BRÅKET

Information om seminarier och högre undervisning i matematiska ämnen i Stockholmsområdet

NR 24 **FREDAGEN DEN 14 AUGUSTI 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 20 augusti kl. 13.00.

SEMINARIER

Må 08–17 kl. 10.30. Seminar in Fluid Mechanics. *(Observera dagen!)* **Pinhas Bar-Yoseph,** Technion — Israel Institute of Technology: *Biomechanics review seminar on novel computational methods for simulation of wound healing and analysis of arterial and metabolic disease.* Seminarierummet, Institutionen för mekanik, KTH, Teknikringen 8.

On 08–19 kl. 15.15. Seminarium i matematisk statistik. John Huelsenbeck, Berkeley: *Bayesian Phylogenetics and Chinese Restaurants.* Rum 306 (Cramérrummet), hus 6, Matematiska institutionen, SU, Kräftriket.

Disputation i matematik

Christian Lundkvist skall disputera på avhandlingen *Moduli spaces of zero-dimensional geometric objects* måndagen den 17 augusti kl. 13.00 i Sydvästra galleriet, KTHB, Osquars Backe 31. Se Bråket nr 23 sidan 3.

PDE & Mathematical Finance III

En konferens med denna titel skall äga rum vid KTH den 17 – 20 augusti. Se sidorna 2 – 3.

Disputation i matematik

Farid Bozorgnia skall disputera vid KTH på avhandlingen *Numerical Algorithms for Free Boundary Problems of Obstacle Types* torsdagen den 20 augusti kl. 14.00. Se sidan 3.

PDE & MATHEMATICAL FINANCE III

Time and place: The conference will take place on August 17 – 20, 2009, in lecture hall F3, KTH, Lindstedtsvägen 26, ground floor.

Scientific committee: Teitur Arnarson, Tomas Björk, Boualem Djehiche, Erik Ekström, Henrik Shahgholian, and Johan Tysk.

Organizing committee: Teitur Arnarson and Samantha Bonnevier.

Conference homepage: http://www.math.kth.se/pdefinance/2009/. On the homepage you can find complete information about the conference, including abstracts of the talks (omitted here).

Monday, August 17

9.20 – 9.30 Opening.
9.30 – 10.20 **Ali Lazrak:** *Equilibrium growth when the planner is time inconsistent.*
10.20 – 11.10 **Diogo A. Gomes:** *Bernstein estimates for weakly coupled fully non-linear elliptic systems.*
11.10 – 11.40 Coffee.
11.40 – 12.30 **John Chadam:** *Title to be announced.*
12.30 – 14.30 Lunch.
14.30 – 15.20 **Rama Cont:** *Partial integro-differential equations for option prices in general semimartingale models.*
15.20 – 15.50 Coffee.

Tuesday, August 18

9.30 – 10.20 **Martin Schweizer:** *BSDE transformations and utility indifference valuation.*
10.20 – 11.10 **Peter Duck:** *On nonlinear models of markets with feedback due to finite liquidity: some cautionary notes.*
11.10 – 11.40 Coffee.
11.40 – 12.30 **Saïd Hamadène:** *Title to be announced.*
12.30 – 14.30 Lunch.
14.30 – 15.20 **Johan Tysk:** *Boundary conditions for the single-factor term structure equation.*
15.20 – 15.50 Coffee.
15.50 – 16.40 **Kristoffer Glover:** *Path dependent British options.*

Wednesday, August 19

9.30 – 10.20 **Tomas Björk:** *Title to be announced.*
10.20 – 11.10 **Erik Ekström:** *Can time-homogeneous volatilities produce any call prices?*
11.10 – 11.40 Coffee.
11.40 – 12.30 **Bernt Øksendal:** *Optimal control of PDEs and forward-backward SDEs, with applications to risk minimization.*
12.30 – 14.30 Lunch.
14.30 – 15.20 **Bruno Dupire:** *Functional Ito calculus and PDE for path-dependent options.*
15.20 – 15.50 Coffee.
15.50 – 16.40 **Peter Carr:** *Automated options market making and the local Variance Gamma model.*
19.00 – Conference dinner (see the homepage).

(Continued on the next page.)

Thursday, August 20

9.30 – 10.20 **Boualem Djehiche:** *Title to be announced.*
10.20 – 11.10 **Christoph Schwab:** *Wavelet based derivative pricing in Feller-Lévy Models.*
11.10 – 11.40 Coffee.
11.40 – 12.30 **David Hobson:** *Recovering a time-homogeneous stock price process from perpetual option prices.*
12.30 – 14.30 Lunch.

DISPUTATION I MATEMATIK

Farid Bozorgnia

skall disputera på avhandlingen

Numerical Algorithms for Free Boundary Problems of Obstacle Types

torsdagen den 20 augusti 2009 kl. 14.00 i sal H1, KTH, Teknikringen 33, 2 tr. Till opponent har utsetts *Assistant Professor Adam Oberman,* Simon Fraser University, Burnaby, Canada.

Abstract of the thesis

This thesis consists of four scientific papers concerning numerical methods for certain free boundary problems. The papers include mathematical analysis of different approximations of the problems and the description of numerical implementation along with numerical results.

Paper I deals with a free boundary problem that appears in biology modelling. Two novel iterative methods for a class of population models of competitive type are introduced. The numerical approximations are related to the positive solution as the competitive rate tends to infinity. Furthermore, the first method is applied to an optimal partition problem.

In Paper II we study perturbation of the following free boundary problem

$$\begin{cases} \Delta u_i = \lambda^+ \chi_{\{u_i>0\}} - \lambda^- \chi_{\{u_i<0\}} & \text{in } \Omega, \\ u_i = g_i & \text{on } \partial\Omega. \end{cases} \tag{1}$$

We perturb the data in the right-hand side of the two-phase problem and the boundary values g. The main result of the paper is a proof of the continuity and differentiability of the solution with respect to the coefficients. Also the stability of the solution and the free boundary with respect to perturbation in coefficients and boundary values, is shown.

In Paper III different numerical approximations for a two-phase membrane problem are discussed. In the first method a new iterative method with different examples is presented. We also study the regularization method and give an a posteriori error estimate which is needed for the implementation of the regularization method. Moreover, an efficient algorithm based on the finite element method is given. It is shown that the sequence constructed by the algorithm is monotone and converges to the solution of a given free boundary problem.

The last paper deals with numerical approximations for the m-membrane problem. We consider minimization of the functional

$$I = \int_\Omega \sum_i^m \big(\tfrac{1}{2}|\nabla u_i|^2 + f_i u_i\big)\, dx, \tag{2}$$

over the set $\{(u_1, \dots, u_m) \,|\, u_i - g_i \in H_0^1(\Omega),\ u_1 \geq u_2 \geq \cdots \geq u_m\}$.
