BRÅKET

Information om seminarier och högre undervisning i matematiska ämnen i Stockholmsområdet

NR 19 **FREDAGEN DEN 16 MAJ 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 22 maj kl. 13.00.

Disputation i statistik

Daniel Bruce disputerar på avhandlingen *Optimal Design and Inference for Correlated Bernoulli Variables using a Simplified Cox Model* fredagen den 16 maj kl. 10.00 i hörsal 3, hus B, SU, Universitetsvägen 10, Frescati. Se Bråket nr 17 sidan 8.

Money, jobs: Se sidorna 13 – 14.

SEMINARIER

Fr 05–16 kl. 11.00 – 12.00. Optimization and Systems Theory Seminar. Stefan Almér, Optimeringslära och systemteori, KTH: *Control and Analysis of Pulse-Modulated Systems.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 11.

Fr 05–16 kl. 13.15 – 14.15. DNA-seminariet Uppsala-KTH (Dynamical systems, Number theory, Analysis). Nalini Anantharaman, École Polytechnique, Palaiseau, Frankrike: *Entropy and localization of eigenfunctions.* Sal D33, KTH, Lindstedtsvägen 5, b.v. Se Bråket nr 18 sidan 13.

Fortsättning på nästa sida.

Perspectives in Analysis, Geometry, and Topology

Ett konferens med denna titel skall äga rum vid SU den 19 – 25 maj. Se sidorna 6 – 7.

Festive Combinatorics

En konferens med denna titel skall äga rum vid KTH den 28 – 30 maj. Se Bråket nr 18 sidan 14.

Disputation i numerisk analys

Mohammad Motamed disputerar på avhandlingen *Topics in Analysis and Computation of Linear Wave Propagation* tisdagen den 20 maj kl. 10.15 i sal D2, KTH, Lindstedtsvägen 5, b.v. Se Bråket nr 18 sidan 12.

Disputation i optimeringslära och systemteori

Stefan Almér disputerar vid KTH på avhandlingen *Control and Analysis of Pulse-Modulated Systems* fredagen den 23 maj kl. 10.00. Se sidorna 10 – 11.

Seminarier (fortsättning)

Må 05–19 kl. 13.15. Seminarium i numerisk analys. *(Observera dagen och tiden!)* **Professor Shi Jin,** Department of Mathematics, University of Wisconsin, USA: *Coherent semiclassical transport models for thin quantum barriers.* Rum 1537, KTH CSC, Lindstedtsvägen 3, plan 5. Se Bråket nr 18 sidan 8.

Professor Jin är opponent vid Mohammad Motameds disputation. Se Bråket nr 18 sidan 12.

Må 05–19 kl. 15.15–17.00. Seminarium i matematisk statistik. Timo Koski: *Om Warings fördelning.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 4.

Ti 05–20 kl. 13.15–14.15. DNA-seminariet Uppsala-KTH (Dynamical systems, Number theory, Analysis). Jay Jorgenson, City College of New York, CUNY: *Relating Maass forms to holomorphic one forms.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 5.

On 05–21 kl. 10.00–11.00. Presentation av examensarbete i matematik (15 högskolepoäng, påbyggnadsnivå). **Roger Fredriksson:** *Increased Wealth through Mathematics?* Handledare: **Thomas Höglund.** Sal 21, hus 5, Matematiska institutionen, SU, Kräftriket. Se sidan 4.

On 05–21 kl. 10.30. Logikseminariet Stockholm-Uppsala. Johan Granström: *A degenerate intensional model of intuitionistic type theory without a universe.* Sal TBA, Ångströmlaboratoriet, Uppsala universitet. Se sidan 13.

On 05–21 kl. 11.00–12.00. KTH/Nordita/SU Seminar in Theoretical Physics. Hans Fogedby, Köpenhamn: *Aspects of nonequilibrium: Growth and pattern formation in the Kardar-Parisi-Zhang equation for a growing interface.* Sal FA31, Roslagstullsbacken 21, AlbaNova universitetscentrum. Se Bråket nr 18 sidan 9.

On 05–21 kl. 13.15–14.15. DNA-seminariet Uppsala-KTH (Dynamical systems, Number theory, Analysis). Mark Pollicott, Warwick University: *Computing the Lyapunov exponent for random matrix products.* Sal Å64119, Ångströmlaboratoriet, Uppsala universitet. Se sidan 5.

On 05–21 kl. 13.15–14.15. Seminarium i analys och dynamiska system. Yacin Ameur, KTH: *On fluctuations of eigenvalues of random normal matrices.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 5.

On 05–21 kl. 14.30–15.30. KCSE (KTH Computational Science and Engineering Centre) Seminar. Linus Marstorp, Mekanik, KTH: *Explicit algebraic subgrid stress models in rotating channel flow.* PDC:s seminarierum, KTH, Teknikringen 14, plan 3.

To 05–22 kl. 10.15–11.15. Matematiska kollokviet (Uppsala). Professor Paul Malliavin, Université Paris VI: *Beurling-Ahlfors conformal welding and analysis on the space of Jordan curves.* Sal 2347, MIC, Polacksbacken, Uppsala universitet. Se sidan 8.

To 05–22 kl. 10.30. Seminar in Fluid Mechanics. Professor Gilead Tadmor, Department of Electrical and Computer Engineering, Northeastern University, Boston, USA: *A unified framework for low order Galerkin flow models and feedback flow control.* Seminarierummet, Institutionen för mekanik, KTH, Teknikringen 8. Se Bråket nr 18 sidan 10.

Fortsättning på nästa sida.

Seminarier (fortsättning)

To 05–22 kl. 13.15–14.15. Minicourse in Mathematics. Martin Gulbrandsen: *Local aspects of geometric invariant theory. Second lecture.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 17 sidan 10.

To 05–22 kl. 15.15–16.15. AlbaNova and Nordita Colloquium in Physics — The 2008 Oskar Klein lecture. Helen Quinn, Stanford University: *Klein-Gordon (scalar) particles in the Universe.* Oskar Kleins auditorium, Roslagstullsbacken 21, AlbaNova universitetscentrum.

Fr 05–23 kl. 12.00–13.00. GRU-seminarium i matematik: *Rapport från Köpenhamn.* Sammanträdesrum 3424 (innanför pausrummet), Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 4. Se sidan 13.

Fr 05–23 kl. 13.15–14.15. Graduate Student Seminar. Martin Bender, Matematik, KTH: *Title to be announced.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

Fr 05–23 kl. 15.15–16.15. Matematiska kollokviet (Uppsala). Professor Birge Huisgen-Zimmermann, University of California, Santa Barbara: *A geometric approach to the representation theory of finite-dimensional algebras.* Häggsalen, Ångströmlaboratoriet, Uppsala universitet. Se sidan 8.

Må 05–26 kl. 11.00–12.00. Optimization and Systems Theory Seminar. *(Observera dagen!)* **Professor Gilead Tadmor,** Department of Electrical and Computer Engineering, Northeastern University, Boston, USA: *Control and estimation with preview: Differential games, geometric and analytic constraints.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 11.

Professor Tadmor är opponent vid Stefan Alméns disputation. Se sidorna 10–11.

Må 05–26 kl. 14.15. Informellt doktorandseminarium i teoretisk datalogi. *(Observera tiden och lokalen!)* **Irem Aktug,** Teorigruppen, KTH CSC: *Provably correct runtime monitoring.* Rum 1535, KTH CSC, Lindstedtsvägen 3, plan 5. Se sidan 9.

Ti 05–27 kl. 13.15. Seminar in Theoretical and Applied Mechanics. Professor Bengt Enflo, Mekanik, KTH: *A standing acoustic wave with shocks in a cubically nonlinear medium.* Seminarierummet, Institutionen för mekanik, KTH, Teknikringen 8. Se sidan 12.

On 05–28 kl. 13.00. Seminarium i statistik. Dan Hedlin: *Local and global score functions in selective editing.* Sal B705, Statistiska institutionen, SU, Universitetsvägen 10B, plan 7, Frescati. Se sidan 13.

On 05–28 kl. 13.15–14.15. Seminarium i analys och dynamiska system. Jens Hoppe, KTH: *Membranes and singularities.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

On 05–28 kl. 15.15. Seminarium i numerisk analys. Florian Beyer, Matematik, KTH: *A numerical study of the strong cosmic censorship conjecture in general relativity.* Rum 4523, KTH CSC, Lindstedtsvägen 5, plan 5. Se Bråket nr 18 sidan 11.

Observera att datum för Florian Beyers seminarium har ändrats. I Bråket nr 18 anges fel datum för seminariet.

Fortsättning på nästa sida.

Seminarier (fortsättning)

On 05 – 28 kl. 19.00. Populärvetenskaplig föreläsning i fysik. Professor Thomas Lindblad, Fysik, KTH: *Infraljud — ett sätt att övervaka vår miljö? Om ljud från jordbävningar till blåvalar.* Oskar Kleins auditorium, Roslagstullsbacken 21, AlbaNova universitetscentrum. Se sidan 12.

To 05 – 29 kl. 11.00 – 11.50. DNA-seminariet Uppsala-KTH (Dynamical systems, Number theory, Analysis). Florian Luca, Universidad Nacional Autonoma de Mexico: *On the iterates of the Euler function.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 9.

To 05 – 29 kl. 13.15 – 14.15. Minicourse in Mathematics. Martin Gulbrandsen: *Local aspects of geometric invariant theory. Third lecture.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 17 sidan 10.

SEMINARIUM I MATEMATISK STATISTIK

Timo Koski: Om Warings fördelning

Sammanfattning: Seminariet är av översiktskaraktär och inleds med en genomgång av Schuberts och Glänzels dynamiska cellmodell från år 1984. Under vissa förutsättningar visar det sig att jämviktslösningen till modellen ges av Warings fördelningsfamilj. Denna familj av fördelningar introducerades och namngavs av J. O. Irwin år 1955. Irwin var intresserad av empiriska fördelningar i biologi och medicin med en mycket lång svans. I själva verket uppför sig svansen av en Waringfördelning enligt en potenslag. Den välkända Yulefördelningen tillhör familjen. Warings fördelningsfamilj ges därefter en karakterisering genom en speciell form av trunkerade betingade fördelningar och väntevärden. Till sist diskuteras en tolkning av Schubert och Glänzel, som har en aktuell tillämpning i RUT 2.

Tid och plats: Måndagen den 19 maj kl. 15.15 – 17.00 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

PRESENTATION AV EXAMENSARBETE I MATEMATIK

Roger Fredriksson: Increased Wealth through Mathematics?

Handledare: **Thomas Höglund.**

Abstract: In this thesis we will construct a number of different fund portfolios with different objectives and constraints, using portfolio theory. All of the constructed portfolios are possible to create in the Swedish premium pension system, and we will follow their progress while comparing them to each other and to the default choice provided by the Seventh AP Fund. Our goal is both to check that the theory is applicable to funds and if our findings are consistent with the predicted outcome. Furthermore it is of great interest to see if there is any substantial economic gain in applying portfolio theory to the fund selection process.

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

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

Jay Jorgenson:
Relating Maass forms to holomorphic one forms

Abstract: In the setting of general finite volume hyperbolic Riemann surfaces, my recent work with Jurg Kramer begins with an identity which relates holomorphic one forms and non-holomorphic weight zero forms. In this talk I will discuss applications of this identity in two directions: The study of analytic invariants associated to Arakelov theory of algebraic curves, and the study of L-functions.

Tid och plats: Tisdagen den 20 maj kl. 13.15 – 14.15 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

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

Mark Pollicott:
Computing the Lyapunov exponent for random matrix products

Abstract: Given two square matrices A and B, the Lyapunov exponent (associated to a Bernoulli measure) is the average growth rate of n-fold products of these matrices. In the case of positive matrices, we describe a method for getting formal expressions for the exponents, which leads to a useful method of appoximating them numerically.

Tid och plats: Onsdagen den 21 maj kl. 13.15 – 14.15 i sal Å64119, Ångströmlaboratoriet, Uppsala universitet.

SEMINARIUM I ANALYS OCH DYNAMISKA SYSTEM

Yacin Ameur:
On fluctuations of eigenvalues of random normal matrices

Abstract: I will discuss a theorem about the joint (weighted) asymptotic distribution of eigenvalues of random normal matrices when the order of those matrices increases indefinitely. The result applies to fairly general weight functions on the complex plane.

This reports on joint work with Håkan Hedenmalm and Nikolai Makarov.

Tid och plats: Onsdagen den 21 maj kl. 13.15 – 14.15 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

GRADUATE STUDENT SEMINAR

Inget seminarium i denna serie ges fredagen den 16 maj. Det tidigare annonserade seminariet som skulle ha ägt rum denna dag är *inställt.*

KTH/SU MATHEMATICS COLLOQUIUM

Inget kollokvium ges onsdagen den 21 maj. Det tidigare annonserade kollokviet som skulle ha ägt rum denna dag är *inställt.*

PERSPECTIVES IN ANALYSIS, GEOMETRY, AND TOPOLOGY

A Marcus Wallenberg Symposium on the occasion of Oleg Viro's 60th birthday, Aula Magna, Stockholm University, May 19 – 25, 2008

The encounters between the fields of analysis, geometry and topology are widespread and often provide major impetus for breakthroughs in these domains. Impressive examples include the exciting new developments in low-dimensional topology related to invariants of links and three and four manifolds; Perelman's spectacular proof of the Poincaré conjecture; and also the recent advances made in algebraic, complex, symplectic and tropical geometry.

This conference invites distinguished speakers representing major directions in analysis, geometry and topology who, through their work, have contributed to establishing relations between these fields.

It also provides a pleasant opportunity to express admiration for the work and mathematical interests of Oleg Viro who will be celebrating his 60th birthday this year. Oleg Viro has made invaluable contributions to Swedish research by complementing the country's long-standing strong tradition of analysis with his own renowned expertise in topology and areas of geometry: subjects not previously widely studied in Sweden.

Organizers: **Anders Björner, Lennart Carleson, Ilia Itenberg, Burglind Jöricke, Ib Madsen,** and **Mikael Passare.**

For more information, see the web page http://www2.math.su.se/pagt/. A detailed program of the conference is given below.

Monday, May 19

10.00 – 10.45 Opening with speeches by **Professor Kåre Bremer,** Vice-Chancellor (rektor) of Stockholm University, and by **Professor Emeritus Lennart Carleson,** who will speak about "academic freedom".

11.00 – 12.00 **Louis Kauffman,** Chicago: *An extended bracket state summation for virtual knots and links.*

Lunch.

14.00 – 15.00 **Michael Polyak,** Haifa: *Enumerative geometry and finite type invariants.*

15.30 – 16.30 **Alexander Degtyarev,** Ankara: *Towards the generalized Shapiro and Shapiro conjecture.*

17.00 – 18.00 **Ngaiming Mok,** Hong Kong: *Geometric structures on Fano manifolds of Picard number 1.*

Tuesday, May 20

9.30 – 10.30 **Gang Tian,** Cambridge: *Ricci flow and projective manifolds.*

11.00 – 12.00 **Ludwig Faddeev,** Saint Petersburg: *Discrete series of representations for the modular double of* $U_q(\mathrm{sl}(2, R))$.

Lunch.

14.00 – 15.00 **Tobias Ekholm,** Uppsala: *A surgery exact sequence in linearized contact homology.*

15.30 – 16.30 **Paolo Lisca,** Pisa: *Heegaard Floer invariants of Legendrian and transverse knots.*

17.00 – 18.00 **John Etnyre,** Atlanta: *Fibred knots and the Bennequin bound.*

(Continued on the next page.)

Wednesday, May 21

9.30 – 10.30 **Gennadi Henkin,** Paris: *Cauchy-Pompeiu type formulas for $\overline{\partial}$ on affine algebraic Riemann surfaces and some applications.*

11.00 – 12.00 **Charles Epstein,** Philadelphia: *Solving Maxwell's equations in exterior domains.*

Lunch.

14.00 – 15.00 **Elliott Lieb,** Princeton: *Four decades of 'Stability of Matter' and analytic inequalities.*

15.30 – 16.30 **Eric Bedford,** Bloomington: *Dynamics of rational surface automorphisms of positive entropy.*

17.00 – 18.00 **Mikhail Lyubich,** Toronto: *Yang-Lee zeros for diamond lattices and 2D rational dynamics.*

Thursday, May 22

9.00 – 10.00 **Viatcheslav Kharlamov,** Strasbourg: *On the number of connected components in the intersection of three real quadrics.*

10.30 – 11.30 **Grigory Mikhalkin,** Toronto: *Patchworking of real algebraic knots and links.*

12.00 – 13.00 **Stepan Orevkov,** Toulouse: *Classification of algebraic links in RP^3 of degree 5 and 6.*

Lunch.

14.00 – 18.30 Excursion.

19.00 Reception at Town Hall.

Friday, May 23

9.30 – 10.30 **Selman Akbulut,** East Lansing: *On exotic structures on 4-manifolds.*

11.00 – 12.00 **Nicolai Reshetikhin,** Berkeley: *Invariants of links and quantum groups at roots of unity.*

Lunch.

14.00 – 15.00 **Robert MacPherson,** Princeton: *The geometry of grains.*

15.30 – 16.30 **Laszlo Lempert,** West Lafayette: *Two examples of complex manifolds, motivated by (theoretical) physics.*

17.00 – 18.00 **Boris Khesin,** Toronto: *A non-holonomic Moser theorem and diffeomorphism groups.*

19.00 Banquet.

Saturday, May 24

9.30 – 10.30 **Tomasz Mrowka,** Cambridge: *Knot invariants from instantons.*

11.00 – 12.00 **Askold Khovansky,** Toronto: *Algebraic equations, convex bodies, and Bernstein theorem for some spherical varieties.*

Lunch.

14.00 – 15.00 **Ronald Fintushel,** East Lansing: *Constructions of 4-manifolds.*

15.30 – 16.30 **Stefan Nemirovskii,** Moscow: *Lagrangian embeddings and complex analysis.*

17.00 – 18.00 **Stanislav Smirnov,** Genève: *Conformal invariance and universality in 2D Ising model.*

Sunday, May 25

9.30 – 10.30 **Eugenii Shustin,** Tel Aviv: *Computing real algebraic and tropical enumerative invariants.*

11.00 – 12.00 **Alexander Shumakovitch,** Washington: *Khovanov homology, its properties and applications.*

12.00 Closure.

MATEMATISKA KOLLOKVIET (UPPSALA)

Paul Malliavin:
Beurling-Ahlfors conformal welding and analysis on the space of Jordan curves

Abstract: Beurling-Ahlfors conformal welding identifies the space J^∞ of smooth Jordan curves to a double quotient of the diffeomorphism group of the circle by the three-dimensional Möbius group. Extending conformal welding along stochastic flow, a canonical Brownian motion is constructed on the space of J^h of Hölderian Jordan curves. Automorphic canonical probability measures are constructed on J^α; these measures unitarize some highest weight representations of Virasoro algebra.

Tid och plats: Torsdagen den 22 maj kl. 10.15 – 11.15 i sal 2347, MIC, Polacksbacken, Uppsala universitet. Kaffe, te och kakor serveras utanför föreläsningssalen cirka 20 minuter innan kollokviet börjar.

Anmärkning: Kollokviet är en gästföreläsning inför avtäckningen av skulpturen av *Arne Beurling* (1905 – 1986). Arne Beurling var professor i matematik i Uppsala under åren 1937 – 1954 och därefter vid Institute for Advanced Study i Princeton. Under sommaren 1940 lyckades han forcera den tyska krypteringsmaskinen G-skrivaren. Detta var till stor nytta för det svenska militära försvaret senare under andra världskriget.

Skulpturen är utförd av konstnärerna Jan-Erik Björk och Ylva Lindgren och skall avtäckas torsdagen den 22 maj kl. 16.00 i parken vid Lägerhyddsvägen 2, Uppsala.

Professor Paul Malliavin är känd för många betydelsefulla arbeten i stokastisk analys (Malliavin-kalkylen). Han var under 1950-talet medarbetare till Arne Beurling vid Institute for Advanced Study i Princeton.

MATEMATISKA KOLLOKVIET (UPPSALA)

Birge Huisgen-Zimmermann:
A geometric approach to the representation theory of finite-dimensional algebras

Abstract: At the outset, we will present some classes of finite-dimensional algebras of wide interest (including algebras defined by quivers and relations) and outline the classification problem for their finite-dimensional representations. Given such an algebra, we will describe an algebraic variety that parametrizes the representations of fixed dimension d, to aid classification. These varieties were first studied by Gabriel, Gelfand-Ponomarev, and others. Some historical highlights of the ensuing development will serve to motivate interest in such geometric parametrizations of a priori purely algebraic objects.

We will follow with a gentle introduction to degenerations, an intrinsically geometric way of grouping the d-dimensional representations into subclasses that are often more accessible than the full class: Roughly speaking, degenerations of a representation result from a geometry-guided process of breaking its 'structural bonds', so as to incrementally unravel its structure and relate it to less complex ones for the purpose of analysis. Again, we will start with examples and review a few milestones of the general theory. In order to keep the emphasis on the underlying ideas, we will then drastically restrict the setting and explain some recent results in this specialized scenario.

Tid och plats: Fredagen den 23 maj kl. 15.15 – 16.15 i Häggsalen, Ångströmlaboratoriet, Uppsala universitet. Kaffe, te och kakor serveras utanför föreläsningssalen cirka 20 minuter innan kollokviet börjar.

INFORMELLT DOKTORANDSEMINARIUM I TEORETISK DATALOGI

Irem Aktug: Provably correct runtime monitoring

Abstract: Runtime monitoring is an established technique for enforcing a wide range of program safety and security properties. A monitor operates by observing the behaviour of a target program and terminating the program when an action that violates the property is about to occur. Numerous security applications like firewalls, kernels, memory sandboxes, and Java stack inspection are based on this principle. Monitors have been implemented either as external entities that run in parallel with the target program or through rewriting the program to make it self-monitoring; these we call *external monitoring* and *monitor inlining,* respectively.

In this talk, we present a formalization of monitoring and monitor inlining for Java bytecode programs. Monitors can be formalized as security automata induced from a special-purpose monitor specification language, *ConSpec.* The automata operate on finite or infinite strings of calls to a fixed API, allowing local dependencies on parameter values and heap content. We use a two-level class file annotation scheme to characterize two key properties of an inlined program:

1. That the program is correct with respect to the monitor as a constraint on allowed program behaviour, and
2. that the program has an instance of the given monitor embedded into it, which yields state changes at prescribed points according to the monitor's transition function.

As our main application of these results we describe a concrete inliner, and use the annotation scheme to characterize its correctness. For this inliner, correctness of the level II annotations can be decided efficiently by a weakest precondition annotation checker, thus allowing on-device checking of inlining correctness in a proof-carrying code setting.

Tid och plats: Måndagen den 26 maj kl. 14.15 i rum 1535, KTH CSC, Lindstedtsvägen 3, plan 5.

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

Florian Luca: On the iterates of the Euler function

Abstract: Let $\phi(n)$ be the Euler function of the positive integer n. For a positive integer k, let $\phi^{(k)}(n)$ be the kth fold iterate of the function $\phi(n)$. In my talk, I will look at the range of the function $\phi^{(k)}(n)$. For example, putting $V_k(x) = \#\{\phi^{(k)}(n) \le x\}$, then for x sufficiently large the estimate

$$\#V_k(x) \le \frac{x}{(\log x)^k} \exp(13k^{3/2}(\log\log x \log\log\log x)^{1/2})$$

holds uniformly in $k \ge 1$. Under the prime k-tuples conjecture I show that $\#V_k(x) \gg_k x/(\log x)^k$. I will also give the main ideas of an unconditional proof of this lower bound when $k = 2$.

These results have been obtained jointly with Carl Pomerance.

Tid och plats: Torsdagen den 29 maj kl. 11.00 – 11.50 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

DISPUTATION I OPTIMERINGSLÄRA OCH SYSTEMTEORI

Stefan Almér

disputerar på avhandlingen

Control and Analysis of Pulse-Modulated Systems

fredagen den 23 maj 2008 kl. 10.00 i sal D3, KTH, Lindstedtsvägen 5, b.v. Till opponent har utsetts *professor Gilead Tadmor,* Department of Electrical and Computer Engineering, Northeastern University, Boston, USA.

Abstract of the thesis

The thesis consists of an introduction and four appended papers. In the introduction we give an overview of pulse-modulated systems and provide a few examples of such systems. Furthermore, we introduce the so-called dynamic phasor model which is used as a basis for analysis in two of the appended papers. We also introduce the harmonic transfer function and finally we provide a summary of the appended papers.

The first paper considers stability analysis of a class of pulse-width modulated systems based on a discrete time model. The systems considered typically have periodic solutions. Stability of a periodic solution is equivalent to stability of a fixed point of a discrete time model of the system dynamics. Conditions for global and local exponential stability of the discrete time model are derived using quadratic and piecewise quadratic Lyapunov functions. A griding procedure is used to develop a systematic method to search for the Lyapunov functions.

The second paper considers the dynamic phasor model as a tool for stability analysis of a general class of pulse-modulated systems. The analysis covers both linear time periodic systems and systems where the pulse modulation is controlled by feedback. The dynamic phasor model provides an $\mathbf{L}_2$-equivalent description of the system dynamics in terms of an infinite dimensional dynamic system. The infinite dimensional phasor system is approximated via a skew truncation. The truncated system is used to derive a systematic method to compute time periodic quadratic Lyapunov functions.

The third paper considers the dynamic phasor model as a tool for harmonic analysis of a class of pulse-width modulated systems. The analysis covers both linear time periodic systems and non-periodic systems where the switching is controlled by feedback. As in the second paper of the thesis, we represent the switching system using the $\mathbf{L}_2$-equivalent infinite dimensional system provided by the phasor model. It is shown that there is a connection between the dynamic phasor model and the harmonic transfer function of a linear time periodic system, and this connection is used to extend the notion of harmonic transfer function to describe periodic solutions of non-periodic systems. The infinite dimensional phasor system is approximated via a square truncation. We assume that the response of the truncated system to a periodic disturbance is also periodic and we consider the corresponding harmonic balance equations. An approximate solution of these equations is stated in terms of a harmonic transfer function which is analogous to the harmonic transfer function of a linear time periodic system. The aforementioned assumption is proved to hold for small disturbances by proving the existence of a solution to a fixed point equation. The proof implies that for small disturbances, the approximation is good.

(Continued on the next page.)

Finally, the fourth paper considers control synthesis for switched mode DC-DC converters. The synthesis is based on a sampled data model of the system dynamics. The sampled data model gives an exact description of the converter state at the switching instances, but also includes a lifted signal which represents the inter-sampling behaviour. Within the sampled data framework we consider $\mathcal{H}_\infty$ control design to achieve robustness to disturbances and load variations. The suggested controller is applied to two benchmark examples; a step-down and a step-up converter. Performance is verified in both simulations and in experiments.

OPTIMIZATION AND SYSTEMS THEORY SEMINAR

Stefan Almér:
Control and Analysis of Pulse-Modulated Systems

Abstract: The talk gives an overview of control and analysis problems associated with pulse-modulated systems. We focus specially on pulse-width modulated (PWM) systems and use the DC-DC converter as an illustrative example throughout the talk.

In the talk I present a number of different approaches which have been used to model pulse-modulated systems for different purposes. A discrete time model was used for stability analysis. A sampled data model was used for $\mathcal{H}_\infty$ control synthesis, and the so-called dynamic phasor model was used for both stability and harmonic analysis of PWM systems.

Tid och plats: Fredagen den 16 maj kl. 11.00 – 12.00 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

OPTIMIZATION AND SYSTEMS THEORY SEMINAR

Gilead Tadmor:
Control and estimation with preview:
Differential games, geometric and analytic constraints

Abstract: In this talk we shall review a series of results pertaining to robust and optimal (i.e., H^∞ and H^2) control and estimation, where a certain level of latency is allowed: In the control context, the common term of reference is "preview control" and in the estimation context, this set of problems is known as "fixed-lag" smoothing. These results represent joint work by the speaker and Professor Leonid Mirkin (Technion, Israel).

The results will include, as time allows, the first complete solution for both the continuous and the discrete case, of the H^∞ preview control problem, H^2 feed-forward tracking and estimation problems with an FIR design that includes optimization of the preview/ smoothing length, and a detailed analysis of limiting factors on achievable performance in the continuous- and discrete-time fixed-lag smoothing problem. What characterizes the technical approach leading to these results is the integration of a geometric, Hilbert-space/ operator interpolation perspective, semigroup tools, and classical time domain differential games/variational viewpoint.

Tid och plats: Måndagen den 26 maj kl. 11.00 – 12.00 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

SEMINAR IN THEORETICAL AND APPLIED MECHANICS

Bengt Enflo:
A standing acoustic wave
with shocks in a cubically nonlinear medium

Abstract: A cubically nonlinear equation is derived for a transverse finite amplitude wave in an isotropic solid. This wave equation with resonator boundary conditions is transformed into a functional equation. Introducing a dissipative term with a second derivative, this functional equation is further reduced to a second order partial differential equation with a fast and a slow time. From this equation, by specializing to steady state and integrating one step, we obtain a first order ordinary differential equation with three terms in addition to the derivative: a cubic and a linear term in the dependent variable and a known term (sinus). The coefficient of the derivative is proportional to the dissipation and assumed to be small. Among several cases the most complicated case, the coefficient of the linear term lying between zero and $(0.5)^{(2/3)} = 0.63$, is treated in this seminar.

If the small dissipative parameter is put equal to zero, the time dependence of the wave profile everywhere in the resonator is given by a third degree algebraic equation. In each time period of the solution there are two discontinuities (shocks), because the three different solutions are valid in outer regions, consisting of different intervals of the time period. In order to find inner solutions around the shocks a rescaling is made, so that the derivative term in the wave equation becomes important. The outer and inner solutions have to be matched to each other at four places, on both sides of the two shocks. In two of these places it is necessary to introduce an intermediate solution, valid in a broader boundary layer than the boundary layer of the inner solution. The intermediate solution can be represented using an integral of Airy functions and is matched both outwards to the outer solution and inwards to the inner solution.

The actual first order ordinary differential equation is also solved numerically, both in the outer region and in the neighbourhood of the shocks.

Tid och plats: Tisdagen den 27 maj kl. 13.15 i seminarierummet, Institutionen för mekanik, KTH, Teknikringen 8.

POPULÄRVETENSKAPLIG FÖRELÄSNING I FYSIK

Thomas Lindblad:
Infraljud — ett sätt att övervaka vår miljö?
Om ljud från jordbävningar till blåvalar

Sammanfattning: Infraljud är ljud med låg frekvens, typisk några hertz. Det kan avlyssnas över stora avstånd med hjälp av speciella, men relativt enkla och billiga, mikrofoner. Med hjälp av tre mikrofoner kan man erhålla riktningen till infraljudskällan, och placerar man ut ett system av mikrofoner på detta sätt kan man ”triangulera in” händelsen. Infraljud produceras av såväl seismiska händelser som jordbävningar, vulkanutbrott, meteoritnedslag, etc., som av raketstarter, sprängningar, bränder, m.m. Det finns också djur som kommunicerar över stora avstånd med hjälp av infraljud, t.ex. elefanter och blåvalar.

Tid och plats: Onsdagen den 28 maj kl. 19.00 i Oskar Kleins auditorium, Roslagstullsbacken 21, AlbaNova universitetscentrum.

LOGIKSEMINARIET STOCKHOLM-UPPSALA

Johan Granström:
A degenerate intensional model of intuitionistic type theory without a universe

Abstract: Taking up where Olov Wilander left off at the previous seminar, I will present an idea on how to to make Smith's 1988 model into a fully intensional model and at the same time extending it to the entire higher type structure.

Tid och plats: Onsdagen den 21 maj kl. 10.30 i sal TBA, Ångströmlaboratoriet, Uppsala universitet.

GRU-SEMINARIUM I MATEMATIK

Rapport från Köpenhamn

Sammanfattning: Mats Boij berättar om ett studiebesök vid Danmarks Tekniska Universitet, där man använder Maple genomgående i hela första årets matematikundervisning. Kan vi lära något av dem? De har också andra intressanta inslag i sin undervisning. Bland annat har de tillämpningsorienterade projektarbeten och använder gymnasielärare som övningsassistenter.

Den som anmäler sitt deltagande i seminariet till Lars Filipsson (lfn@math.kth.se) senast kvällen före seminariet får en lunchsmörgås.

Tid och plats: Fredagen den 23 maj kl. 12.00 – 13.00 i sammanträdesrum 3424 (innanför pausrummet), Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 4.

SEMINARIUM I STATISTIK

Dan Hedlin:
Local and global score functions in selective editing

Abstract: With selective editing the incoming questionnaires are prioritized, and those that have been given priority are selected for editing. The prioritization step often involves the computation of an item score (local score) for each data value that reflects the importance of investigating this data value. A score may be computed for each item on the questionnaire, and the item scores may be combined to a unit score (global score). The seminar discusses ways of summarizing item scores to a unit score making use of the mathematical concept of distance.

Tid och plats: Onsdagen den 28 maj kl. 13.00 i sal B705, Statistiska institutionen, SU, Universitetsvägen 10B, plan 7, Frescati.

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.

(Continued on the next page.)

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

Jobs to apply for

11. Linköpings universitet söker en universitetslektor i beräkningsvetenskap. Sista ansökningsdag är den 26 maj. Web-info: http://www.liu.se/jobbdb/show.html?2485.
12. Lunds universitet söker en eller flera doktorander i matematik med inriktning mot datorseende eller medicinsk bildanalys. Sista ansökningsdag är den 29 maj. Web-info: http://www3.lu.se/info/lediga/admin/document/PA2008-1436.pdf.
13. Linköpings universitet söker en universitetslektor i matematisk statistik. Sista ansökningsdag är den 9 juni. Web-info: http://www.liu.se/jobbdb/show.html?2500.

Old information

Jobs to apply for

14. Institutionen för matematik vid KTH utlyser två industridoktorandtjänster inom finansiell matematik till två projekt som kommer att drivas tillsammans med AB Svensk Exportkredit. Sista ansökningsdag är den 5 juni. Web-info: http://www.math.kth.se/IDannons.pdf.
15. The Australian National University i Canberra söker en "Postdoctoral/Research Fellow in Mathematics". Tjänsten varar upp till två år och finansieras av "an ARC Discovery Project grant in Harmonic Analysis of Elliptic Systems on Riemannian Manifolds". Kandidater bör ha forskningserfarenhet av harmonisk analys och till viss del av operatorteori, partiella differentialekvationer och differentialgeometri. Sista ansökningsdag är den 16 maj. Web-info: http://info.anu.edu.au/hr/Jobs/Academic_Positions/_MSI4767.asp.
16. KTH söker doktorander i matematik. Sista ansökningsdag är den 16 maj. Web-info: http://www.math.kth.se/utlysning.tjanst/utlysn.dokt.080416.html.
17. Linköpings universitet söker en doktorand inom forskarskolan i tvärvetenskaplig matematik. Utbildningen vänder sig till studenter som har ett starkt intresse för matematik och som samtidigt är intresserade av att arbeta aktivt med problem med anknytning till ett tillämpat ämne. Aktuella avhandlingsprojekt finns beskrivna på http://www.mai.liu.se/tvarvetenskap/. Sista ansökningsdag är den 16 maj. Web-info: http://www.liu.se/jobbdb/show.html?2447.
18. Uppsala universitet söker två forskare i tillämpad matematik. Anställningen omfattar längst två år. Doktorsexamen i matematik eller annat ämne med stort matematiskt innehåll skall ha avlagts tidigast tre år före ansökningstillfället. Sista ansökningsdag är den 26 maj. Web-info: http://www.personalavd.uu.se/ledigaplatser/780forsk.html.
19. Göteborgs universitet söker en universitetslektor i matematisk statistik med inriktning mot statistisk inferens. Tjänsten är placerad vid Matematiska vetenskaper (samverkande med CTH). Sista ansökningsdag är den 22 maj. Web-info: http://www.math.chalmers.se/univlektormatematiskstatistik080228eng.pdf.
20. Chalmers tekniska högskola söker en professor i matematisk statistik. Sista ansökningsdag är den 22 maj. Web-info: http://www.math.chalmers.se/ProfMathStat4March08.pdf.