BRÅKET

Information om seminarier och högre undervisning i matematiska ämnen i Stockholmsområdet

NR 35 **FREDAGEN DEN 30 OKTOBER 2009**

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 5 november kl. 13.00.

Disputation i matematisk statistik

Daniel Andersson skall disputera på avhandlingen *Contributions to the Stochastic Maximum Principle* fredagen den 30 oktober kl. 13.00 i sal F3, KTH, Lindstedtsvägen 26, b.v. Se Bråket nr 33 sidan 4.

Money, jobs: Se sidorna 6 – 7.

SEMINARIER

Fr 10–30 kl. 12.15 – 13.00. Grundutbildningsseminarium. Lars Brandell: *Resultatet av det diagnostiska provet som gavs till de nyantagna teknologerna i början av höstterminen 2009.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

Må 11–02 kl. 15.15 – 16.00. Seminarium i finansiell matematik. Yuwei Zhao presenterar sitt examensarbete: *Numerical algorithms for a class of obstacle problems.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 34 sidan 6.

Må 11–02 kl. 16.15 – 17.00. Seminarium i finansiell matematik. Zhao Li presenterar sitt examensarbete: *Importance Sampling for Estimating Risk Measures in Portfolio Credit Risk Models.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 4.

On 11–04 kl. 10.15 – 12.00. Kombinatorikseminarium. Kimmo Eriksson, Mälardalens högskola: *Limiting shapes of birth-and-death processes on Young diagrams.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 3.

On 11–04 kl. 11.00 – 12.00. KTH/Nordita/SU Seminar in Theoretical Physics. *(Observera lokalen!)* **Göran Lindblad,** KTH: *Hidden Markov chains: models of quantum dynamics with memory.* Rum 122:026, AlbaNova universitetscentrum. Se Bråket nr 34 sidan 5.

Fortsättning på nästa sida.

Kurs

Henrik Shahgholian: Reading course: Methods in Elliptic PDE. Se sidorna 4 – 5.

Seminarier (fortsättning)

On 11–04 kl. 13.15 – 14.15. Seminarium i analys och dynamiska system. Henrik Shahgholian, KTH: *Obstacle type problems: An overview and some recent results.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 34 sidan 7.

On 11–04 kl. 13.15 – 15.00. Algebra and Geometry Seminar. Anatol Kirillov, RIMS, Kyoto: *Different faces of the FK quadratic algebras: Algebra, Geometry, Combinatorics, Topology, Special Functions and Integrable Systems.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 3.

On 11–04 kl. 16.00. KTH/SU Mathematics Colloquium. Professor Nils Dencker, Lunds universitet: *The spectral instability of differential operators.* 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 34 sidan 7.

To 11–05 kl. 10.30. Seminar in Fluid Mechanics. Pavel Kudinov: *Particle-based methods for fluid dynamics, or can validation be an obstacle for scientific progress?* Seminarierummet, Institutionen för mekanik, KTH, Teknikringen 8. Se sidan 6.

To 11–05 kl. 14.00 – 15.00. Institut Mittag-Leffler Seminar. Agatha Walczak-Typke, Universität Wien: *Constructibility of potentially isomorphic pairs vs classification in Homogeneous Model Theory.* Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 3.

To 11–05 kl. 15.30 – 16.30. Institut Mittag-Leffler Seminar. Carlos Di Prisco, IVIC, Caracas: *Graphs defined by the shift operation.* Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 5.

Må 11–09 kl. 15.15. Seminarium i finansiell matematik. Professor Xunyu Zhou, University of Oxford: *Finding quantiles.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se nedan.

Fr 11–13 kl. 13.15 – 14.15. Graduate Student Seminar. Oscar Andersson Forsman: *Title to be announced.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

SEMINARIUM I FINANSIELL MATEMATIK

Xunyu Zhou: Finding quantiles

Abstract: Existing portfolio choice models in continuous time typically reduce to finding optimal terminal cash flows which are random variables. While it works for expected utility maximization, it generally fails to work for models with non-expected utility criteria, such as the goal-achieving model, Yaari's dual model, Lopes' SP/A model, the behavioural model under prospect theory, models with coherent risk measures, as well as those explicitly involving VaR and CVaR in objectives and/or constraints. This talk reviews the latest development in solving these non-classical models by changing decision variables — from random variables to their quantile functions.

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

KOMBINATORIKSEMINARIUM

Kimmo Eriksson:
Limiting shapes of birth-and-death processes on Young diagrams

Abstract: I will present joint work with Jonas Sjöstrand where we consider a family of birth processes and birth-and-death processes on Young diagrams of integer partitions of n. This family incorporates three famous models from very different fields: Rost's totally asymmetric particle model (in discrete time), Simon's urban growth model, and Moran's infinite alleles model. We study stationary distributions and limit shapes as n tends to infinity.

Tid och plats: Onsdagen den 4 november kl. 10.15 – 12.00 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

ALGEBRA AND GEOMETRY SEMINAR

Anatol Kirillov:
Different faces of the FK quadratic algebras: Algebra, Geometry, Combinatorics, Topology, Special Functions and Integrable Systems

Abstract: I will introduce a certain class of quadratic algebras related with the classical Yang-Baxter equation, and describe some of their properties and connections with the mathematical subjects mentioned in the title. I will try to explain why these algebras can be treated as "The Grand Unification" of "classical", "q" and "elliptic" theories.

Tid och plats: Onsdagen den 4 november kl. 13.15 – 15.00 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

INSTITUT MITTAG-LEFFLER SEMINAR

Agatha Walczak-Typke:
Constructibility of potentially isomorphic pairs vs classification in Homogeneous Model Theory

Abstract: The work presented is joint with S.-D. Friedman and T. Hyttinen. Our aim was to generalize a very nice result of Friedman, Hyttinen, and Rautila, which tied first-order model theoretic classification theory to constructibility under the assumption of 0-sharp, to a non-elementary model theoretic setting. The original result stated:

Theorem. Assume 0-sharp exists and let T be a constructible first-order theory which is countable in the constructible universe L. Let κ be a cardinal in L larger than $\aleph_1$ in L. Then the collection of constructible pairs of models A, B of T, of size κ, which are isomorphic in a cardinal- and real-preserving extension of L is itself constructible if and only if T is classifiable (i.e. superstable with NDOP and NOTOP).

We have chosen Homogeneous Model Theory as a good setting for generalizing this result because of the already well developed structure/non-structure theory in this setting. I will present the result for Homogeneous Model Theory analogous to the theorem above, and discuss some of the issues involved in the proof.

Tid och plats: Torsdagen den 5 november kl. 14.00 – 15.00 vid Institut Mittag-Leffler, Auravägen 17, Djursholm.

SEMINARIUM I FINANSIELL MATEMATIK

Zhao Li

presenterar sitt examensarbete:

Importance Sampling for Estimating Risk Measures in Portfolio Credit Risk Models

Abstract: This paper is the report of a Master's Degree project carried out at the Royal Institute of Technology, and in this paper we mainly apply the estimators and methods derived by P. Glasserman and J. Li (2003, 2005) of importance sampling methods in portfolio credit risk models. By using the exponential twisting method we will be able to compute the probability beyond one certain loss level ($P(L > X)$). We use the search method and a 'direct' method derived by Peter W. Glynn to estimate the Value-at-Risk (VaR) from the probability and Expected Shortfall (ES) in two portfolio credit risk models, and estimate a convex risk measure Shortfall Risk (SR) with the estimator given by J. Dunkel and S. Weber (2007) in the two models as well. We provide numerical simulation to show the good performance of importance sampling comparing with the plain Monte Carlo.

Tid och plats: Måndagen den 2 november kl. 16.15 – 17.00 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

GRADUATE COURSE IN MATHEMATICS

Reading course: Methods in Elliptic PDE
(7.5 credit)

Course leader: **Henrik Shahgholian,** henriksh@kth.se.

A course with the above title will start in early November 2009, and will stretch into May 2010.

This will be a self-study course. The idea is to gather students with a common interest to learn the basics of partial differential equations (PDE) and several other aspects which are usually not taught in standard courses. The focus will be on various methods, tools and ideas that are used by mathematicians working with PDE.

Examination:

1) Presentation of a topic.
2) Preparation of three homeworks, with solutions, within the chosen topic.
3) Solving a homework, suggested by other participants.

First meeting: Tuesday, November 3, at 13.15 in seminar room 3733, Department of Mathematics, KTH, Lindstedtsvägen 25, floor 7.

Prerequisites: Good knowledge of basic Analysis, and some introductory PDE course at undergraduate level.

Duration: November 2009 – May 2010.

Target group: Ph.D. students in Mathematics and Applied Science which use PDE in their research. Advanced undergraduate students with interest in admission to doctoral studies in Mathematics.

Below I give, somewhat detailed, a list of topics that one needs to learn in order to be able to do research in PDE or FBP.

(Continued on the next page.)

Topics

1) Maximum/comparison principle (various forms), Hopf's lemma.
2) Harnack's inequality, boundary Harnack.
3) Fundamental solution, Green's function, Green's integral identities.
4) Elliptic estimates, B. P. Alexandroff's estimates.
5) Barriers, regularity up to the boundary.
6) Sobolev spaces: Weak and strong convergence in function spaces, imbedding, compactness arguments.
7) Notion of solutions: $W^{k,m}$, viscosity, classical in C^k.
8) Rearrangements.
9) Qualitative theory: Symmetry properties, moving plane methods, reflections, inversions, sliding methods.
10) Aspects in Geometric measure theory: Scaling and blow-up, flatness, measure theoretic normal, densities, structure theorems.
11) Hausdorff dimension, packing measures.

Suggested literature

1) Caffarelli, Luis A.; Cabré, Xavier: *Fully nonlinear elliptic equations.* American Mathematical Society Colloquium Publications, 43. American Mathematical Society, Providence, RI, 1995. vi + 104 pp. ISBN: 0-8218-0437-5.

2) Evans, Lawrence C.; Gariepy, Ronald F.: *Measure theory and fine properties of functions.* Studies in Advanced Mathematics. CRC Press, Boca Raton, FL, 1992. viii + 268 pp. ISBN: 0-8493-7157-0.

3) Gilbarg, David; Trudinger, Neil S.: *Elliptic partial differential equations of second order.* Reprint of the 1998 edition. Classics in Mathematics. Springer-Verlag, Berlin, 2001. xiv + 517 pp. ISBN: 3-540-41160-7.

4) Kawohl, Bernhard: *Rearrangements and convexity of level sets in PDE.* Lecture Notes in Mathematics, 1150. Springer-Verlag, Berlin, 1985. iv + 136 pp. ISBN: 3-540-15693-3.

5) Malý, Jan; Ziemer, William P.: *Fine regularity of solutions of elliptic partial differential equations.* Mathematical Surveys and Monographs, 51. American Mathematical Society, Providence, RI, 1997. xiv + 291 pp. ISBN: 0-8218-0335-2.

6) Pucci, Patrizia; Serrin, James: *The maximum principle.* Progress in Nonlinear Differential Equations and their Applications, 73. Birkhäuser Verlag, Basel, 2007. x + 235 pp. ISBN: 978-3-7643-8144-8.

Welcome!
Henrik Shahgholian

INSTITUT MITTAG-LEFFLER SEMINAR

Carlos Di Prisco:
Graphs defined by the shift operation

Abstract: We consider graphs defined by the shift on spaces like the Baire space or the Cantor space, and prove several results regarding their Borel chromatic numbers.

Tid och plats: Torsdagen den 5 november kl. 15.30 – 16.30 vid Institut Mittag-Leffler, Auravägen 17, Djursholm.

SEMINAR IN FLUID MECHANICS

Pavel Kudinov:
Particle-based methods for fluid dynamics,
or can validation be an obstacle for scientific progress?

Abstract: "Smoothed particle hydrodynamics" by J. J. Monaghan, published in Annual Review of Astronomy and Astrophysics in 1992 has 1009 citations record in Scopus. A new branch of the particle-based method, called "Moving-Particle Semi-Implicit Method" (MPS), proposed in 1996, is developing fast and seems to be able to tackle any possible fluid dynamics problem. Yet there is a question mark. Why can one see results of the particle-based simulations in Astronomy applications and in Hollywood blockbusters much more often than in every day engineering applications? In an attempt to answer the question some interesting aspects of particle-based methods are demonstrated with simple test problems.

Tid och plats: Torsdagen den 5 november kl. 10.30 i seminarierummet, Institutionen för mekanik, KTH, Teknikringen 8.

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 2009. 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.

New information

Jobs to apply for

11. Københavns Universitet söker doktorander i matematik, statistik, försäkringsmatematik och finansmatematik. Sista ansökningsdag är den 1 januari 2010. Web-info: http://www.math.ku.dk/english/programmes/ph.d/apply/.
12. Københavns Universitet utlyser flera postdoktorala tjänster, placerade vid Institut for Matematiske Fag (Department of Mathematical Sciences). Tjänstetiden är minst ett och högst tre år. Sista ansökningsdag är den 1 december. Web-info: http://www.math.ku.dk/english/research/postdoc_apply/.

(Continued on the next page.)

13. Linköpings universitet söker en professor i matematisk statistik med inriktning mot området beräkningsmatematik. Sista ansökningsdag är den 27 november. Web-info: http://www.liu.se/jobbdb/show.html?3080.

14. Linköpings universitet söker en professor i tillämpad matematik med inriktning mot området beräkningsmatematik. Sista ansökningsdag är den 27 november. Web-info: http://www.liu.se/jobbdb/show.html?3082.

Old information

Money to apply for

15. Stiftelsen G. S. Magnusons fond utdelar stipendier inom matematik med bland annat följande ändamål: Stöd till doktorander, stöd till den som önskar ytterligare meritera sig efter doktorsexamen och bidrag för att kvarhålla forskare inom landet. Sista ansökningsdag är den 1 februari 2010. Web-info: http://www.kva.se/Documents/Utlysningar/Stipendier/sarskilda/info_stip_Magnuson_sv_10.pdf.

16. Kungl. Vetenskapsakademien utlyser stipendier och anslag inom matematik enligt följande: Till doktorander utdelas stipendier med ett maximibelopp på 100 000 kr, och till forskare som avlagt doktorsexamen år 2004 eller senare utdelas forskningsanslag med ett maximibelopp på 300 000 kr. Anslag utgår under högst ett år. Sista ansökningsdag är den 1 februari 2010. Web-info: http://www.kva.se/sv/utlysningar/stipendier-och-anslag/Matematik/.