BRÅKET

Information om seminarier och högre undervisning i matematiska ämnen i Stockholmsområdet

BRÅKET

Combinatorics, Dynamics, Probabilities

En svensk-rysk konferens med detta namn äger rum på KTH under tiden 3 – 7 oktober. Se sidorna 6 – 9.

Minisymposium on Integral Quadratic Constraints

Detta äger rum på KTH fredagen den 6 oktober. Se sidorna 10 – 11.

SEMINARIER

Fr 09 – 29 kl. 9.00 – 10.00. Kollokvium i fysik. Docent Erik Aurell, Matematiska institutionen, SU: *Econophysics or Phynance?* Sal F 01, Fysiska institutionen, KTH, Lindstedtsvägen 24, b.v. Se Bråket nr 29 sidan 5.

Fr 09 – 29 kl. 11.15. Algebraic Geometry Seminar. Sebastian del Baño Rollin, National Westminster Bank, London: *The motive of a moduli space of vector bundles on a curve.* Sammanträdesrum 3548, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 5. Se Bråket nr 29 sidan 4.

Fr 09 – 29 kl. 15.15. Matematiska institutionens kollokvium (Uppsala). Professor Bernt Lindström, Institutionen för matematik, KTH: *Elementära metoder i knutteorin.* Rum 2247, Matematiska institutionen, Polacksbacken, Uppsala universitet. Institutionen bjuder på kaffe, te och kakor kl. 14.45 i personalrummet. Efter föredraget ges möjlighet till diskussion och förfriskningar. Se Bråket nr 29 sidan 4.

Må 10 – 02 kl. 13.15 – 15.00. Algebra and Geometry Seminar. Anna Larsson: *A periodization of semisimple Lie algebras.* Rum 306, hus 6, Matematiska institutionen, SU, Kräftriket, Roslagsvägen 101. Se sidan 3.

Må 10 – 02 kl. 15.15. Seminar in Theoretical Physics. Joseph Minahan, Teoretisk fysik, Uppsala universitet: *Simple models for tachyon condensation in string theory.* Seminarierummet, Teoretisk fysik, KTH, Osquldas väg 6, plan 4. Se sidan 5.

Må 10 – 02 kl. 15.15 – 16.00. Seminarium i matematisk statistik. Fredrik Armerin: *Credit risk.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 29 sidan 6.

Seminarier (fortsättning)

Må 10−02 kl. 16.15−17.00. Seminarium i matematisk statistik. Henrik Hult: *A class of dynamic risk measures.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 29 sidan 7.

Ti 10−03 kl. 15.00−17.00. Artinian Gorenstein rings and Frobenius algebras. Dan Laksov: *Basic theory of Frobenius algebras, part III.* Sammanträdesrum 3548, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 5.

On 10−04 kl. 13.00. Pedagogiskt seminarium i statistik. Gösta Hägglund, Rolf Larsson och **Jan Wretman:** *Nya examinationsformer på tre av kurserna vid Statistiska institutionen, SU.* Rum B705, Statistiska institutionen, SU.

On 10−04 kl. 13.15−15.00. Seminar on stacks. Torsten Ekedahl. Rum 306, hus 6, Matematiska institutionen, SU, Kräftriket, Roslagsvägen 101. Se sidan 4.

On 10−04 kl. 14.00−15.00. Mittag-Leffler Seminar. John Baldwin, Chicago: *Free amalgamations.* Institut Mittag-Lefﬂer, Auravägen 17, Djursholm.

On 10−04 kl. 15.30−16.30. Mittag-Leffler Seminar. Martin Ziegler, Freiburg: *The Lascar Galois group.* Institut Mittag-Lefﬂer, Auravägen 17, Djursholm.

To 10−05 kl. 15.15−17.00. Professor Paul Cohen, Stanford: *Lecture series in Forcing Methods in Set Theory.* (Det fjärde föredraget i en serie.) Sal C1, Electrum, Kista. Se Bråket nr 26 sidan 4 och detta nr sidan 9.

To 10−05 kl. 16.15−18.00. Seminarium i matematik och fysik vid Mälardalens högskola (Eskilstuna). Bengt Rydström, Institutionen för matematik och fysik, Mälardalens högskola: *Vintergatans struktur.* Rum B315, Mälardalens högskola, Eskilstuna. Se Bråket nr 29 sidan 8. Internet-adressen till information om seminariet är http://www.ima.mdh.se/_seminars.htm.

Fr 10−06 kl. 9.00−10.00. Kollokvium i fysik. Docent Anders Karlsson, Kvantelektronik och kvantoptik, KTH, Kista: *Quantum cryptography; are we now moving from promise to practice?* Sal F01, Fysiska institutionen, KTH, Lindstedtsvägen 24, b.v. Se sidan 11.

Fr 10−06 kl. 11.00−12.00. Optimization and Systems Theory Seminar. Professor Anders Rantzer, Lunds tekniska högskola: *Title to be announced.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

Fr 10−06 kl. 13.15. Seminar in Mathematical Physics. Marek Gozdz: *Dirac operator on a fuzzy 3-sphere.* (Presentation of Master Thesis.) Seminarierummet, Teoretisk fysik, KTH, Osquldas väg 6, plan 4.

Fr 10−06 kl. 13.30. Minisymposium on Integral Quadratic Constraints. Anton Shiriaev, Odense University: *Stability of systems via integral quadratic constraints.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 10.

Fr 10−06 kl. 14.15. Minisymposium on Integral Quadratic Constraints. Anders Hansson, Reglerteknik, S3, KTH: *Efficient solution of linear matrix inequalities for integral quadratic constraints.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 10.

Fr 10−06 kl. 15.30. Minisymposium on Integral Quadratic Constraints. Alexandre Megretski, Massachusetts Institute of Technology: *Integral quadratic constraints in automated system analysis.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 11.

Fortsättning på nästa sida.

Seminarier (fortsättning)

Må 10−09 kl. 15.15−17.00. Seminarium i matematisk statistik. Lars Holst: *Om tangent-, Euler- och Bernoullital.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 4.

On 10−11 kl. 13.00. Licentiatseminarium i statistik. *(Observera lokalen!)* **Christian Tallberg** framlägger sin licentiatavhandling: *Centrality and Random Graphs.* Opponent: **Professor Peter J. Carrington,** University of Waterloo, Canada. Sal B413, Södra huset, Frescati, Universitetsvägen 10 B, 4 vån. Se sidan 5.

On 10−11 kl. 15.15−16.00. Seminarium i matematik och fysik vid Mälardalens högskola (Västerås). Erling Englund, Umeå universitet: *Perturbed renewal equations with applications to queueing systems and risk processes.* Rum N13, Mälardalens högskola, Högskoleplan, Västerås. Internet-adressen till information om seminariet är http://www.ima.mdh.se/_seminars.htm.

To 10−12 kl. 15.15−17.00. Professor Paul Cohen, Stanford: *Lecture on Analytic Number Theory.* (Det femte föredraget i en serie.) Sal C1, Electrum, Kista. Se Bråket nr 26 sidan 4 och detta nr sidan 9.

To 10−12 kl. 16.30. Doktorandseminarium i matematisk statistik. Annica Dominicus, SU: *Statistiska problem i tvillingstudier.* Rum 306, Cramérrummet, hus 6, Matematiska institutionen, SU, Kräftriket, Roslagsvägen 101.

Fr 10−13 kl. 9.00−10.00. Kollokvium i fysik. Speaker to be announced: *The Nobel Prize in Physics 2000.* Sal F 01, Fysiska institutionen, KTH, Lindstedtsvägen 24, b.v.

Fr 10−13 kl. 11.00−12.00. Optimization and Systems Theory Seminar. Dr Ilya Ioslovich, Faculty of Agricultural Engineering, Technion, Haifa, Israel: *Upper bounds for duals of positive linear programs with box-constrained uncertainties.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 4.

Fr 10−13 kl. 13.00. Docentföreläsning i matematik. Benjamin Baumslag: *Subgroups of groups with a finite presentation: A sketch of some important results in combinatorial group theory.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 4.

ALGEBRA AND GEOMETRY SEMINAR
Anna Larsson:
A periodization of semisimple Lie algebras

Abstract: In this talk, we discuss semisimple Lie algebras over an algebraically closed field of characteristic 0. We outline a proof of the fact that a periodization of such Lie algebras without $sl(2)$-component can be presented as a free graded Lie algebra modulo quadratic relations only. This can be derived from a result due to H. Garland and J. Lepowski about homology groups. However, our approach will be through a Chevalley basis and our method relies on elementary tools only.

Tid och plats: Måndagen den 2 oktober kl. 13.15−15.00 i rum 306, hus 6, Matematiska institutionen, SU, Kräftriket, Roslagsvägen 101.

SEMINAR ON STACKS

Torsten Ekedahl

I will start a seminar series on stacks. This is in some sense a continuation of the series held last semester but will start by recalling what has been said (the length of which will depend on the audience and their memories). Notes from the lectures are and will be available as http://www.matematik.su.se/~teke/stacknotes.dvi.

NB. The time for further seminars in the series may be changed on popular demand.

Tid och plats: Onsdagen den 4 oktober kl. 13.15 – 15.00 i rum 306, hus 6, Matematiska institutionen, SU, Kräftriket, Roslagsvägen 101.

SEMINARIUM I MATEMATISK STATISTIK

Lars Holst:
Om tangent-, Euler- och Bernoullital

Sammanfattning: Vad är sannolikheten att en slumppermutation av $1, 2, \ldots, n$ är av den oscillerande typen "ner-upp-ner-upp-..."? Dylika sannolikheter kan uttryckas med hjälp av s.k. tangent- och Eulertal. Bernoullital behandlas också och hur sådana kan uttryckas med tangenttal. Seminariet är av allmänbildningskaraktär.

Tid och plats: Måndagen den 9 oktober kl. 15.15 – 17.00 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

OPTIMIZATION AND SYSTEMS THEORY SEMINAR

Ilya Ioslovich: Upper bounds for duals
of positive linear programs with box-constrained uncertainties

Abstract: We consider positive linear programs with box-constrained variables and box-constrained uncertainties of all input data. The knowledge of upper bounds for dual variables is very useful for the analysis of sensitivity and especially for the presolving analysis related to determination of redundant primal variables. The upper bounds of duals are found by solving a set of specially constructed continuous knapsack problems (one for each row constraint). Results of presolving analysis are compared with results of the CPLEX presolver.

This is joint work with Per-Olof Gutman.

Tid och plats: Fredagen den 13 oktober kl. 11.00 – 12.00 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

DOCENTFÖRELÄSNING I MATEMATIK

Benjamin Baumslag:
Subgroups of groups with a finite presentation:
A sketch of some important results in combinatorial group theory

Abstract: Schreier's theorem, one relator groups, the word problem, subgroups of groups with a finite presentation.

Tid och plats: Fredagen den 13 oktober kl. 13.00 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

SEMINAR IN THEORETICAL PHYSICS

Joseph Minahan: Simple models
for tachyon condensation in string theory

Abstract: In this talk we will discuss simple scalar field theory models where one can find exact nontrivial lump solutions. The scalar field can be thought of as an open string tachyon field in open string field theory, and the lump solutions are the analogues of the unstable D branes. We show that there is one model in particular that captures many of the relevant features of string theory.

Tid och plats: Måndagen den 2 oktober kl. 15.15 i seminarierummet, Teoretisk fysik, KTH, Osquldas väg 6, plan 4.

LICENTIATSEMINARIUM I STATISTIK

Christian Tallberg

framlägger sin licentiatavhandling:

Centrality and Random Graphs

Opponent: **Professor Peter J. Carrington,** University of Waterloo, Canada.

Abstract: Centrality in random graphs is studied in two reports: *Testing Centrality in Random Graphs* and *Comparing Degree-based and Closeness-based Centrality Measures.*

By using block models, centrality is tested in random graphs. The null hypothesis model, assumed to generate edges with common probability, is the Bernoulli(p)-distribution. First an attempt is made to derive the maximum likelihood estimators of the parameters in the block model. It is shown that they are troublesome to derive. Therefore centrality testing is performed by computer simulation. Properties of the tests are investigated. Actor level centrality indices are aggregated to obtain graph centrality indices. Ten tests based on graph level centralities are presented. Two of the tests are based on degree and eight of the tests are based on closeness. It is concluded that none of the tests are uniformly most powerful. A general tendency is that the heterogeneity-based tests generate stronger power than the average-based tests. Noted is that also the tests defined as the maximums of the actor centralities have strong power.

Under the assumptions that the edges in realizations of directed random graphs are conditionally independent Bernoulli(p_i)-distributed, where the edge probabilities, p_i, are independently beta-distributed, statistical properties of four graph centrality measures are investigated. Three of the measures are extensively used within the context of social networks; the maximum of the actor centralities, the mean centrality, and the variance of the centralities. The fourth measure considered is the difference between the maximum of the actor centralities and the mean centrality. The graph centrality measures are investigated for two different actor centrality concepts, degree centrality and closeness centrality. Analytical results of statistical properties of the measures for degree-based centrality are derived, while similar results for closeness-based measures are difficult to derive. Statistical properties are obtained for both degree-based measures and closeness-based measures by computer simulation, where the empirical results agree with the theoretically derived results for the degree-based measures.

Tid och plats: Onsdagen den 11 oktober kl. 13.00 i sal B413, Södra huset, Frescati, Universitetsvägen 10 B, 4 vån.

COMBINATORICS, DYNAMICS, PROBABILITIES

Swedish-Russian conference
October 3 – 7, 2000

The conference is aimed mainly at young mathematicians from Sweden and Russia, but participants from other countries are also welcome. The emphasis will be on the interaction of Combinatorics and Dynamics, and their relation to Probability and Mathematical Physics.

We plan to expand collaboration between strong research groups working in these areas in Sweden and Russia, and also to encourage cooperation between people working in different areas.

Financial support for the conference is provided by NFR (Swedish Natural Science Research Council), KVA (Royal Swedish Academy of Sciences), and RFBR (Russian Foundation for Basic Research).

Main speakers:
- Professor Dmitry Anosov, Steklov Institute, Moscow.
- Professor Olle Häggström, Chalmers University of Technology and Göteborg University.
- Professor Svante Janson, Uppsala University.
- Docent Kurt Johansson, KTH.
- Professor Vadim Kaimanovich, CNRS, France.
- Professor Anatoly Vershik, Steklov Institute, St. Petersburg.

The mini-courses given by the main speakers will be complemented with shorter talks by younger participants and an open problems session.

Time and location: The conference will take place during the first week of October, 2000, (Tuesday October 3 to Saturday October 7) at the Royal Institute of Technology (KTH), Stockholm. The talks from Tuesday October 3 to Friday October 6 will be held in Kollegiesalen, Administrationsbyggnaden, Valhallavägen 79. The talks on Saturday October 7 will be held in lecture room E 2, Lindstedtsvägen 3.

Organizers: Tatiana Smirnova-Nagnibeda, KTH, e-mail `tatiana@math.kth.se`. Stanislav Smirnov, KTH, e-mail `stas@math.kth.se`, fax 08-723 17 88. Information about the conference can be found at `http://www.math.kth.se/~stas/sto2000/index.html`.

Schedule

Tuesday, October 3

8.30 – 9.00   Registration.

9.00   Opening.

9.20 – 10.10   **Kurt Johansson:** *Random matrices, random growth and random tilings (I).*
Random matrices have a rich mathematical structure with connections to many different parts of mathematics. Recently, connections with certain problems in combinatorial probability have been the focus of much attention. In this minicourse I will give some background on random matrices and discuss how random matrix distributions and random matrix-like distributions appear in certain random growth models, related to the length of the longest increasing subsequence in a random permutation, and in some types of random tilings.

10.40 – 11.30   **Dmitry Anosov:** *Flows on surfaces and related geometric questions (I).*

(Continued on the next page.)

11.40 – 12.30 **Svante Janson:** *Brownian limits for combinatorial problems (I).*
Many problems on random (discrete) combinatorial structures have asymptotics that can be described using Brownian motion and processes derived from it, such as the Brownian bridge and Brownian excursion. I will discuss some such problems, involving random trees, forests, and applications to hashing in computer science.

14.00 – 14.30 **Svante Linusson,** Linköping University: *The random assignment problem.*

14.40 – 15.00 **Yuri Yakubovich,** Steklov Institute, St. Petersburg: *Limit theorems for partitions.*

15.05 – 15.25 **Alexei Fishkin,** Moscow University: *Topological entropy for random dynamical systems and the analogue of Misiurewicz-Przytycki theorem.*

15.30 – 15.50 **Alexander Prikhod'ko,** Steklov Institute, Moscow: *On smooth models of dynamical systems with discrete spectrum.*

16.20 – 16.40 **Niklas Eriksen,** KTH: *Building the tree of life.*

16.45 – 17.05 **Maxim Vsemirnov,** Steklov Institute, St. Petersburg: *Graphs with large girth.*

17.15 – 17.35 **Stefan Israelsson,** Uppsala University: *A generalization of the law of large numbers for random matrices.*

17.40 – 18.00 **Alexander Gorbulskij,** St. Petersburg University: *The equivalence of notions of entropy for diadic sequences of partitions.*

Wednesday, October 4

9.00 – 9.50 **Vadim Kaimanovich:** *Ergodicity and conservativity: random walks, Brownian motion, geometric flows (I).*
Ergodicity and conservativity are the most basic and fundamental properties of a group of transformations (particular case: just a single invertible transformation) with a quasi-invariant measure. The aim of the minicourse is to discuss these properties in two closely related situations:

1. For Markov processes on algebraic and geometric structures (random walks on groups, Brownian motion on Riemannian manifolds).

2. For geometric flows on negatively curved manifolds (the geodesic and the horocycle flow).

In particular, it will be shown that ergodicity of both geometric flows admits a natural interpretation in terms of the Brownian motion on the manifold (recurrence for the geodesic flow and absence of bounded harmonic functions for the horocycle flow).

10.00 – 10.50 **Olle Häggström:** *Trends in percolation theory (I).*
Percolation theory deals with connectivity properties of random media. As a mathematical idealization, one usually takes an infinite graph (such as the $\mathbf{Z}^d$ lattice), removes edges (or vertices) at random, and asks about the possible existence of infinite connected components in the remaining subgraph.
Spectacular progress was made in mathematical percolation theory in the 1980's. This was followed by a more silent period in the first half of the 1990's. In the last few years, things have started to look better again, and the subject has begun to develop in a variety of new directions. In this talk, I intend to survey some of these developments. Topics that I plan to discuss include: conformal invariance, continuum percolation, dynamical percolation, entanglement and rigidity percolation, and percolation on nonamenable graphs.

11.20 – 11.50 **Torbjörn Lundh,** Chalmers University of Technology and Göteborg University: *Percolation diffusion.*

12.00 – 12.30 **Michael Shapiro,** KTH: *Combinatorics of totally positive varieties.*

14.00 – 14.30 **Johan Jonasson,** Chalmers University of Technology and Göteborg University: *Explicit isoperimetric constants for planar graphs and applications to percolation theory.*

14.40 – 15.00 **Dimitri Gioev,** KTH: *New applications of Bohnenblust-Spitzer combinatorial identity: joint distributions for random walks and a three-term Szegö formula.*

15.05 – 15.25 **Vadim Moldavskii,** Moscow University: *Conformal invariants and rotation number.*

15.30 – 15.50 **Pavel Nikitin,** St. Petersburg University: *Geometry and analysis of de Rham's curve.*

16.20 – 16.40 **Olga Anosova,** Moscow University: *On invariant manifolds in singularly perturbed systems.*

16.45 – 17.05 **Kristian Bjerklöv,** KTH: *Discrete quasi-periodic Schrödinger equations.*

17.15 – 17.35 **Vitaly Kurlin,** Moscow University: *An isotopic classification of spatial 3-valent graphs.*

17.40 – 18.00 **Victor Kleptsyn,** Moscow University: *Analytical classification of Fuchsian singular points.*

Thursday, October 5

9.00 – 9.50 **Kurt Johansson:** *Random matrices, random growth and random tilings (II).*

10.00 – 10.50 **Svante Janson:** *Brownian limits for combinatorial problems (II).*

11.20 – 11.50 **Volodymyr Nekrashevich,** Kiev University: *Schreier graphs of self-similar group actions on the Cantor set.*

12.00 – 12.30 **Nikita Sidorov,** University of Science and Technology in Manchester: *On the fine structure of stationary measures in IFS which contract-on-average.*

12.40 – 13.00 **Roman Muchnik,** Yale University, USA: *Orbits of Zariski dense semigroups of $SL(n, Z)$.*

Friday, October 6

9.00 – 9.50 **Dmitry Anosov:** *Flows on surfaces and related geometric questions (II).*

10.20 – 11.10 **Anatoly Vershik:** *Ergodic theory of polymorphisms.*

A polymorphism is a "multivalued map" in the category of measure spaces; this is also an analogue of Markov map for such spaces. The dynamic theory of polymorphisms is a generalization of classical ergodic theory with tight links to the stationary Markov processes. Ergodic theory of the polymorphisms includes:

a. Geometrical part: the set of polymorphisms is a convex semigroup, compact in weak topology.
b. Spectral theory and theory of dilations.
c. Entropy theory.
d. Connection to (Kolmogorov) Markov processes.
e. Trajectory theory and connections to gruppoids and C^*-algebras.

Some of those topics will be discussed.

11.20 – 12.30 *Problem session.*

14.00 – 14.20 **Sergei Shadrin,** Moscow University: *Euler characteristic of the spaces of real meromorphic functions.*

14.25 – 14.45 **Oleg Karpenkov,** Moscow University: *Combinatorics of boundary singularities B_n^l of k-immersions and Bernoulli-Euler updown numbers.*

14.55 – 15.15 **Anders Öberg,** Umeå University: *Dini continuous probability weights and exact dimension of invariant measures.*

(Continued on the next page.)

15.20 – 15.40 **Georgi Chakvetadze,** Steklov Institute, Moscow: *Interval dynamics and a model for drilling wells.*

16.10 – 16.30 **Robert Nyqvist,** Växjö University: *Examples of dynamical systems in finite field extensions of the p-adic numbers.*

16.35 – 16.55 **Konstantin Kokhas,** St. Petersburg University: *Heisenberg group over a field of finite characteristic and its factor-representations.*

17.05 – 17.25 **Natalia Dobrinskaia,** Moscow University: *A classification problem of manifolds with torus actions and given orbit space.*

17.30 – 17.50 **Pavel Bachurin,** Moscow University: *On a relation between time average and minimal attractors.*

Saturday, October 7

9.00 – 9.50 **Vadim Kaimanovich:** *Ergodicity and conservativity: random walks, Brownian motion, geometric flows (II).*

10.00 – 10.50 **Olle Häggström:** *Trends in percolation theory (II).*

11.20 – 11.40 **Alexander Bufetov,** Princeton University, USA: *Ergodic theorems for free group actions.*

11.45 – 12.05 **Sergey Dobrynin,** St. Petersburg University: *Several ways to construct a normal form in the free solvable group.*

12.10 – 12.30 **Mikhail Gorbulskij,** St. Petersburg University: *Metric properties of representations of the affine group.*

14.00 – 14.20 **Hans Ringström,** KTH: *On the asymptotic behaviour of solutions to an ODE arising in cosmology.*

14.25 – 14.45 **Anton Borisyuk,** Steklov Institute, Moscow: *Global bifurcations on the Klein bottle. Unimodal case.*

14.50 – 15.10 **Maria Saprykina,** KTH: *Some new examples in analytic ergodic theory.*

15.20 – 15.40 **Anton Gorodetsky,** Steklov Institute, Moscow: *Intrinsically hyperbolic maps and some properties of partially hyperbolic systems.*

15.45 – 16.05 **Sergey Kitaev,** Chalmers University of Technology and Göteborg University: *On non-existence of an iterative morphism which defines an Arshon sequence.*

16.10 – 16.30 **Sergey Shapovalov,** Steklov Institute, Moscow: *Countable symbolic dynamics.*

GUEST LECTURES BY PROFESSOR PAUL COHEN

Professor Paul Cohen from Stanford visits SICS (Swedish Institute of Computer Science) from September 4 to October 20, 2000. He gives a series of lectures on September 7, 14, 28 and October 5, 12, 19 at 15.15 – 17.00 in lecture hall C1, Electrum, Kista. See Bråket no. 26 page 4.

Professor Cohen has given the following abstracts of the remaining lectures:

On October 5 I will give the last lecture concerning Set Theory, where I will give more examples of the forcing technique to show how one attacks a variety of problems, including various versions of the axiom of choice, GCH, and Lebesgue measurability.

On October 12 I will give an introduction to the basic ideas of Analytic Number Theory, including the proof of the Riemann-von Mangoldt formula, extensions of the zeta function to L-series, number fields, and function fields. If time permits, basic facts about spectral theory, and how the Selberg zeta function is an example where the spectral interpretation, although stated for a geometric problem, does give rise to a Riemann like function.

On October 19 I will speak about adeles, and discuss the evidence for the possibility that a spectral interpretation of the Riemann Hypothesis may exist on this space.

MINISYMPOSIUM ON INTEGRAL QUADRATIC CONSTRAINTS

This minisymposium is organized by the Division of Optimization and Systems Theory, KTH. The purpose is to bring together leading researchers to discuss the current status of the field.

It will take place on Friday, October 6, 2000, in seminar room 3721, Department of Mathematics, KTH, Lindstedtsvägen 25, floor 7.

The notion *integral quadratic constraint* was introduced by Yakubovich in the 1960's, and it has been shown to be a useful concept in systems analysis. Indeed, it unifies much of the existing stability theory and it results in stability criteria that can be verified using convex optimization.

Partial list of participants:
- V. A. Yakubovich, St. Petersburg University.
- A. Megretski, Massachusetts Institute of Technology.
- A. Rantzer, Lund Institute of Technology.
- A. Shiriaev, Odense University.
- A. Lindquist, KTH.
- X. Hu, KTH.
- A. Hansson, KTH.
- U. Jonsson, KTH.

There will be three presentations, each followed by a discussion.

Schedule

13.30 **Anton Shiriaev:** *Stability of systems via integral quadratic constraints.*
    The talk is aimed to present and discuss the relationship between the quadratic criterion of absolute stability developed by V. A. Yakubovich and the technique developed recently by A. Megretsky and A. Rantzer for L-2 stability of the system, based on the integral quadratic constraints in the frequency domain. Some improvements of the results by Megretsky and Rantzer for the case of unbounded 'nonlinear' block and examples are given.

14.15 **Anders Hansson:** *Efficient solution of linear matrix inequalities for integral quadratic constraints.*
    In this talk is discussed how to implement an efficient interior-point algorithm for the semi-definite programs that result from integral quadratic constraints. The algorithm is a primal-dual potential reduction method, and the computational effort is dominated by a least-squares system that has to be solved in each iteration. The key to an efficient implementation is to utilize iterative methods and the specific structure of integral quadratic constraints.The algorithm has been implemented in Matlab. To give a rough idea of the efficiencies obtained, it is possible to solve problems resulting in a linear matrix inequality of dimension 130×130 with approximately 5000 variables in about 10 minutes on a lap-top. Problems with approximately 20000 variables and a linear matrix inequality of dimension 230×230 are solved in a few hours. It is not assumed that the system matrix has no eigenvalues on the imaginary axis, nor is it assumed that it is Hurwitz.

15.00 Coffee break.

15.30 **Alexandre Megretski:** *Integral quadratic constraints in automated system analysis.*
Verification of robustness and performance of complex control systems is a major time consuming component of the design process. The paradigm of analysis via quadratic constraints is a very promising approach to designing algorithms capable of automatic rigorous analysis of robustness and performance. For example, a MATLAB-based toolbox developed recently at MIT and LTH analyses arbitrary interconnections of elements of a limited library of "classical absolute stability blocks", including un-modelled and real parametric uncertainty, slowly time varying gains, saturation and hysteresis, harmonic coefficients, etc. Work on extending the technique to "hybrid" models is currently under way.

The talk will cover some theoretical challenges associated with the use of IQC in automated system analysis:

- Formulating "care-free" analysis criteria. In other words, an efficient computer algorithm should be capable of verifying all assumptions in the analysis theorems.
- Facilitating the use of signal range information (such as some signals being logical variables, etc.) in the analysis process.
- Developing optimization tools which work efficiently on the optimization problems with the specific structure typical for the IQC analysis.

17.00 End of the symposium.

KOLLOKVIUM I FYSIK

Anders Karlsson: Quantum cryptography; are we now moving from promise to practice?

Abstract: Quantum information is probably one of the hottest topics in physics today; reports on quantum computing, quantum teleportation, and quantum cryptography appear frequently in science and popular media. Of all aspects in the fields of quantum information, quantum cryptography — or rather fundamentally secure cryptographic key distribution using the encoding of the databits on single-photon states — is probably closest to becoming a real application. In the last ten years or so quantum cryptography has moved from a paper proposal to field experiments up to 48 km on optical fibres and up to 1.6 km in free space daylight conditions. Furthermore, a recent generation of experiments has employed entangled twin-photon states, the same states used to illustrate quantum non-locality, to further enhance the security and the transmission distance. In this talk, I will both be describing the basics of quantum cryptography as well as reviewing some of the latest experiments done at KTH Kista and worldwide.

Tid och plats: Fredagen den 6 oktober kl. 9.00 – 10.00 i sal F 01, Fysiska institutionen, KTH, Lindstedtsvägen 24, b.v.