BRÅKET

Information om seminarier och högre undervisning i matematiska ämnen i Stockholmsområdet

NR 12 **FREDAGEN DEN 23 MARS 2001**

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 29 mars kl. 13.00.

Disputation i optimeringslära och systemteori

Per Enqvist disputerar vid KTH på avhandlingen *Spectral estimation by geometric, topological and optimization methods* fredagen den 6 april kl. 10.00. Se sidan 7.

Kurs

Anders Hansson: Optimization for Control and Signal Processing. Se sidan 4.

SEMINARIER

Fr 03–23 kl. 9.00–10.00. Kollokvium i fysik. Professor Christofer Leygraf, Korrosionslära, KTH: *Surface physics studies in corrosion science.* Sal F 01, Fysiska institutionen, KTH, Lindstedtsvägen 24, b.v. Se sidan 6.

Fr 03–23 kl. 11.00–12.00. Optimization and Systems Theory Seminar. Di Yuan, Matematiska institutionen, Linköpings universitet: *Optimization of internet protocol network design and routing.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 10 sidan 8.

Fr 03–23 kl. 11.10. Seminarium i algebraisk geometri. Gerard van der Geer, Universiteit van Amsterdam: *Curves over finite fields.* Sammanträdesrum 3548, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 5. Se sidan 4.

Fr 03–23 kl. 15.15. Noncommutative Geometry and Applications to Quantum Field Theory. Juha Loikkanen: *Problems in K-theory for physicists.* Seminarierummet, Teoretisk fysik, KTH, Osquldas väg 6, plan 4.

Fr 03–23 kl. 15.15–17.00. Potentialanalysseminarium. Hans Rullgård, SU: *On a problem of Gísli Másson and Boris Shapiro.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 11 sidan 10.

Må 03–26 kl. 13.15–15.00. Algebraseminarium. Kathryn Hess, Lausanne: *The emergence of the Witt ring in the cellular lattice of rational spaces.* Rum 306, hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 4.

Fortsättning på nästa sida.

Professor Vaughan Jones besöker Sverige

Se sidan 8.

Seminarier (fortsättning)

Må 03–26 kl. 15.15–17.00. Seminarium i finansiell matematik. Björn Palmgren, Finansinspektionen: *Försäkringsderivat och andra modellfrågor i finansiell tillsyn.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 11 sidan 5.

Ti 03–27 kl. 13.15–14.00. Seminar in Theoretical and Applied Mechanics. Professor Anders Martin-Löf, Matematisk statistik, SU: *On the physical theory of Brownian motion.* Seminarierummet, Institutionen för mekanik, KTH, Teknikringen 8. Se sidan 5.

On 03–28 kl. 12.30–13.15. Uppsatsseminarium på påbyggnadskurs i statistik. Martin Lagerström: *Några prognosmodeller för efterfrågan på småhus.* Handledare: **Karin Dahmström** och **Per Dahmström.** Opponent: **Michael Norlund.** Rum B705, Statistiska institutionen, SU, Universitetsvägen 10B, plan 7, Frescati.

On 03–28 kl. 13.15. Seminarium i analys och dynamiska system. *(Observera lokalen!)* **Lennart Carleson:** *Growth models and conformal mappings.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

Under resten av läsåret kommer seminarierna i serien "Analys och dynamiska system" att äga rum i seminarierum 3733.

On 03–28 kl. 13.30–14.15. Uppsatsseminarium på fördjupningskurs i statistik. Carin Ericson: *Klusteranalys av regionplaneområden i Stockholms län med avseende på bebyggelse och befolkning.* Handledare: **Ove Frank.** Opponent: **Tom Ekberg.** Rum B705, Statistiska institutionen, SU, Universitetsvägen 10B, plan 7, Frescati.

On 03–28 kl. 14.00–15.00. Mittag-Leffler Seminar. Peter Aczel, Manchester: *The notions of type, class and set in a liberated intuitionism.* Institut Mittag-Leffler, Auravägen 17, Djursholm. Se Bråket nr 11 sidan 10.

On 03–28 kl. 14.30–15.15. Uppsatsseminarium på fördjupningskurs i statistik. Tom Ekberg: *Klusteranalys av regionplaneområden i Stockholms län med avseende på arbetskraft och näringsgrenar.* Handledare: **Ove Frank.** Opponent: **Martin Lagerström.** Rum B705, Statistiska institutionen, SU, Universitetsvägen 10B, plan 7, Frescati.

On 03–28 kl. 15.00–17.00. KTH Learning Lab inbjuder till seminarium. Christer Johannesson, föreståndare för Fysiska institutionens kurslaboratorium, KTH: *Aktiviteter för barn och ungdom samt lärarfortbildning för långsiktig rekrytering till naturvetenskaplig och teknisk utbildning.* Sal D2, KTH, Lindstedtsvägen 5, b.v. Se Bråket nr 11 sidan 6. *Observera att förhandsanmälan krävs.*

On 03–28 kl. 15.15. Seminarium i matematisk statistik. Professor Bengt Rosén, SCB: *En optimal urvals-estimations-strategi vid undersökning av en ändlig population.* Rum 306, Cramérrummet, hus 6, Matematiska institutionen, SU, Kräftriket. Se Bråket nr 11 sidan 12.

On 03–28 kl. 15.15–16.00. Seminarium i matematik och fysik vid Mälardalens högskola (Västerås). Daniel Ying, Mälardalens högskola: *Riemann functors.* Lektionssal N24, Mälardalens högskola, Västerås. Internet-adressen till information om seminariet är http://www.ima.mdh.se/seminarier/index.e.shtml.

Fortsättning på nästa sida.

Seminarier (fortsättning)

On 03–28 kl. 15.30–16.15. Uppsatsseminarium på fördjupningskurs i statistik. Michael Norlund: *Likheter och olikheter i arbetskraftens fördelning på kön, ålder och näringsgren inom basområden i Stockholms län.* Handledare: **Ove Frank.** Opponent: **Carin Ericson.** Rum B705, Statistiska institutionen, SU, Universitetsvägen 10B, plan 7, Frescati.

On 03–28 kl. 15.30–16.30. Mittag-Leffler Seminar. Reinhard Kahle, Tübingen: *Universes in explicit mathematics.* Institut Mittag-Leffler, Auravägen 17, Djursholm. Se Bråket nr 11 sidan 10.

Fr 03–30 kl. 9.00–10.00. Kollokvium i fysik. Docent Ramon Wyss, Kärn- och reaktorfysik, KTH: *The quest for proton-neutron superfluidity or the Meissner effect in iso-space.* Sal F01, Fysiska institutionen, KTH, Lindstedtsvägen 24, b.v.

Fr 03–30 kl. 10.15–12.00. Algebra- och geometriseminarium. *(Extra seminarium. Observera dagen, tiden och lokalen!)* **Gerard van der Geer,** Universiteit van Amsterdam: *The theta divisor for number fields.* Sal 13, hus 5, Matematiska institutionen, SU, Kräftriket. Se sidan 5.

Fr 03–30 kl. 11.00–12.00. Optimization and Systems Theory Seminar. Per Enqvist, Optimeringslära och systemteori, KTH: *Spectral estimation by geometric, topological and optimization methods.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 5.

Fr 03–30 kl. 17.00. Doktorandseminarium i matematisk statistik. Anna Carlsund, KTH: *Alarmsystem för smittsamma sjukdomar.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

Ti 04–03 kl. 13.15. Seminar in Theoretical Physics. Joseph Minahan, Uppsala: *P-adic string field theory.* Rum 4731, Fysikum, SU, Vanadisvägen 9. Se sidan 7.

To 04–05 kl. 14.00–15.00. Optimization and Systems Theory Seminar. *(Observera dagen och tiden!)* **Professor Alberto Isidori,** Dipartimento di Informatica e Sistemistica, Università di Roma "La Sapienza": *Nonlinear output regulation with adaptive internal model.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 6.

Professor Isidori är fakultetsopponent vid Per Enqvists disputation. Se sidan 7.

To 04–05 kl. 16.15–18.00. Seminarium i matematik och fysik vid Mälardalens högskola (Eskilstuna). Lars Mowitz, Göteborgs universitet: *Från uppgift till utmaning — Att berika problemställningar.* Lektionssal Tentum, Mälardalens högskola, Eskilstuna. Internet-adressen till information om seminariet är http://www.ima.mdh.se/seminarier/index.e.shtml.

Fr 04–06 kl. 9.00–10.00. Kollokvium i fysik. Dr Georgios Kavoulakis, Laserfysik och kvantoptik, KTH: *Bose-Einstein condensation of atoms in traps.* Sal F01, Fysiska institutionen, KTH, Lindstedtsvägen 24, b.v.

Fr 04–06 kl. 15.15. Professor Vaughan Jones, Berkeley: *Noncommutative geometry for dummies.* Sal D1, KTH, Lindstedtsvägen 17, 3 tr. Se sidan 8.

Fr 04–06 kl. 15.15. Noncommutative Geometry and Applications to Quantum Field Theory. Luca Mana: *The Runge-Kutta method for nonlinear differential equations and Hopf algebras.* Seminarierummet, Teoretisk fysik, KTH, Osquldas väg 6, plan 4.

SEMINARIUM I ALGEBRAISK GEOMETRI

Gerard van der Geer:
Curves over finite fields

Abstract: Although the topic goes back to the early 19th century, interest has fluctuated much. Applications such as coding theory and cryptography have contributed to the recent interest for curves over finite fields. After a short sketch of the history, we discuss recent developments with respect to the question: How many points can a curve of given genus over a finite field of cardinality q possess?

Tid och plats: Fredagen den 23 mars kl. 11.10 i sammanträdesrum 3548, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 5.

ALGEBRASEMINARIUM

Kathryn Hess: The emergence of the Witt ring
in the cellular lattice of rational spaces

Abstract: In this talk I will present recent joint work with Paul-Eugène Parent, in which we have completely described the structure of the lattice of cellular classes of formal, rational two-cones that are $2n-1$-connected. In particular we have shown that the sublattice of cellular classes of rational spaces formed by attaching a $4n$-cell to a wedge of $2n$-dimensional spheres possesses a natural ring structure, isomorphic to the Witt ring of anisotropic quadratic forms over $\mathbb{Q}$. The natural partial ordering in the lattice of cellular classes therefore induces a highly nontrivial and (to the best of our knowledge) new partial ordering on the equivalence classes of anisotropic quadratic forms over $\mathbb{Q}$.

Tid och plats: Måndagen den 26 mars kl. 13.15 – 15.00 i rum 306, hus 6, Matematiska institutionen, SU, Kräftriket.

GRADUATE COURSE

Anders Hansson:
Optimization for Control and Signal Processing

In May – June 2001 the Department of Mathematics, KTH, and the Department of Signals, Sensors, and Systems, KTH, will give a course on Optimization for Control and Signal Processing.

The course will give a thorough introduction to the topic, as well as in-depth understanding in some specific areas, where we have invited guest-lecturers. We believe that the course should be suitable not only for PhD students in optimization, control, and signal processing, but also for people in industry who would like to learn more about how to solve challenging control and signal processing problems using state of the art optimization.

For more details about the course and how to register, see http://www.s3.kth.se/~hansson/optimization/optimization.html.

Welcome
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SEMINAR IN THEORETICAL AND APPLIED MECHANICS

Anders Martin-Löf:
On the physical theory of Brownian motion

Sammanfattning: Seminariet skall handla om utvecklingen av teorin för den slumpmässiga rörelsen hos små partiklar i en vätska, och vad den säger om materiens struktur, och om hur denna teori senare gett upphov till Wienerprocessen, som kommit till användning inom många andra områden av sannolikhetsteorin.

Tid och plats: Tisdagen den 27 mars kl. 13.15 – 14.00 i seminarierummet, Institutionen för mekanik, KTH, Teknikringen 8.

ALGEBRA- OCH GEOMETRISEMINARIUM

Gerard van der Geer:
The theta divisor for number fields

Abstract: The analogy between function fields of curves and number fields dates back to the 19th century and played an important role in the development of both algebraic geometry and number theory. Nevertheless, the analogy is far from complete. In the theory of curves the theta divisor plays a decisive role. What is the analogue in the number field case? In the talk I will discuss joint work with R. Schoof in which an analogue of the theta divisor emerges.

Tid och plats: Fredagen den 30 mars kl. 10.15 – 12.00 i sal 13, hus 5, Matematiska institutionen, SU, Kräftriket.

OPTIMIZATION AND SYSTEMS THEORY SEMINAR

Per Enqvist: Spectral estimation
by geometric, topological and optimization methods

Abstract: The purpose of this presentation is to give a survey of my thesis that will be defended on April 6. The thesis consists of four papers dealing with various aspects of spectral estimation and the stochastic realization problem.

Since cepstrum parameters characterize a spectrum in a similar way as covariances and can be estimated from data, it makes sense to consider realizations based on the cepstrum. By considering a cepstrum interpolation problem, the approaches used in the thesis are described. In particular, an optimization problem is formulated for determining a minimum variance interpolant. Duality theory is then used to obtain a convex optimization problem that can be solved using homotopy methods. Differential geometry is used to study the set of solutions corresponding to different choices of parameter values. The parameters are shown to form local coordinates for the set of interpolants. Since this particular interpolation problem lacks solutions for some parameter combinations, an approximative interpolation problem is introduced and the entropy of the approximative interpolant is studied.

Other interpolation problems studied in the thesis, such as the covariance extension problem with a degree constraint, are described and the main theorems are presented.

Tid och plats: Fredagen den 30 mars kl. 11.00 – 12.00 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

KOLLOKVIUM I FYSIK

Christofer Leygraf:
Surface physics studies in corrosion science

Abstract: Corrosion-induced failures result in estimated annual costs in Sweden of approximately 10 000 SEK per person and year. The list of corroding objects, small or large, is endless: cars, implant materials, electronic components, statues, bridges, ... A summary of current research activities in corrosion science performed at KTH are presented. The research emphasis is on a molecular understanding of corrosion related phenomena from a surface science perspective. The activities are directed towards three main research areas: atmospheric corrosion, gaseous corrosion, and high temperature corrosion. Most research projects are in collaboration with Swedish or European industries, some of them are also as joint efforts with researchers at the Department of Physics, KTH.

Tid och plats: Fredagen den 23 mars kl. 9.00 – 10.00 i sal F 01, Fysiska institutionen, KTH, Lindstedtsvägen 24, b.v.

OPTIMIZATION AND SYSTEMS THEORY SEMINAR

Alberto Isidori:
Nonlinear output regulation with adaptive internal model

Abstract: Internal-model based control schemes efficiently address the problem of tracking/rejecting families of exogenous inputs, all those that can be thought as generated by a fixed autonomous finite-dimensional dynamical system (the initial condition of which identifies the actual, unknown, exogenous input affecting the plant). In this sense, they generalize the classical way in which integral-control based schemes cope with constant but unknown disturbances. However, the main limitation of these schemes is that a precise model of the system that generates all exogenous inputs must be available, to be replicated in the control law. This limitation is not sensed in a problem of set point control, where the uncertain exogenous input is constant and thus obeys a trivial, parameter independent, differential equation but becomes immediately evident in the problem of rejecting e.g. a sinusoidal disturbance of unknown amplitude and phase. An internal-model based controller is able to cope with uncertainties on amplitude and phase of the exogenous sinusoid, but the frequency at which the internal-model oscillates must exactly match the frequency of the exogenous sinusoid: Any mismatch in such frequencies results in a nonzero steady-state error.

Motivated by the interest in removing such a limitation, we address the problem of designing an internal-model based control scheme in which the "natural frequencies" of the internal model are automatically tuned so as to match those of an exosystem which is totally unknown (except for an upper bound on its dimension). In this context, we provide a control scheme that is able to successfully address the problem of asymptotically tracking/rejecting any family of exogenous inputs generated by some (fixed-dimensional, but otherwise completely unknown) autonomous dynamical system, for a significant class of nonlinear systems, in the presence of possibly large parameter uncertainties.

Tid och plats: Torsdagen den 5 april kl. 14.00 – 15.00 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

SEMINAR IN THEORETICAL PHYSICS

Joseph Minahan: P-adic string field theory

Abstract: P-adic string theory is a simplified version of the standard bosonic string theory. We will review some details of the p-adic string and the derivation of an action for the tachyon field. We then show that the action has nontrival classical solutions, which are the analogues of D-branes. We find the fluctuation spectrum about the D-branes and find the effective action for these modes. We then show that this action is consistent with p-adic string amplitudes for these fields.

Tid och plats: Tisdagen den 3 april kl. 13.15 i rum 4731, Fysikum, SU, Vanadisvägen 9.

DISPUTATION I OPTIMERINGSLÄRA OCH SYSTEMTEORI

Per Enqvist

disputerar på avhandlingen

Spectral estimation by geometric, topological and optimization methods

fredagen den 6 april 2001 kl. 10.00 i Kollegiesalen, Administrationsbyggnaden, KTH, Valhallavägen 79. Till fakultetsopponent har utsetts *professor Alberto Isidori,* Dipartimento di Informatica e Sistemistica, Università di Roma "La Sapienza".

Abstract of the thesis

This thesis consists of four papers dealing with various aspects of spectral estimation and the stochastic realization problem.

In Paper A a robust algorithm for solving the Rational Covariance Extension Problem with degree constraint (RCEP) is presented. This algorithm improves on the current state of art that is based on convex optimization. The new algorithm is based on a continuation method, and uses a change of variables to avoid spectral factorizations and the numerical ill-conditioning occuring in the original formulation for some parameter values.

In Paper B a parameterization of the RCEP is described in the context of cepstral analysis and homomorphic filtering. Further, it is shown that there is a natural extension of the optimization problem mentioned above to incorporate cepstral parameters as a parameterization of zeros. The extended optimization problem is also convex and, in fact, it is shown that a window of covariances and cepstral lags form local coordinates for ARMA models of order n.

In Paper C the geometry of shaping filters is analysed by considering parameterizations using various combinations of poles, zeros, covariance lags, cepstral lags and Markov parameters. In particular, the covariance and cepstral interpolation problem is studied using differential geometry and duality theory. Assuming there is an underlying system that is stable and minimum phase, it is shown in this paper that there is a one-to-one correspondence between Markov parameters and cepstral coefficients. An approach based on simultaneous Markov and covariance parameter interpolation has been studied by Skelton et al. In this paper it is studied from a global analysis point of view.

Paper D deals with a regularization of two filter design methods, namely the covariance and cepstral matching ARMA design method and covariance matching for MA filters. Both methods are posed as optimization problems, and a barrier term is introduced to achieve a strictly minimum phase solution. As a result of the regularization, exact interpolation is traded for a gain in entropy, and the map from data to filter defined by the optimization problems is turned into a diffeomorphism.

Professor Vaughan Jones besöker Sverige

Professor Vaughan Jones, Berkeley (Fieldspristagare 1990), kommer att besöka Sverige för en föreläsningsturné under tiden 4 – 9 april 2001 som speciellt inbjuden föredragshållare av Kungl. Vetenskapsakademien/Nationalkommittén för matematik. Han kommer bl.a. att hålla ett föredrag vid KTH fredagen den 6 april kl. 15.15 i sal D1, Lindstedtsvägen 17, 3 tr., med titeln *Noncommutative geometry for dummies.* Ytterligare upplysningar kommer i nästa nummer av Bråket.

Michael Benedicks