BRÅKET

Information om seminarier och högre undervisning i matematiska ämnen i Stockholmsområdet

NR 24 **FREDAGEN DEN 17 AUGUSTI 2007**

BRÅKET

Veckobladet från Institutionen för matematik vid Kungl Tekniska Högskolan och Matematiska institutionen vid Stockholms universitet

Redaktör: Gunnar Karlsson

Telefon: 08-790 84 79

Adress för e-post: gunnarkn@math.kth.se

Bråket på Internet: http://www.math.kth.se/braaket.html eller http://www.math.kth.se/braket/

Postadress:
Red. för Bråket
Institutionen för matematik
KTH
100 44 Stockholm

- - - - - - -

Sista manustid för nästa nummer: Torsdagen den 23 augusti kl. 13.00.

Second Workshop on PDE and Finance

Denna äger rum vid KTH den 20 – 23 augusti. Se sidan 2.

Kurser

Ralf Fröberg: Commutative Algebra. Se sidan 6.

Ola Hössjer: Probability Theory. Se sidan 3.

Svante Linusson: Hyperplane Arrangements. Se sidan 5.

SEMINARIER

Må 08 – 20 kl. 13.00. Seminarium i statistik. *(Observera dagen!)* **Professor Richard Valliant,** University of Michigan and the Joint Program for Survey Methodology at the University of Maryland: *Cell collapsing in poststratification.* Sal B705, Statistiska institutionen, SU, Universitetsvägen 10B, plan 7, Frescati. Se sidan 2.

Professor Valliants seminarium anordnas gemensamt av Statistiska institutionen, SU, och Statistiska centralbyrån.

Ti 08 – 21 kl. 14.00 – 15.00. Joint CIAM and Optimization and Systems Theory Seminar. *(Observera dagen och tiden!)* **Professor Steve Webb,** Head of Radiotherapy Physics Research, Institute of Cancer Research, University of London: *IMRT — a clinical reality for cancer treatment.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 3.

To 08 – 23 kl. 15.15 – 16.15. AlbaNova and Nordita Colloquium in Physics. Juri Toomre, JILA, University of Colorado, Boulder: *Unfolding the sources of solar magnetism with helioseismology and simulations.* Oskar Kleins auditorium, Roslagstullsbacken 21, AlbaNova universitetscentrum. Se sidan 4.

Fortsättning på nästa sida.

Workshops vid Institut Mittag-Leffler

Under hösten 2007 anordnas två sådana. Den första äger rum den 10 – 14 september. Se sidan 6.

Presentation av Wallenbergprojektet

Denna äger rum vid KTH den 19 september. Se sidan 6.

Ledig tjänst: FRA söker en kryptolog. Se sidan 3.

Seminarier (fortsättning)

Fr 08−24 kl. 11.00−12.00. Optimization and Systems Theory Seminar. Associate Professor Mathias Stolpe, Department of Mathematics, Technical University of Denmark: *Global optimization of discrete topology design problems.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 4.

To 08−30 kl. 15.15−16.15. AlbaNova and Nordita Colloquium in Physics. Maria Kallery, Aristotle University of Thessaloniki, Greece: *Teaching physics and astronomy in the early years.* Oskar Kleins auditorium, Roslagstullsbacken 21, AlbaNova universitetscentrum. Se sidan 5.

SEMINARIUM I STATISTIK

Richard Valliant: Cell collapsing in poststratification

Professor Richard Valliant has more than 25 years of practical survey experience, including work on the Consumer Price Index, the Producer Price Index, and other surveys that supply some of the important economic indicators in the United States of America. His current research interests include the use of models in survey estimation, price index estimation, and analysis of complex survey data.

Abstract: Poststratification is a common method of estimation in household surveys. Cells are formed based on characteristics that are known for all sample respondents and for which external control counts are available from a census or another source. The inverses of the poststratification adjustments are usually referred to as coverage ratios. In the United States coverage of some demographic groups may be substantially below 100 percent, and poststratifying serves to correct for biases due to poor coverage. A standard procedure in poststratification is to collapse or combine cells when the sample sizes fall below some minimum or the weight adjustments are above some maximum. Collapsing can either increase or decrease the variance of an estimate but may simultaneously increase its bias. We study the effects on bias and variance of this type of dynamic cell collapsing theoretically and through simulation using a population based on the 2003 U.S. National Health Interview Survey. Two alternative estimators are also examined that restrict the size of weight adjustments when cells are collapsed. The most effective method of controlling bias is to combine cells based on the size of their means rather than on other criteria that are used in practice.

Tid och plats: Måndagen den 20 augusti kl. 13.00 i sal B705, Statistiska institutionen, SU, Universitetsvägen 10B, plan 7, Frescati.

SECOND WORKSHOP ON PDE AND FINANCE

The lectures of this workshop will start on Monday morning at 9.20 (August 20), and the last lectures will be given on Thursday before lunch (August 23). Place for the lectures: Room E3, KTH, Osquars Backe 16, second floor.

The program of the workshop is given at http://www.math.kth.se/pde_finance07/.

JOINT CIAM AND OPTIMIZATION AND SYSTEMS THEORY SEMINAR

Steve Webb:

IMRT — a clinical reality for cancer treatment

Abstract: This lecture will review the clinical need for Intensity Modulated Radiation Therapy (IMRT) and will explain how this can be planned and delivered. Movies will be shown to illustrate the delivery in the context of treating head and neck cancers, and in parallel the work at the ICR/RMH in delivering pelvic IMRT will be reviewed.

The lecture will then turn to look at why image guidance is now the focus of further improving clinical delivery of conformal radiation therapy. Historical background and modern state-of-the-art technology will be intertwined.

The speaker's personal perspective and comment on the field will be summed up.

Tid och plats: Tisdagen den 21 augusti kl. 14.00 – 15.00 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

GRADUATE COURSE IN PROBABILITY THEORY

Lecturer: **Ola Hössjer.**

During the first half of the fall 2007 I will give a 5 credits (7.5 ECTS credits) graduate course *Probability Theory,* covering about half of the contents in the following book:

Durrett, Richard: *Probability: Theory and Examples,* 3rd edition, Thomson Brooks/ Cole, 2004. (ISBN-10: 0534424414, ISBN-13: 9780534424411).

In case you have the 2nd edition of Durrett's book (Duxbury Press, 1995), you may use it plus the errata list found at Durrett's home page. A few details have been added to some proofs in the 3rd edition.

We will cover: Measure-theoretic background. Random variables, expectation and independence. Weak Law of Large Numbers. Borel-Cantelli Lemmas. Strong Law of Large Numbers. Convergence of Random Series. Weak Convergence. Characteristic Functions. Central Limit Theorems for i.i.d. sequences and triangular arrays. Poisson convergence.

To pass, each student has to give one lecture and solve home assignments distributed during the course.

We will meet once a week on Mondays at 10.15 – 12.00 in room 306, house 6, Department of Mathematics, Stockholm University, Kräftriket, starting on August 27 and finishing on October 22.

Please send an e-mail to me (ola@math.su.se) if you wish to attend the course.

Welcome!

Ola Hössjer

Ledig tjänst

Enheten för Kryptoanalys vid Försvarets radioanstalt (FRA) söker en kryptolog. Sista ansökningsdag är måndagen den 3 september 2007. För tjänsten krävs kunskaper motsvarande en forskarutbildning i datalogi, matematik eller annat matematiskt-naturvetenskapligt ämne. Ytterligare upplysningar om tjänsten finns på http://www.fra.se/tjänst-0140.shtml.

ALBANOVA AND NORDITA COLLOQUIUM IN PHYSICS

Juri Toomre:
Unfolding the sources of solar magnetism with helioseismology and simulations

Abstract: There exist major challenges to understand how the Sun builds the large-scale and intense magnetic fields that we observe at its surface and how these fields evolve in time. The origin of these magnetic fields must rest with dynamo processes occurring deep within the star. Many complex dynamical elements are involved in the operation of the solar global dynamo. These include the differential rotation of the convection zone and the tachocline at its base, turbulent production and transport of the magnetic fields by the convection, shear amplification of the fields, and magnetic buoyancy that leads to the eventual field eruption onto the photosphere. Major advances in supercomputing allow us to improve the fidelity with which we can model these intensely turbulent processes. These efforts are aided by continuing guidance provided by helioseismology in probing dynamics in the solar interior. We discuss the close interplay between helioseismology and recent three-dimensional simulations in studying the solar global dynamo.

Tid och plats: Torsdagen den 23 augusti kl. 15.15 – 16.15 i Oskar Kleins auditorium, Roslagstullsbacken 21, AlbaNova universitetscentrum.

OPTIMIZATION AND SYSTEMS THEORY SEMINAR

Mathias Stolpe:
Global optimization of discrete topology design problems

Abstract: A classical problem within the field of structural topology optimization is to find the stiffest structure subject to multiple loads and a bound on the volume (or weight) of the structure. We minimize a weighted average of the compliances, i.e. the inverse of the stiffness. The design variables describe the cross sectional areas of the bars in a truss or fibre directions in a structure made of laminated composites. This class of problems is well-studied for continuous variables. We consider here the situation that the variables are discrete.

Our goal is to compute guaranteed globally optimal structures. We present a method for the computation of a global optimizer of the underlying non-convex discrete problem. The method is a finitely convergent nonlinear branch and cut method tailored to solve large-scale instances of the original discrete problem. The branch and cut algorithm is based on solving a sequence of continuous relaxations, which are obtained by relaxing the discreteness requirements. The main effect of this approach lies in the fact that these relaxed problems can be equivalently reformulated as all-quadratic convex problems and thus can be efficiently solved to global optimality.

The presented nonlinear branch and cut method is numerically compared to a commercial branch and cut method applied to a convex mixed $0-1$ equivalent reformulation of the original discrete problem. The commercial software solves significantly more relaxations. The main reason for this behaviour is explained by comparing the strength of the relaxations used. We present global optimal solutions to several large-scale numerical examples.

Tid och plats: Fredagen den 24 augusti kl. 11.00 – 12.00 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

GRADUATE COURSE IN MATHEMATICS

Svante Linusson: Hyperplane Arrangements

The first half of the course will go through the fundamental combinatorics of arrangements of affine hyperplanes. For this part we will use the the lecture notes *An Introduction to Hyperplane Arrangements,* written by Richard P. Stanley and available on his home page http://www-math.mit.edu/~rstan/arr.html.

For the second half we will go through research papers in the area for more detailed combinatorics or topological and algebraic aspects of hyperplane arrangements or subspace arrangements. This part may depend on the interest of the students.

The students of the course are expected to take active part in the presentation and discussion of the material. This will also be a large part of the examination.

The lectures are planned to be on Thursdays at 13.15 – 15.00. The first lecture will be on Thursday, August 30, at 13.15 – 15.00 in seminar room 3733, Department of Mathematics, KTH, Lindstedtsvägen 25, floor 7.

Students who plan to attend but are unable to come to the first lecture should contact me via e-mail linusson@math.kth.se.

Welcome!
Svante Linusson

ALBANOVA AND NORDITA COLLOQUIUM IN PHYSICS

Maria Kallery:
Teaching physics and astronomy in the early years

Abstract: Recent research suggests that during their early-years children begin to construct science concepts of increasing complexity. From the educational perspective, there is a growing realization that appropriate scientific work can and should begin in infant classes, as science in the early-years is expected to contribute to the formation of a background which will lead to better understanding of difficult scientific concepts and scientific phenomena studied later in a more formal way.

To create quality teaching and learning opportunities for the young learners, science education in the early childhood should be in knowledgeable hands. Early-years teachers themselves need to have science knowledge and pedagogical skills as well as the ability to appropriately synthesize the two. However, research has found that non-science-specialist teachers, in their work, face several problems related to different factors.

In this colloquium I will present reasons for exposing children to science early in life, the aims of early-years education, and ways to approach it. I will review teachers' difficulties that have been identified by many years of research, and I will present the work of our action research group composed of experienced early-years teachers and of a specialist in science. This group developed and implemented sequences of activities for the initiation of young children aged 4 – 6 into science. Finally I will present two of these sequences which concern concepts and phenomena of physics and astronomy and I will discuss their impact on children's learning and attitudes as well as on the teachers' knowledge and practices.

Tid och plats: Torsdagen den 30 augusti kl. 15.15 – 16.15 i Oskar Kleins auditorium, Roslagstullsbacken 21, AlbaNova universitetscentrum.

COURSE IN COMMUTATIVE ALGEBRA

Lecturer: **Ralf Fröberg.**

I will give a course in Commutative Algebra on Tuesdays at 15.15 – 17.00 with start on September 4 in room 306, Department of Mathematics, Stockholm University, Kräftriket. Course book is Sharp, *Steps in Commutative Algebra,* 2nd edition, London Mathematical Society Student Texts 51.

Akademibokhandeln in Frescati has promised to have the book on September 1.

We will treat chapters 1 – 9 and 13 – 14. The examination will consist of home exercises, short talks by the participants, and perhaps a written examination on the theory.

Welcome!
Ralf Fröberg

WORKSHOPS AT INSTITUT MITTAG-LEFFLER

The scientific program at Institut Mittag-Leffler during the fall of 2007 is devoted to *Stochastic Partial Differential Equations.*

As part of the activities of the semester, two workshops are organized. They are partially funded by the Centre of Mathematics for Applications (Oslo) and the Generalitat de Catalunya (Catalunya, Spain).

The first workshop has the title *Stochastic Partial Differential Equations,* and it will take place during September 10 – 14, 2007.

The second workshop has the title *Applications of Partial Differential Equations,* and it will take place during November 19 – 23, 2007.

Detailed information about the scientific program and the workshops can be found at http://www.mittag-leffler.se/programs/0708f/.

Presentation av Wallenbergprojektet

Institutionen för matematik, KTH, har fått ett stort anslag från Knut och Alice Wallenbergs Stiftelse för att stärka forskningen och forskningsmiljön. Sedan den 1 januari 2007 och fem år framåt drivs med stöd av dessa medel ett projekt vid avdelningen för matematik. Finansieringen gäller doktorander, postdocs, forskningsassistenter/biträdande lektorer, gästforskare, kollokvier/workshops, m.m.

Onsdagen den 19 september kommer Wallenbergprojektet att presenteras för institutionens medlemmar. Vi tänker oss ett mycket informellt program, cirka kl. 14.15 – 17.00, med korta presentationer av de olika forskningsgruppernas verksamhet och med allmän information om projektet. Därefter följer mat och dryck i pausrummet.

Alla är hjärtligt välkomna. Vik redan nu eftermiddagen och kvällen den 19 september för denna presentation.

För ledningsgruppen
Anders Björner
