BRÅKET

Information om seminarier och högre undervisning i matematiska ämnen i Stockholmsområdet

NR 31 **FREDAGEN DEN 3 OKTOBER 2008**

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 9 oktober kl. 13.00.

SEMINARIER

Fr 10–03 kl. 15.15 – 16.15. Matematiska kollokviet i Uppsala. Professor Adimurthi, Tata Institute, Bangalore: *Conservation laws with continuous laws.* Polhemsalen, Ångströmlaboratoriet, Uppsala universitet. Kaffe/te serveras utanför föreläsningssalen kl. 14.55. Se Bråket nr 30 sidan 4.

Må 10–06 kl. 10.15 – 12.00. Lecture in the course FDD3001. Johan Hoffman, KTH CSC: *The d'Alembert paradox: resolved or not?* Sal E36, KTH, Lindstedtsvägen 3, b.v. Se Bråket nr 30 sidan 7.

Må 10–06 kl. 15.15. Seminarium i matematisk statistik. Professor Saïd Hamadène, Université du Maine: *Backward stochastic differential equations, optimal switching and variational inequalities with inter-connected obstacles.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 4.

Ti 10–07 kl. 13.15. Plurikomplexa seminariet. Håkan Samuelsson, Göteborg: *Regularizations of residue currents.* Rum 306, hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 3.

Fortsättning på nästa sida.

Disputation i optimeringslära och systemteori

Giovanna Fanizza disputerar vid KTH på avhandlingen *Modeling and Model Reduction by Analytic Interpolation and Optimization* fredagen den 10 oktober kl. 10.00. Se sidorna 6 – 7.

Disputation i datalogi

Irem Aktug disputerar på avhandlingen *Algorithmic Verification Techniques for Mobile Code* onsdagen den 8 oktober kl. 10.00 i sal F3, KTH, Lindstedtsvägen 26, b.v. Se Bråket nr 30 sidan 8.

Money, jobs: Se sidorna 8 – 9.

Disputation i datalogi

Elin Anna Topp disputerar vid KTH på avhandlingen *Human-Robot Interaction and Mapping with a Service Robot: Human Augmented Mapping* måndagen den 13 oktober kl. 10.15. Se sidan 5.

Seminarier (fortsättning)

Ti 10–07 kl. 15.15 – 16.15. AlbaNova and Nordita Colloquium in Physics. *(Observera dagen!)* **Speaker to be announced:** *The 2008 Nobel Prize in Physics.* Oskar Kleins auditorium, Roslagstullsbacken 21, AlbaNova universitetscentrum.

Ti 10–07 kl. 15.15. Seminarium i teoretisk datalogi. Associate Professor Úlfar Erlingsson, School of Computer Science, Reykjavík University: *Security policy enforcement through Transactional Memory Introspection.* Rum 1537, KTH CSC, Lindstedtsvägen 3, plan 5. Se Bråket nr 30 sidan 7.

Úlfar Erlingsson är opponent vid Irem Aktugs disputation. Se Bråket nr 30 sidan 8.

On 10–08 kl. 10.00 – 11.00. Presentation av examensarbete i matematik (15 högskolepoäng, fördjupningsnivå). **Kharema Ebshesh:** *Linear operators in infinite-dimensional vector spaces.* Handledare: **Andrzej Szulkin** och **Yishao Zhou.** Sal 21, hus 5, Matematiska institutionen, SU, Kräftriket. Se sidan 4.

On 10–08 kl. 10.15 – 12.00. Kombinatorikseminarium. Ragnar Freij, Chalmers tekniska högskola, Göteborg: *Equivariant discrete Morse theory, and the complex of connected graphs.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 6.

On 10–08 kl. 13.15 – 15.00. Algebra and Geometry Seminar. Torsten Ekedahl: *Swan's argument revisited.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 3.

On 10–08 kl. 16.00. KTH/SU Mathematics Colloquium. Richard M. Schoen, Stanford University: *Positive curvature in geometry and relativity.* 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 30 sidan 6.

To 10–09 kl. 14.00 – 15.00. Institut Mittag-Leffler Seminar. Alan Rendall, Albert-Einstein-Institut, Golm: *Cosmological weak null singularities.* Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 4.

To 10–09 kl. 15.15 – 16.15. AlbaNova and Nordita Colloquium in Physics. Professor Marek Abramowicz, Göteborg: *Observational constraints for primordial mini black holes.* Oskar Kleins auditorium, Roslagstullsbacken 21, AlbaNova universitetscentrum. Se Bråket nr 30 sidan 10.

To 10–09 kl. 15.30 – 16.30. Institut Mittag-Leffler Seminar. Paul Allen, Albert-Einstein-Institut, Golm: *The Cauchy problem for timelike minimal submanifolds.* Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 4.

To 10–09 kl. 18.00 – 20.00. Offentlig föreläsning på Kungl. Vetenskapsakademien: *För vad fick de Nobelpris? Populärvetenskaplig kväll om 2008 års Nobelpris i fysik och kemi.* Beijersalen, Kungl. Vetenskapsakademien, Lilla Frescativägen 4A, Stockholm. Se Bråket nr 30 sidan 6.

Fr 10–10 kl. 13.15 – 14.15. Graduate Student Seminar. Neil Dobbs, Matematik, KTH: *Title to be announced.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

On 10–15 kl. 13.15 – 14.15. Seminarium i analys och dynamiska system. Professor Adimurthi, Tata Institute, Bangalore: *Title to be announced.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

Fortsättning på nästa sida.

Seminarier (fortsättning)

On 10–15 kl. 14.30 – 15.30. KCSE (KTH Computational Science and Engineering Centre) Seminar. Anders Hedenström, Lunds universitet: *Animal flight as seen through the side-wall of a wind tunnel.* Rum RB 15, Roslagstullsbacken 15, AlbaNova universitetscentrum. Se sidan 7.

To 10–16 kl. 15.15 – 16.15. AlbaNova and Nordita Colloquium in Physics. Christian Spiering, DESY, Zeuthen: *Status and perspectives of astroparticle physics in Europe.* Oskar Kleins auditorium, Roslagstullsbacken 21, AlbaNova universitetscentrum. Se sidan 8.

Fr 10–17 kl. 13.00. Licentiatseminarium i matematik. David Eklund presenterar sin licentiatavhandling: *Algebraic C^*-actions and homotopy continuation.* Opponent: **Professor Chris Peterson,** Colorado State University, USA. Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

PLURIKOMPLEXA SEMINARIET

Håkan Samuelsson: Regularizations of residue currents

Abstract: Given a holomorphic function, f, the corresponding residue current $\overline{\partial}(1/f)$ is well understood. If $f_1, \dots, f_m$ are holomorphic functions such that $\operatorname{codim}\{f_1 = \cdots = f_m = 0\} = m$, then the Coleff-Herrera product of the $\overline{\partial}(1/f_j)$ can be formed, and it yields a current that has turned out to be a good notion of a multivariable residue of the tuple $(f_1, \dots, f_m)$. However, the Coleff-Herrera product is a bit difficult to define. I will present various natural alternative approaches to it and discuss recent results, joint with Jan-Erik Björk, that extend works by Mikael Passare and Alain Yger.

Tid och plats: Tisdagen den 7 oktober kl. 13.15 i rum 306, hus 6, Matematiska institutionen, SU, Kräftriket.

ALGEBRA AND GEOMETRY SEMINAR

Torsten Ekedahl: Swan's argument revisited

Abstract: This is a continuation in the (seemingly endless) series on geometric invariants of finite groups. This time I will discuss detecting non-triviality over non-algebraically closed fields. Using ideas from Swan that he used to show non-rationality of the field of invariants over Q of the cyclic group of order 47, we shall show that the class of $BZ/47$ in the Grothendieck group of algebraic stacks over Q is non-trivial. The proof consists of three parts; defining an invariant, identifying the invariant in a Grothendieck group of modules over the integral group ring of the cyclic group of order 46, and then (using standard arguments plus Swan's computation) showing that this invariant is non-trivial. Relevant results will be recalled.

Tid och plats: Onsdagen den 8 oktober kl. 13.15 – 15.00 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

SEMINARIUM I MATEMATISK STATISTIK

Saïd Hamadène:
Backward stochastic differential equations, optimal switching and variational inequalities with inter-connected obstacles

Abstract: We will give an overview over the strong connection between backward stochastic differential equations, optimal switching and solutions of systems of variational inequalities with inter-connected obstacles. Applications to optimal management and control of power plants are highlighted.

Tid och plats: Måndagen den 6 oktober kl. 15.15 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

PRESENTATION AV EXAMENSARBETE I MATEMATIK

Kharema Ebshesh:
Linear operators in infinite-dimensional vector spaces

Handledare: **Andrzej Szulkin** och **Yishao Zhou.**

Abstract: The theory of linear operators is an extensive area. This thesis is about the linear operators in infinite-dimensional vector spaces. We study elementary properties of Banach spaces, bounded operators, compact operators and spectrum of compact operators. We give an application to a two-point boundary value problem for a linear ordinary differential equation in the end.

Tid och plats: Onsdagen den 8 oktober kl. 10.00 – 11.00 i sal 21, hus 5, Matematiska institutionen, SU, Kräftriket.

INSTITUT MITTAG-LEFFLER SEMINAR

Alan Rendall:
Cosmological weak null singularities

Abstract: This talk begins by recalling some of what is known about the concept of weak null singularities in black hole interiors. This leads on to some considerations on the relations between black hole and cosmological singularities. Next a rather explicit example of weak null singularities in a class of cosmological solutions is presented in detail. Finally an attempt is made to situate this example in a wider context.

Tid och plats: Torsdagen den 9 oktober kl. 14.00 – 15.00 vid Institut Mittag-Leffler, Auravägen 17, Djursholm.

INSTITUT MITTAG-LEFFLER SEMINAR

Paul Allen:
The Cauchy problem for timelike minimal submanifolds

Abstract: I discuss some recent work regarding the Cauchy problem for timelike minimal submanifolds and present some related open problems.

Tid och plats: Torsdagen den 9 oktober kl. 15.30 – 16.30 vid Institut Mittag-Leffler, Auravägen 17, Djursholm.

DISPUTATION I DATALOGI

Elin Anna Topp

disputerar på avhandlingen

Human-Robot Interaction and Mapping with a Service Robot: Human Augmented Mapping

måndagen den 13 oktober 2008 kl. 10.15 i sal F3, KTH, Lindstedtsvägen 26, b.v. Till opponent har utsetts *professor Benjamin Kupers,* Department of Computer Science, University of Texas, USA.

Abstract of the thesis

An issue widely discussed in robotics research is the aging society with its consequences for care-giving institutions and opportunities for developments in the area of service robots and robot companions. The general idea of using robotic systems in a personal or private context to support an independent way of living, not only for the elderly but also for the physically impaired, is pursued in different ways, ranging from socially oriented robotic pets to mobile assistants. Thus, the idea of the personalized general service robot is not too far fetched. Crucial for such a service robot is the ability to navigate in its working environment, which has to be assumed an arbitrary domestic or office-like environment that is shared with human users and bystanders. With methods developed and investigated in the field of simultaneous localization and mapping, it has become possible for mobile robots to explore and map an unknown environment, while they can stay localized with respect to their starting point and the surroundings. These approaches though do not consider the representation of the environment that is used by humans to refer to particular places. Robotic maps are often metric representations of features that can be obtained from sensory data. Humans have a more topological, in fact partially hierarchical way of representing environments. Especially for the communication between a user and her personal robot, it is thus necessary to provide a link between the robotic map and the human understanding of the robot's workspace.

The term Human Augmented Mapping is used for a framework that allows to integrate a robotic map with human concepts. Communication about the environment can thus be facilitated. By assuming an interactive setting for the map acquisition process, it is possible for the user to influence the process significantly. Personal preferences can be made part of the environment representation that is acquired by the robot. Advantages become also obvious for the mapping process itself, since in an interactive setting the robot can ask for information and resolve ambiguities with the help of the user. Thus, a scenario of a "guided tour" in which a user can ask a robot to follow and present the surroundings is assumed as the starting point for a system for the integration of robotic mapping, interaction and human environment representations.

A central point is the development of a generic, partially hierarchical environment model, that is applied in a topological graph structure as part of an overall experimental Human Augmented Mapping system implementation. Different aspects regarding the representation of entities of the spatial concepts used in this hierarchical model, particularly considering regions, are investigated. The proposed representation is evaluated both as description of delimited regions and for the detection of transitions between them. In three user studies different aspects of the human-robot interaction issues of Human Augmented Mapping are investigated and discussed. Results from the studies support the proposed model and representation approaches and can serve as basis for further studies in this area.

KOMBINATORIKSEMINARIUM

Ragnar Freij:
Equivariant discrete Morse theory,
and the complex of connected graphs

Abstract: Forman's discrete Morse theory (DMT) is a much used tool to calculate the homotopy type of simplicial complexes of combinatorial interest. Many such complexes are naturally equipped with some group action. I will show how a mild generalization of DMT can be used to calculate the G-homotopy type of a simplicial complex, acted upon by a group G. I will illustrate the theory by determining certain G-invariants for the complex of non-connected graphs, with a particular group G acting on it.

Tid och plats: Onsdagen den 8 oktober kl. 10.15 – 12.00 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

DISPUTATION I OPTIMERINGSLÄRA OCH SYSTEMTEORI

Giovanna Fanizza

disputerar på avhandlingen

Modeling and Model Reduction
by Analytic Interpolation and Optimization

fredagen den 10 oktober 2008 kl. 10.00 i sal F3, KTH, Lindstedtsvägen 26, b.v. Till opponent har utsetts *professor György Michaletzky,* Department of Probability Theory and Statistics, Eötvös Lorand University, Budapest, Ungern.

Abstract of the thesis

This thesis consists of six papers. The main topic of all these papers is modeling a class of linear time-invariant systems. The system class is parameterized in the context of interpolation theory with a degree constraint. In the papers included in the thesis, this parameterization is the key tool for the design of dynamical system models in fields such as *spectral estimation* and *model reduction.*

A problem in *spectral estimation* amounts to estimating a spectral density function that captures characteristics of the stochastic process, such as covariance, cepstrum, Markov parameters and the frequency response of the process. A *model reduction problem* consists in finding a small order system which replaces the original one so that the behaviour of both systems is similar in an appropriately defined sense.

In Paper A a new spectral estimation technique based on the rational covariance extension theory is proposed. The novelty of this approach is in the design of a spectral density that optimally matches covariances and approximates the frequency response of a given process simultaneously.

In Paper B a model reduction problem is considered. In the literature there are several methods to perform model reduction. Our attention is focused on methods which preserve, in the model reduction phase, the stability and the positive real properties of the original system. A reduced-order model is computed employing the analytic interpolation theory with a degree constraint. We observe that in this theory there is a freedom in the placement of the spectral zeros and interpolation points. This freedom can be utilized for the computation of a rational positive real function of low degree which approximates the best a given system.

(Continued on the next page.)

A problem left open in Paper B is how to select spectral zeros and interpolation points in a systematic way in order to obtain the best approximation of a given system. This problem is the main topic in Paper C. Here, the problem is investigated in the analytic interpolation context, and spectral zeros and interpolation points are obtained as solutions of an optimization problem.

In Paper D, the problem of modeling a floating body by a positive real function is investigated. The main focus is on modeling the radiation forces and moment. The radiation forces are described as the forces that make a floating body oscillate in calm water. These forces are passive and usually they are modeled with a system of high degree. Thus, for efficient computer simulation it is necessary to obtain a low order system which approximates the original one. In this paper, the procedure developed in Paper C is employed. Thus, this paper demonstrates the usefulness of the methodology described in Paper C for a real world application.

In Paper E, an algorithm to compute the steady-state solution of a discrete-type Riccati equation, the Covariance Extension Equation, is considered. The algorithm is based on a homotopy continuation method with predictor-corrector steps. Although this approach does not seem to offer particular advantage to previous solvers, it provides insights into issues such as positive degree and model reduction, since the rank of the solution of the covariance extension problem coincides with the degree of the shaping filter.

In Paper F, a new algorithm for the computation of the analytic interpolant of a bounded degree is proposed. It applies to the class of non-strictly positive real interpolants and it is capable of treating the case with boundary spectral zeros. Thus, in Paper F, we deal with a class of interpolation problems which could not be treated by the optimization-based algorithm proposed by Byrnes, Georgiou and Lindquist. The new procedure computes interpolants by solving a system of nonlinear equations. The solution of the system of nonlinear equations is obtained by a homotopy continuation method.

KCSE SEMINAR

Anders Hedenström:
Animal flight as seen through the side-wall of a wind tunnel

Abstract: Flapping flight has evolved on at least four occasions (probably many more), i.e. in birds, bats, Pterosaurs (extinct), and insects. The size ranges from sub-mm (insects) to about 5 m wing span in birds and Pterosaurs. Even if organismal evolution is a tinkering process with material at hand, physical laws dictate what is feasible and required. Hence, the wing design is very different between birds and bats, while the overall shape and performance are quite similar. Studies in a low-turbulence wind tunnel crafted for animal flight studies have revealed new insights into bird and bat aerodynamics. In this talk I review recent studies on birds and bats using digital particle image velocimetry (DPIV). Overall wake topology varies with forward flight speed, but the change is rather smooth and does not indicate the use of discrete 'gaits' as hypothesized by some researchers. Quantitative measurements of wakes suggest that unsteady high-lift mechanisms are involved at slow speeds, and in bats the mechanism is a leading edge vortex.

Tid och plats: Onsdagen den 15 oktober kl. 14.30 – 15.30 i rum RB 15, Roslagstullsbacken 15, AlbaNova universitetscentrum.

ALBANOVA AND NORDITA COLLOQUIUM IN PHYSICS

Christian Spiering:
Status and perspectives of astroparticle physics in Europe

Abstract: Astroparticle physics is the field at the intersection of particle physics, astronomy and cosmology. It addresses questions like "What is dark matter?", "Do protons live forever?", "What are the properties of neutrinos and how did they shape our Universe?", "What is the origin of cosmic rays?", or "What will we learn from gravitational waves?". The field has grown close to technical maturity and undergoes a rapid development, with fascinating discoveries made or just ahead. With cost of next generation experiments on the 100 MEuro scale, a coherent approach and worldwide cooperation is mandatory. A European Roadmap on Astroparticle has been worked out by ApPEC (Astroparticle Physics European Coordination). The talk will review the field and present the main findings and recommendations of the roadmap.

Tid och plats: Torsdagen den 16 oktober kl. 15.15 – 16.15 i Oskar Kleins auditorium, Roslagstullsbacken 21, AlbaNova universitetscentrum.

MONEY, JOBS

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

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://www2.math.su.se/~johannes/mj.html.
Unless stated otherwise, a given date is the last date (e.g. for applications), and the year is 2008. 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.

Old information

Money to apply for

11. Stiftelsen för internationalisering av högre utbildning och forskning (STINT) välkomnar ansökningar till programmet Institutional Grants for Younger Researchers. Programmet riktar sig till yngre forskare som tidigt i sin karriär — högst sju år efter disputationen — vill bygga upp ett internationellt samarbete med andra yngre forskare. Forskningssamarbete skall utgöra tyngdpunkten, men aktiviteter som t.ex. undervisning, seminarier, gemensamma kurser och sommarskolor kan utgöra en del av samarbetet. Bidrag om högst 400 000 kr per år kan beviljas för upp till tre år. Sista ansökningsdag är den 15 oktober. Web-info: http://www.stint.se/index.php?articleId=137.

(Continued on the next page.)

Jobs to apply for

12. Skolan för datavetenskap och kommunikation (CSC) vid KTH kungör ”the Dahlquist Postdoctoral Fellowship”, uppkallat efter professor Germund Dahlquist, KTHs pionjär inom numerisk analys. Priset är forskning på heltid på KTH Numerisk Analys. Prisperioden är ett år, och kan förlängas med ytterligare ett år. Sista ansökningsdag är den 15 november. Web-info:
http://www.kth.se/csc/om/priser/dqf/1.14813?l=sv_SE.
13. University of Iceland söker en ”Associate Professor” i tillämpad matematik. Sista ansökningsdag är den 1 november. Web-info: http://www.raunvis.hi.is/Reiknifr/.