* Perimeter Institute, Canada.

Abstract of the thesis

Quantum mechanical properties of finite-dimensional quantum systems are used within the field of quantum information. In this thesis the set of states (density matrices) for such systems is studied and described, largely in geometrical terms. The introductory part also acquaints the reader with relevant background about majorization, bistochastic matrices, mutually unbiased bases, Hadamard matrices and entanglement, with the aim to make the papers attached easier to read.

Paper I considers Peres' criterion for separability, for two qubit states. Paper II deals with the problem of how density matrices can be mixed from pure states, especially what probability distributions over pure states that are possible. In Paper III the set of bistochastic matrices — Birkhoff's polytope — and the subset of unistochastic matrices is studied, with a detailed description in dimensions 3 and 4. In Paper IV it is seen how the states of a complete set of mutually unbiased bases form a polytope in the set of density matrices, with certain combinatorial properties. A search for mutually unbiased bases in dimension 6 is presented in Paper VI, which includes a thorough discussion on 6 by 6 Hadamard matrices. Paper V presents a result about geodesics in the set of quantum states with respect to the curved Bures-Uhlmann geometry.
