BRÅKET

Information om seminarier och högre undervisning i matematiska ämnen i Stockholmsområdet

NR 13 **FREDAGEN DEN 4 APRIL 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 10 april kl. 13.00.

SEMINARIER

Fr 04–04 kl. 11.00 – 12.00. Optimization and Systems Theory Seminar. Chung-Yao Kao, Institut Mittag-Leffler, Djursholm: *Efficient computational algorithms for IQC analysis.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 11 sidan 7.

Må 04–07 kl. 13.00. Seminarium i teoretisk datalogi. Gustav Hast, Nada, KTH: *Bevisbar säkerhet och svåra predikat.* Rum 1537, Nada, KTH. Se Bråket nr 12 sidan 7.

Må 04–07 kl. 15.15 – 16.00. Seminarium i finansiell matematik. Anders Holst presenterar sitt examensarbete: *Utility Based Pricing of Credit Risk Derivatives in Incomplete Markets.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 3.

Må 04–07 kl. 16.15 – 17.00. Seminarium i finansiell matematik. Mårten Grebäck presenterar sitt examensarbete: *An Analytic Framework for Computing Value-at-Risk in Incomplete Markets with Credit Risk.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 6.

Fortsättning på nästa sida.

MITTAG-LEFFLER SEMINAR

Alexandre Megretski: Robustness of finite state automata

Abstract: The classical robust control deals with systems that can be approximated by finite order linear time-invariant (LTI) models, uses integral constraints, such as induced gain bounds, to assess robustness with respect to the error of such approximation, and employs H-infinity optimization to design robust controllers. This talk will describe mathematical results, application examples, and open problems associated with an attempt to build an alternative robust control framework, in which finite state automata play the role of nominal models.

Tid och plats: Torsdagen den 10 april kl. 15.30 – 16.30 vid Institut Mittag-Leffler, Auravägen 17, Djursholm.

Seminarier (fortsättning)

Ti 04–08 kl. 14.00 – 15.00. Mittag-Leffler Seminar. Velimir Jurdjevic, University of Toronto, Canada: *Mechanical tops and their elastic extensions.* Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 4.

Ti 04–08 kl. 15.30 – 16.30. Mittag-Leffler Seminar. Amol Sasane, University of Groningen, the Netherlands: *Hankel norm approximation for infinite-dimensional systems.* Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 3.

On 04–09 kl. 10.00 – 11.45. Logikseminariet Stockholm-Uppsala. Jens Brage presenterar en nyskriven uppsats med titeln: *A classical tableau calculus.* Sal 16, hus 5, Matematiska institutionen, SU, Kräftriket.

On 04–09 kl. 13.15. Seminarium i analys och dynamiska system. Eero Saksman, Helsingfors: *The boundary correspondence of the Nevanlinna counting function on the unit disk.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

On 04–09 kl. 13.15. Algebra- och geometriseminarium. Vincenzo Micale, Catania: *On the homology of* $\mathrm{Der}_k(A)$*, for affine monomial curves* A*.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 4.

On 04–09 kl. 15.15. Seminarium i matematisk statistik. Professor Ørnulf Borgan, Universitetet i Oslo: *Cox regression for nested case-control data: A marked point process approach.* Rum 306 (Cramérrummet), hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 5.

To 04–10 kl. 14.00 – 15.00. Mittag-Leffler Seminar. Anders Rantzer, Lunds universitet: *On dissipation, density and decentralization.* Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 4.

To 04–10 kl. 15.30 – 16.30. Mittag-Leffler Seminar. Alexandre Megretski, Massachusetts Institute of Technology, USA: *Robustness of finite state automata.* Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 1.

To 04–10 kl. 16.15 – 18.00. Seminarium i matematik och fysik vid Mälardalens högskola (Eskilstuna). Johan Grundberg, Mälardalens högskola: *Fotonen och den fotoelektriska effekten.* Lektionssal H122, Mälardalens högskola, Eskilstuna.

Fr 04–11 kl. 10.00 – 12.00. Högre seminariet i språkfilosofi och logik. Fritz Hamm, Tübingen: *Sense and denotation as algorithm and value: Moschovakis' theory of meaning.* Rum D700, Filosofiska institutionen, SU, Universitetsvägen 10D, Frescati. Se Bråket nr 12 sidan 5.

Fr 04–11 kl. 10.15 – 12.00. Valda problem i geometri. Torsten Ekedahl: *Toric varieties (continued).* Rum 306, hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 5.

Fr 04–11 kl. 15.00 – 16.00. Presentation av examensarbete i matematik. Kimmy Samuelsson: *A Term Structure Model with Macro Factors.* Rum 306, hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 6.

Må 04–14 kl. 16.15 – 17.00. Seminarium i matematisk statistik. *(Observera tiden!)* **Fredrik Gustavsson** presenterar sitt examensarbete: *Processoptimering medelst multivariata och kombinatoriska metoder.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 5.

Fortsättning på nästa sida.

Seminarier (fortsättning)

Ti 04–15 kl. 14.15 – 15.00. Seminarium i numerisk analys. *(Observera dagen!)* **Jean-David Benamou,** INRIA, Paris: *Title to be announced.* Rum 4523, Nada, KTH, Lindstedtsvägen 3, plan 5.

On 04–16 kl. 13.15. Seminarium i analys och dynamiska system. Victor Shulman, Ryssland: *Radical Banach algebras and radicals in Banach algebras.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

SEMINARIUM I FINANSIELL MATEMATIK

Anders Holst

presenterar sitt examensarbete:

Utility Based Pricing of Credit Risk Derivatives in Incomplete Markets

Abstract: The aim of this thesis is to price Event Sensitive Contingent Claims (ESCC) in a utility based setup. A method for pricing in discrete time is explored, where the individual investor is studied, and the price is based on the extra utility added by the ESCC.

Three examples are considered, a default digital, a defaultable commercial bond, and a call option with counterparty default risk. The example with the default digital is more rigorous with dynamic default intensity and different risk aversion in addition to the basic pricing.

A brief survey over credit risk and credit risk derivatives is also conducted.

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

MITTAG-LEFFLER SEMINAR

Amol Sasane:
Hankel norm approximation for infinite-dimensional systems

Abstract: Model reduction is an important engineering problem, in which one aims to replace an elaborate model by a simpler model without undue loss of accuracy. The accuracy can be mathematically measured in several possible norms, and the Hankel norm is one such. The Hankel norm gives a meaningful notion of distance between two linear systems: It is the induced norm of the operator that maps past inputs to future outputs. It turns out that the engineering problem of model reduction in the Hankel norm is closely related to the mathematical problem of finding solutions to the Nehari-Takagi problem, which we prefer to call *the sub-optimal Hankel norm approximation problem* in this talk.

First we will give the statement of the sub-optimal Hankel norm approximation problem and solve it in the frequency domain assuming the existence of a solution to a certain J-spectral factorization problem. Finally, in the case of a transfer function, we give an explicit formula for a J-spectral factor in terms of the state-space parameters of the system, hence solving the sub-optimal Hankel norm approximation problem.

Tid och plats: Tisdagen den 8 april kl. 15.30 – 16.30 vid Institut Mittag-Leffler, Auravägen 17, Djursholm.

MITTAG-LEFFLER SEMINAR

Velimir Jurdjevic:
Mechanical tops and their elastic extensions

Abstract: In this lecture I will show that each mechanical system, starting from the pendulum in the plane, all the way to an n-dimensional rigid body, has an extension to an elastic problem in which the mechanical system appears as an invariant subsystem of the elastic problem. Since elastic problems have natural formulations in non-Euclidean spaces, they may be used as models for non-Euclidean mechanics, Lorentzian in particular.

Tid och plats: Tisdagen den 8 april kl. 14.00 – 15.00 vid Institut Mittag-Leffler, Auravägen 17, Djursholm.

ALGEBRA- OCH GEOMETRISEMINARIUM

Vincenzo Micale:
On the homology of $\mathrm{Der}_k(A)$, for affine monomial curves A

Abstract: Let $D = \mathrm{Der}_k(A)$ be the module of k-derivations of a ring $A = k[t^{n_1}, \dots, t^{n_l}]$. We will study $P_D^A(z) = \sum_i \dim_k \mathrm{Tor}_i^A(k, D)$, and show that this series in many cases (but not all) is a rational function.

Tid och plats: Onsdagen den 9 april kl. 13.15 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

MITTAG-LEFFLER SEMINAR

Anders Rantzer:
On dissipation, density and decentralization

Abstract: The increasing complexity of control applications raises new demands on methods for analysis and synthesis. An essential aspect is the possibilities for modularization and decentralization, both in analysis and in implementation. This aspect is crucial to reduce complexity and improve robustness in the solutions.

A theory that supports decentralization very well is the theory of dissipativity that was introduced by Willems in the 1970's inspired by the notions of passivity and gain as well as the absolute stability theory by Yakubovich. The theory has been complemented by computational methods for system analysis using convex optimization. However, the corresponding problems for control synthesis are non-convex and much harder to deal with.

Recently, the concept of density function was introduced as an alternative approach to analysis of system performance and stability. In a certain sense, the density is dual to the storage function used in dissipativity theory. The relation between the two is analogous to the relation between the Eulerian (spatial) and the Lagrangian (material) description of fluid dynamics. In particular, density functions demonstrate convexity in control synthesis. This will be discussed in the seminar together with the decentralization properties that are also very different.

Tid och plats: Torsdagen den 10 april kl. 14.00 – 15.00 vid Institut Mittag-Leffler, Auravägen 17, Djursholm.

SEMINARIUM I MATEMATISK STATISTIK

Ørnulf Borgan:
Cox regression for nested case-control data:
A marked point process approach

Abstract: Cox regression is much used in epidemiology to assess the influence of exposure variables and other covariates on mortality or morbidity. Estimation in Cox's model requires ascertainment of covariate values for all individuals in a cohort, even when only a small fraction of these get diseased or die ("fail"). This may be very costly, or even logistically impossible. The nested case-control design, where covariate information is collected for all failing individuals ("cases") but only for a sample of the non-failing ones ("controls"), offers a useful alternative.

In the talk I will describe how nested case-control data may be conveniently described by a marked point process, and I will indicate how this approach makes it possible to extend most methods for Cox regression with cohort data to the situation when only nested case-control data are available. I will also point out how the marked point process approach makes it easy to extend the classical nested case-control design, with simple random sampling of the controls, to counter-matched sampling and other sampling designs.

Tid och plats: Onsdagen den 9 april kl. 15.15 i rum 306 (Cramérrummet), hus 6, Matematiska institutionen, SU, Kräftriket.

VALDA PROBLEM I GEOMETRI

Torsten Ekedahl: Toric varieties (continued)

Abstract: This will be a continuation of the previous lecture on toric varieties. Lecture notes can be obtained as http://math.su.se/~teke/undervisning/toric.∗, where ∗ is any of dvi, ps, or pdf (they will no doubt be updated several times before the lecture).

Tid och plats: Fredagen den 11 april kl. 10.15 – 12.00 i rum 306, hus 6, Matematiska institutionen, SU, Kräftriket.

SEMINARIUM I MATEMATISK STATISTIK

Fredrik Gustavsson

presenterar sitt examensarbete:

Processoptimering medelst multivariata och kombinatoriska metoder

Sammanfattning: I examensarbetet anges regler för hur en viss del av produktionen i en tillverkningsprocess kan diskrimineras (sorteras bort) med mål att öka processens ekonomiska utbyte. Det görs mätningar på de tillverkade enheterna tidigt i processen, och på grundval av dessa mätningar vill man sortera bort de enheter som ej blir fullgoda i slutet av processen. Medelst multivariata metoder undersöks vilka mätstorheter som är relevanta vid diskrimineringen, och med hjälp av en ekonomisk målfunktion beräknas optimala gränser för mätstorheternas värden. Dessa värden används för att avgöra vilka enheter som skall sorteras bort.

Tid och plats: Måndagen den 14 april kl. 16.15 – 17.00 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

SEMINARIUM I FINANSIELL MATEMATIK

Mårten Grebäck

presenterar sitt examensarbete:

An Analytic Framework for Computing Value-at-Risk in Incomplete Markets with Credit Risk

Abstract: This master thesis presents a framework for analytic computation of Value-at-Risk for a portfolio of arbitrary derivatives. The underlying securities are modelled by jump-diffusion processes, where the number of jumps are Poisson distributed and the diffusion processes are driven by Brownian motions. The method is based on a delta-gamma approximation of the portfolio value and Fourier inversion of the characteristic function. In the second half of the thesis credit risk is introduced by a default event indicator variable. In case of a default, a certain fraction of the defaulted option's value is subtracted from the portfolio value. Several examples are presented illustrating the effects on Value-at-Risk with this extension.

Tid och plats: Måndagen den 7 april kl. 16.15 – 17.00 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

PRESENTATION AV EXAMENSARBETE I MATEMATIK

Kimmy Samuelsson:
A Term Structure Model with Macro Factors

Abstract: This thesis investigates a term structure model presented by Andrew Ang and Monika Piazzesi with the aim to test its ability to forecast the yield curve.

The model is a Vector Autoregressive (VAR) model that combines observable macroeconomic variables with unobservable or latent factors. Cross-equation restrictions are imposed on the VAR in the form of no-arbitrage assumptions, and the price of risk is modelled to be time-varying.

We discover, however, that the feature with the time-varying parameter of risk creates problems so serious, when it comes to estimating the model, that the parameter requires re-parametrization which, in turn, seems to affect the model's ability to forecast negatively.

We explain the data selection and provide a complete specification of the model. We also give insight into the estimation methods used and discuss problems discovered during this. We end the thesis with a test of its ability to forecast the yield curve, before concluding.

Tid och plats: Fredagen den 11 april kl. 15.00 – 16.00 i rum 306, hus 6, Matematiska institutionen, SU, Kräftriket.
