BRÅKET

Information om seminarier och högre undervisning i matematiska ämnen i Stockholmsområdet

BRÅKET

Pris till Julius Borcea

Julius Borcea har fått Svenska matematikersamfundets Wallenbergpris. Se sidan 8.

Nästa nummer av Bråket

utkommer onsdagen den 19 maj. Material måste vara red. tillhanda senast den 18 maj kl. 13.00.

SEMINARIER

Fr 05−14 kl. 11.00−12.00. Optimization and Systems Theory Seminar. Professor Daizan Cheng, Institute of Systems Sciences, Chinese Academy of Sciences, Beijing: *Control of switched systems.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 17 sidan 5.

Må 05−17 kl. 10.30−11.30. DNA-seminariet Uppsala-KTH (dynamiska system, talteori, analys). Peter W. Jones, Yale University: *Schwarzian derivatives for SLE mappings and approximation by Julia Sets.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 4.

Må 05−17 kl. 13.15−14.15. DNA-seminariet Uppsala-KTH (dynamiska system, talteori, analys). Marco Martens, University of Groningen: *Renormalization of Lorenz systems.* Sal D41, KTH, Lindstedtsvägen 17, 1 tr. Se sidan 4.

Disputation i matematik

Aram L. Karakhanyan disputerar vid KTH på avhandlingen *Existence and Regularity of Free Boundary Problems with Fixed Gradient Condition* måndagen den 17 maj kl. 13.00. Se sidan 6.

Disputation i statistik

Johan Koskinen disputerar på avhandlingen *Essays on Bayesian Inference for Social Networks* fredagen den 21 maj kl. 10.00 i hörsal 3, hus B, södra huset, Frescati. Se Bråket nr 18 sidan 9.

Seminarier (fortsättning)

Må 05−17 kl. 14.00−15.00. Kombinatorikseminarium. *(Observera dagen och tiden!)* **Ömer Egecioglu,** Department of Computer Science, University of California at Santa Barbara: *From a polynomial Riemann hypothesis to alternating sign matrices.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 18 sidan 7.

Må 05−17 kl. 14.15−15.00. Seminarium i numerisk analys. Yueqiang Liu, Electric Field Theory, Chalmers tekniska högskola, Göteborg: *Eddy current computations using edge elements and adaptive grids.* Rum 4523, Nada, KTH, Lindstedtsvägen 5, plan 5. Se Bråket nr 18 sidan 3.

Må 05−17 kl. 15.15−16.00. Seminarium i finansiell matematik. Daniel Sunesson presenterar sitt examensarbete: *Two Default Risk Models.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 7.

Må 05−17 kl. 16.15−17.00. Seminarium i finansiell matematik. Lisa Larsson presenterar sitt examensarbete: *Pricing Bermudan Style Swaptions Using the Calibrated Hull White Model.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 4.

Ti 05−18 kl. 10.15. Plurikomplexa seminariet. Håkan Samuelsson, Göteborg: *A regularization of the Coleff-Herrera residue current.* Sal 2215, Matematiska institutionen, Polacksbacken, Uppsala universitet. Se sidan 3.

Ti 05−18 kl. 13.15. Plurikomplexa seminariet. Maciej Klimek, Uppsala: *Strong analyticity of partly filled-in composite Julia sets.* Sal 2215, Matematiska institutionen, Polacksbacken, Uppsala universitet. Se sidan 5.

Ti 05−18 kl. 14.00−16.00. Kollokvium i filosofi. Paisley Livingston, Lignan University, Hong Kong: *What is a text?* Sal F339, Filosofiska institutionen, SU.

On 05−19 kl. 10.00−11.00. Presentation av examensarbete i matematik. Henrik Strohmayer: *Implementation of Gröbnerwalk and Fractalwalk in Singular.* Rum 306, hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 8.

On 05−19 kl. 13.15−14.15. Seminarium i analys och dynamiska system. M. Solomyak, Rehovot, Israel: *On the spectrum of a family of differential operators appearing in the theory of irreversible quantum graphs. General theory.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 18 sidan 5.

On 05−19 kl. 13.15−15.00. Algebra and Geometry Seminar. Ragni Piene: *Enriques diagrams and equisingular strata of families of curves.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 3.

On 05−19 kl. 15.15. Seminarium i matematisk statistik. Mark Iles, Institutionen för medicinsk epidemiologi och biostatistik, Karolinska Institutet: *The use and efficacy of haplotype tagging SNP's.* Rum 306 (Cramérrummet), hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 5.

Må 05−24 kl. 10.00−11.00. Presentation av examensarbete i matematik. Eric Emtander: *Kedjebråk.* Rum 306, hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 8.

Fortsättning på nästa sida.

Seminarier (fortsättning)

Må 05 – 24 kl. 14.15 – 15.00. Seminarium i numerisk analys. Espen R. Jakobsen, Norwegian University of Science and Technology, Trondheim: *Error bounds for monotone approximation schemes for Hamilton-Jacobi-Bellman equations.* Rum 4523, Nada, KTH, Lindstedtsvägen 5, plan 5. Se sidan 8.

Ti 05 – 25 kl. 14.15 – 15.00. Seminarium i numerisk analys. *(Observera dagen!)* **Michael W. Berry,** University of Tennessee: *A comprehensive whole genome phylogeny using correlated peptide motifs defined in a multi-dimensional vector space.* Rum 4523, Nada, KTH, Lindstedtsvägen 5, plan 5. Se sidan 7.

On 05 – 26 kl. 13.00. Seminarium i statistik. Professor Elizabeth Thomson, Sociologiska institutionen, enheten för demografi, SU: *Union stability and stepfamily fertility in Austria, Finland, France, and West Germany.* Sal B705, Statistiska institutionen, SU, Universitetsvägen 10B, plan 7, Frescati. Se sidan 5.

Fr 05 – 28 kl. 13.15. Mathematical Physics Seminar. Gunnar Sigurdsson, KTH, presenterar sin licentiatavhandling: *Canonical involutions and bosonic representations of three-dimensional Lie color algebras.* Seminarierummet i hus 11 (rum 112:028), Roslagstullsbacken 11, Stockholms centrum för fysik, astronomi, bioteknik (SCFAB, AlbaNova).

PLURIKOMPLEXA SEMINARIET

Håkan Samuelsson:
A regularization of the Coleff-Herrera residue current

Abstract: Let f be a holomorphic mapping from some complex manifold to $\mathbb{C}^2$ and assume that f defines a complete intersection. We prove that the Coleff-Herrera residue current corresponding to f can be smoothly regularized by a $(0,2)$-form depending on two parameters.

Tid och plats: Tisdagen den 18 maj kl. 10.15 i sal 2215, Matematiska institutionen, Polacksbacken, Uppsala universitet.

ALGEBRA AND GEOMETRY SEMINAR

Ragni Piene:
Enriques diagrams and equisingular strata of families of curves

Abstract: This is a report on joint work with Steve Kleiman. We give a combinatorial definition of Enriques diagrams and prove relations between numerical invariants associated to such diagrams. The diagrams and the invariants have geometrical interpretations in terms of singularities of curves.

Given a family of reduced curves on a complex surface, its parameter space can be stratified according to the singularity type of the curves. The strata are related to the subschemes $H(T)$ of the Hilbert scheme, where each $H(T)$ parameterizes clusters defined by the complete ideals of a given singularity type D. The scheme $H(T)$ is used to define a natural cycle on the parameter space of the family that enumerates curves with singularity type T.

Tid och plats: Onsdagen den 19 maj kl. 13.15 – 15.00 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

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DNA-SEMINARIET UPPSALA-KTH
(DYNAMISKA SYSTEM, TALTEORI, ANALYS)

Peter W. Jones:
Schwarzian derivatives for SLE mappings
and approximation by Julia Sets

Abstract: We present two results on dynamical systems. The first, due to Nam-Gyu Kang, gives a remarkable identity for Schwarzian derivatives of Riemann Mappings from the upper half plane to the exterior of SLE traces. The second result (joint work with Ilia Binder) is a strong approximation theorem for the $f(\alpha)$ spectrum for arbitrary planar domains (with respect to harmonic measure), where the approximation is by hyperbolic or "Pure Cantor" Julia Sets. We also make some speculations about both of these problems.

Tid och plats: Måndagen den 17 maj kl. 10.30 – 11.30 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

DNA-SEMINARIET UPPSALA-KTH
(DYNAMISKA SYSTEM, TALTEORI, ANALYS)

Marco Martens:
Renormalization of Lorenz systems

Abstract: The small scale geometrical properties of dynamical systems have a strong influence on the actual (measure theoretical) behaviour of systems. In dynamics renormalization is a technique to study small scale geometry. We will discuss renormalization aspects of certain three-dimensional dissipative flows, Lorenz flows, and some analytical tools used in this study.

Tid och plats: Måndagen den 17 maj kl. 13.15 – 14.15 i sal D41, KTH, Lindstedtsvägen 17, 1 tr.

SEMINARIUM I FINANSIELL MATEMATIK

Lisa Larsson

presenterar sitt examensarbete:

Pricing Bermudan Style Swaptions
Using the Calibrated Hull White Model

Abstract: The Hull and White model for the short rate is reviewed, and a trinomial tree for the short rate is built and adjusted to current term structure. To be able to use the tree for pricing of a Bermudan swaption, the tree is calibrated to market prices connected with the derivative that is to be priced. The underlying derivatives for the Bermudan swaption are the European swaptions which have exercise times that coincide with the exercise times in the Bermudan swaption. Finally, the risks are calculated so that a hedge for the Bermudan can be made. The risks considered here are the delta, vega and gamma risks. How the model is implemented by use of object oriented design is also shown. A numerical example is presented at the end of the thesis.

Tid och plats: Måndagen den 17 maj kl. 16.15 – 17.00 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

PLURIKOMPLEXA SEMINARIET

Maciej Klimek:
Strong analyticity of partly filled-in composite Julia sets

Abstract: It will be shown that a composite Julia set generated by an infinite array of polynomial mappings is strongly analytic when regarded as a multifunction of the generating maps. In contrast to earlier results, the construction of such Julia sets does not involve forming of polynomially convex hulls of approximating sets, and consequently is better suited for use in computer simulation.

Tid och plats: Tisdagen den 18 maj kl. 13.15 i sal 2215, Matematiska institutionen, Polacksbacken, Uppsala universitet.

SEMINARIUM I MATEMATISK STATISTIK

Mark Iles:
The use and efficacy of haplotype tagging SNP's

Abstract: As the cost of genotyping drops and the number of known SNP markers increase, the number and density of SNP's being genotyped for a single study is increasing. Analysing such a large number of variables simultaneously presents a statistical challenge. However, given the high levels of correlation between closely spaced SNP's there is potentially much redundancy in genotyping large numbers of SNP's. It is clear that if this correlation structure were well understood/modelled, much of the redundancy could be avoided by genotyping only the most informative SNP's. This has given rise to the identification of haplotype tagging SNP's. These htSNP's are the markers that capture most of the variation in the region being studied, with as little redundancy as possible. I will discuss the ways in which htSNP's are identified, how well they perform on reality, and how their performance might be better estimated.

Tid och plats: Onsdagen den 19 maj kl. 15.15 i rum 306 (Cramérrummet), hus 6, Matematiska institutionen, SU, Kräftriket.

SEMINARIUM I STATISTIK

Elizabeth Thomson:
Union stability and stepfamily fertility
in Austria, Finland, France, and West Germany

Abstract: In this paper, we test the hypothesis that unique effects of stepfamily composition on union fertility are confounded with differences between stepfamilies and couples without stepchildren in the risk of union disruption. We use birth and union histories from Fertility and Family Surveys in Austria, Finland, France, and West Germany. The risks of a union birth and separation are modelled simultaneously, allowing for the potential effects of unobserved predispositions to have a child or to separate on the other event. We test hypotheses drawn from the value of first and second shared births to couples: Net of the couple's combined parity, the birth risk will be greater if the child is (a) the first in a union, (b) the first biological child for one of the partners, or (c) the second child in a union.

Tid och plats: Onsdagen den 26 maj kl. 13.00 i sal B705, Statistiska institutionen, SU, Universitetsvägen 10B, plan 7, Frescati.

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DISPUTATION I MATEMATIK

Aram L. Karakhanyan

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disputerar på avhandlingen

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**Existence and Regularity of Free Boundary Problems
with Fixed Gradient Condition**

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måndagen den 17 maj kl. 13.00 i Kollegiesalen, Administrationsbyggnaden, KTH, Valhalla-vägen 79. Till fakultetsopponent har utsetts *professor Panagiota Daskalopoulos,* Columbia University, New York, USA.

Abstract of the thesis

The thesis consists of the following three papers.

Up-to boundary regularity for a singular perturbation problem for the p-Laplacian type.

In this paper we are interested in establishing up-to boundary uniform estimates for the one phase singular perturbation problem involving a nonlinear singular/degenerate elliptic operator. Our main result states: if $\Omega \subset \mathbf{R}^n$ is a $C^{1,\alpha}$ domain, $f \in C^{1,\alpha}(\overline{\Omega})$ for some $0 < \alpha < 1$ and u^ε verifies

$$\operatorname{div}\mathbf{A}(x, u^\varepsilon, \nabla u^\varepsilon) = \beta_\varepsilon(u^\varepsilon) \text{ in } \Omega,$$
$$0 \leq u^\varepsilon \leq 1 \text{ in } \Omega,$$
$$u^\varepsilon = f \text{ on } \partial\Omega,$$

where $\varepsilon > 0$, $\beta_\varepsilon(t) = \frac{1}{\varepsilon}\beta\left(\frac{t}{\varepsilon}\right)$ and

$$0 \leq \beta(t) \leq B\chi_{\{0<t<1\}}, \quad \int_{\mathbf{R}} \beta_\varepsilon(t)dt = M > 0,$$

with some positive constants B and M, then there exists a constant $C > 0$ independent of ε such that

$$\|\nabla u^\varepsilon\|_{L^\infty(\Omega)} \leq C.$$

Nonlinear free boundary problems with singular source terms, *with A. Hakobyan.*

This paper concerns existence of solutions of a free boundary problem for a class of elliptic quasilinear operators $\mathcal{L}$.

We show that for given points $\{x^j\}_{j=1}^k \subset \mathbf{R}^n$ there is a solution (u, Ω) satisfying

$$\mathcal{L}u = -\sum c_j \delta_{x^j} \text{ in } \Omega,$$
$$u = 0 \text{ on } \partial\Omega,$$
$$|\nabla u| = 1 \text{ on } \partial\Omega,$$

in some weak sense. Here $\Omega \subset \mathbf{R}^n, \{x^j\}_{j=1}^k \subset\subset \Omega$, $c_j > 0$ and δ_{x^j} is the Dirac measure with support at point x^j.

The behavior of the free boundary near the fixed boundary for a minimization problem, *with C. E. Kenig and H. Shahgholian.*

We show that the free boundary $\partial\{u > 0\}$, arising from the minimizer(s) u, of the functional

$$J(u) = \int_\Omega |\nabla u|^2 + \lambda_+^2 \chi_{\{u>0\}} + \lambda_-^2 \chi_{\{u<0\}},$$

approaches the (smooth) fixed boundary $\partial\Omega$ tangentially, at points where the Dirichlet data vanishes along with its gradient.

SEMINARIUM I FINANSIELL MATEMATIK

Daniel Sunesson

presenterar sitt examensarbete:

Two Default Risk Models

Abstract: In this thesis a default risk model is extended to take different industries into account, i.e. the industry dimension is inferred into the model. The theory behind reduced form models is presented, and two different models are considered for the purpose of a comparative analysis. The analysis is focused on the mapping from loan to credit quality rating, and specific features of the loss distribution are also investigated. Finally, the effects on capital requirements under the Basel II paradigm are analysed. The results indicate that the extension results in a considerable redistribution of the credit rating for the individual loans, whereas the risk for the total portfolio remains unaffected.

Tid och plats: Måndagen den 17 maj kl. 15.15 – 16.00 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

SEMINARIUM I NUMERISK ANALYS

Michael W. Berry:
A comprehensive whole genome phylogeny using correlated peptide motifs defined in a multi-dimensional vector space

Abstract: As whole genome sequences continue to expand in number and complexity, effective methods for comparing and categorizing both genes and species represented within extremely large datasets are required. Current methods have generally utilized incomplete (and likely insufficient) subsets of the available data even as additional data become available at a rapid rate. We have developed an accurate and efficient method for producing robust gene and species phylogenies using very large whole genome protein datasets. This method relies on multi-dimensional protein vector definitions supplied by the singular value decomposition (SVD) of large sparse data matrices in which each protein is uniquely represented as a vector of overlapping tetrapeptide frequencies. In one experiment, over 134 000 proteins from 53 complete prokaryotic genomes and one mitochondria were represented in vector spaces constructed from over 500 of the largest singular triplets. Quantitative pairwise estimates of species similarity are obtained by summing the protein vectors to form species vectors, then determining the cosines of the angles between the species vectors. Evolutionary trees are then produced from the distance matrices obtained, following the conversion of these vector derived similarity measures into evolutionary distance measures. Although many accepted prokaryotic relationships were confirmed in these trees, several novel relationships were also noted. In addition, we provide evidence that each of the SVD-derived basis vectors represents a particular conserved protein motif composed of sets of correlated peptides. Each "copep" motif is precisely defined as a particular linear combination of all 160 000 possible tetrapeptides. This analysis represents not only the most detailed simultaneous comparison of prokaryotic genes and species available to date, but also a computational framework for bioinformatics research in whole genome phylogeny.

This is joint work with G. W. Stuart, Indiana State University.

Tid och plats: Tisdagen den 25 maj kl. 14.15 – 15.00 i rum 4523, Nada, KTH, Lindstedtsvägen 5, plan 5.

PRESENTATION AV EXAMENSARBETE I MATEMATIK

Henrik Strohmayer:
Implementation of Gröbnerwalk and Fractalwalk in Singular

Sammanfattning: Gröbnerbaser ger en metod att lösa system av polynomekvationer, och mer allmänt, att räkna i kvotringar till polynomringar. Det finns en välkänd algoritm, Buchbergeralgoritmen, för att bestämma en Gröbnerbas för ett ideal i polynomringen. Denna algoritm kommer att presenteras. De algoritmer som implementerats är förfiningar av standardalgoritmen.

Tid och plats: Onsdagen den 19 maj kl. 10.00 – 11.00 i rum 306, hus 6, Matematiska institutionen, SU, Kräftriket.

PRESENTATION AV EXAMENSARBETE I MATEMATIK

Eric Emtander: Kedjebråk

Sammanfattning: Jag kommer att börja med att tala om den grundläggande teorin för kedjebråk och kedjebråksutveckling, speciellt konvergensfrågor. Därefter kommer jag att ta upp olika tillämpningar av kedjebråksutvecklingar i talteori, bl.a. lösning av Pells ekvation. Jag kommer även att säga något om kedjebråksutveckling av e och π.

Tid och plats: Måndagen den 24 maj kl. 10.00 – 11.00 i rum 306, hus 6, Matematiska institutionen, SU, Kräftriket.

SEMINARIUM I NUMERISK ANALYS

Espen R. Jakobsen:
Error bounds for monotone approximation schemes
for Hamilton-Jacobi-Bellman equations

Abstract: I will discuss recent results on error bounds for monotone approximation schemes for Hamilton-Jacobi-Bellman equations. These are second order degenerate elliptic and fully non-linear equations having non-smooth solutions. They appear in optimal stochastic control theory, which has many applications e.g. in finance. For more than a decade, nobody was was able to obtain error bounds for numerical schemes for such equations. The breakthrough was made by Krylov in 1997 and 2000, and more recently these results have been improved and generalized by Barles and the speaker.

Tid och plats: Måndagen den 24 maj kl. 14.15 – 15.00 i rum 4523, Nada, KTH, Lindstedtsvägen 5, plan 5.

Pris till Julius Borcea

Julius Borcea vid Matematiska institutionen, SU, har fått Svenska matematikersamfundets Wallenbergpris för år 2004. Han delar priset med Serguei Shimorin (se Bråket nr 17 sidan 5). Priset kommer att delas ut vid Svenska matematikersamfundets årsmöte i Lund i början av juni.

Låt oss gratulera Julius till den fina utmärkelsen!