

## BELGIAN MATHEMATICAL SOCIETY

Comité National de Mathématique CNM



NCW Nationaal Comité voor Wiskunde

### **BMS-NCM NEWS: the Newsletter of the Belgian Mathematical Society and the National Committee for Mathematics**

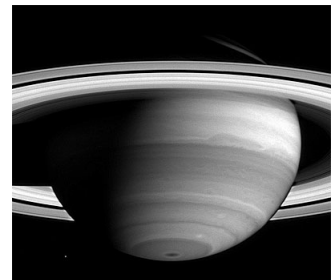
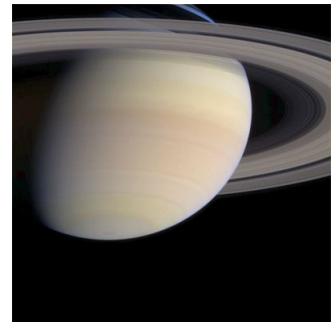
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## **BMS-NCM NEWS**

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No 53, May 15, 2005

## *Letter from the editor*

*Hello everybody!*

*Welcome to the May 15-Issue of our Newsletter.*

*The next issue is scheduled on September 15. So, after these “long summer evenings”, each of you is encouraged to send<sup>1</sup> his/her experience concerning **novels around maths and other any cultural event** that could be of interest for mathematicians, hence to make this Newsletter more and more attractive!*

*This year, there will be a special issue in August, on the occasion of the first **PhD-Day** organized by the BMS (see the announcement and the poster)!*

*Let me also point out the date of the **General Assembly of the Society: May 21** (see also the first section of this Newsletter). I hope to meet you on this occasion!*

*Françoise Bastin*

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<sup>1</sup>To Françoise Bastin, F.Bastin@ulg.ac.be

## 1 News from the BMS

All BMS members are cordially invited to the

**General assembly of the BMS**

*Saturday May 21, 14.00 - 14.25*

to be held at the Department of Pure Mathematics of the University Ghent (S22, Lecture Room 14).

The (short) program reads as follows:

1. Word by the resigning President.
2. Election of the new President and the new board for the Society.
3. Miscellaneous.

Note that the Assembly takes place in the programme of the **Joint BeNeLuxFra Conference in Mathematics** (see below and announcement at the end of the Newsletter).

## 2 Meetings, Conferences, Lectures

### 2.1 May, 2005

**JOINT BeNeLuxFra CONFERENCE in MATHEMATICS**

**JOINT MEETING OF THE  
BELGIAN (BMS), DUTCH (KWG), LUXEMBOURG (SML) AND FRENCH (SMF)  
MATHEMATICAL SOCIETIES**

**May 20-22, 2005**

University of Gent, Belgium

See the second (and last) announcement at the end of this Newsletter.

**ADVANCED COURSE ON POLYTOPE CONSTRUCTIONS**

**Monday to Friday, May 23-27, 2005**

U.L.B.

A one-week, advanced course will be delivered in Brussels, during this month.

#### Lecturers

- Prof. Günter M. Ziegler (TU Berlin), <http://www.math.tu-berlin.de/~ziegler/>
- Prof. Michael Joswig (TU Darmstadt), <http://www.math.tu-berlin.de/~joswig/> \vspace{1ex}

#### Location

Université Libre de Bruxelles, Campus de la Plaine, <http://www.ulb.ac.be/docs/campus/plaine.html>

More information on the course contents is provided below.

The course is open to all people interested, although preliminary registration will be mandatory. To manifest your possible interest in future registration, please send a (short) e-mail to [pleroy@ulb.ac.be](mailto:pleroy@ulb.ac.be)

There will be no charge (except for tea and coffee breaks, and for possible course material), but no support is available.

The second announcement, sent in January to people having replied to this first announcement, contains more practical details and announces a deadline for registration.

Jean-Paul Doignon, [doignon@ulb.ac.be](mailto:doignon@ulb.ac.be)

Département de Mathématiques, Université Libre de Bruxelles

#### More information

- Schedule: two morning lectures of 75 min starting at 9:30am. In the afternoon, exercise and problem sessions (including an introduction to the POLYMAKE software project) are conducted by Nikolaus Witte and/or Thilo Schröder (TU Berlin).

- Topics:
  - 3-dimensional polytopes, circle packings, proofs of Steinitz' Theorem.
  - Deformed products and long paths.
  - f-vectors of four-polytopes. Projected products of polytopes.
  - Convex hull algorithms. Constructions of bad examples.
  - Polytope propagation: an inductive construction of polytopes.
  - Application to statistical models.
- Abstract: Polytopes are concrete geometric objects. Interesting examples abound, which can and should be constructed, analyzed, visualized, and modified explicitly, "by hand", or with computer support (via the POLYMAKE system).

This course is intended as a "hands-on" introduction to polytopes. We will look at various interesting and new constructions, at examples they produce, and at methods and tools for analysis and visualization. Topics will include a construction of 3-dimensional polytopes via circle packings, the visualization of polytopes via Schlegel diagrams, and the generation of "extremal" polytopes via subtle variations of the standard product construction. The final two lectures are devoted to algorithmic aspects.

## 2.2 June, 2005

**4th Kortrijk Conference on Discrete Groups and Geometric Structures, with Applications**  
**May 31 - June 3, 2005**  
 Oostende, Belgium

The conference site will be at Hotel Royal Astrid, <http://www.royalastrid.com/>

The following main speakers will give a one hour talk:

- Oliver Baues (Univ. Karlsruhe),
- Yves Benoist (ENS, Paris),
- Martin Bridson (Imperial College, London),
- Benson Farb (University of Chicago),
- Oscar Garcia-Prada (Univ. Comp. Madrid),
- Etienne Ghys (ENS, Lyon),
- Domingo Toledo (Univ. of Utah, Salt Lake City).

### Scientific Committee

- Yves Felix (U.C.Louvain, Louvain-la-Neuve)
- William Goldman (Univ. of Maryland, College Park)
- Fritz Grunewald (H.Heine Univ., Duesseldorf)
- Paul Igodt (K.U.Leuven / Kortrijk)
- Kyung Bai Lee (Univ. of Oklahoma, Norman).

Organisers: Karel Dekimpe, Yves Felix, Paul Igodt, Hannes Pouseele

All further information (programme, registration, abstract proposal, poster-session, short talks, proceedings, ...) is found at the conference website: <http://www.kulak.ac.be/workshop>

**4th Fejér Riesz Conference – Second Announcement**  
**June 8 - 14, 2005**  
 Eger, Hungary

The János Bolyai Mathematical Society, in cooperation with the Eszterházy Károly College of Eger is organizing a conference to commemorate the 125th anniversary of the birth of two outstanding Hungarian mathematicians: Lipót Fejér and Frigyes Riesz.

The conference will be held in Eger, Hungary, from June 8 (arrival date) till June 14 (departure date) in 2005. Please see the conference website <http://www.math.u-szeged.hu/confer/fejerriesz/Friesz.htm> for information.

If you plan to participate

1. PLEASE REGISTER ONLINE ON THE WEBSITE AS SOON AS POSSIBLE, for space is limited,
2. PLEASE MAKE YOUR HOTEL RESERVATION according to the instructions given on the website,

3. if you intend to give a contributed talk of about 25 minutes, please include the title and abstract in the online registration form (it should be in plain TEX).

The REGISTRATION FEE should be paid before APRIL 15, 2005 (amounts and address are on the conference site). If you have further questions please contact either the János Bolyai Mathematical Society, BUDAPEST, Fő u. 68, 1027, Hungary (Tel/Fax: (36)(1) 201-6974 E-mail: bjmt@renyi.hu) or the conference secretary László Szili: szili@ludens.elte.hu

Looking forward to seeing you at the conference,

the Organizing Committee

## 2.3 July, 2005

### XXIVth JOURNEES ARITHMETIQUES

July, Monday 4 - Friday 8, 2005

Marseille, France

Registration and up-to-date information are available on the Conference Web Site: <http://www.latp.univ-mrs.fr/ja2005>

## 2.4 September, 2005

### IVth International Workshop on Functional Analysis

September 5-9, 2005

Esneux, Belgium

The IVth International Workshop on Functional Analysis will take place on September 5-9, 2005, Esneux, Belgium, in honour of the 65th birthday of Professor Jean Schmets (University of Liège). For more information: see the page at the address <http://www.afo.ulg.ac.be/Sept05.html>

The following main speakers are already scheduled: R. ARON (Kent), K.D. BIERSTEDT (Paderborn), J. BONET (Valencia), S. DINEEN (Dublin), P. DOMANSKY (Poznan), G. GODEFROY (Paris-Jussieu), H. KOENIG (Kiel), R. MEISE (Düsseldorf), L. NARICI (New-York), M. VALDIVIA (Valencia), D. VOGT (Wuppertal), P. WOJTASZCZYK (Warsaw).

S. Dierolf, J. Wengenroth (University of Trier) F. Bastin (University of Liège)

Contact: [F.Bastin@ulg.ac.be](mailto:F.Bastin@ulg.ac.be) and the web pages at the address <http://www.afo.ulg.ac.be/Sept05.html>

## 2005 PhD-Day

Monday 12 September 2005 at the VUB

On September 12, the Belgian Mathematical Society organizes its first

## PhD-Day

The aim is to bring together the Belgian Mathematicians preparing their PhD or having obtained their PhD diploma during the academic year 2004–2005.

The PhD students will have the opportunity to present their research projects via oral presentations and poster sessions. An award will be offered for the best poster. They will also have time to get to know each other and become friends.

In this way we can also present our Society to our colleagues just starting their career in Mathematics and show them what we can offer them. It is therefore *very important* that all members participate to this activity and encourage their students to come to Brussels on September 12th. For this purpose we include a leaflet at the end of this newsletter. You can use this (and make copies if necessary) to announce the event in your department or neighbourhood. Remember that young colleagues who are not (yet) member of the BMS do not receive this newsletter and can only be aware of this event *through YOU!*

There is no participation fee and a lunch will be offered to BMS members. For organizational reasons we ask to register via

<http://bms.ulb.ac.be/phdday>

before July 1st, 2005.

The preliminary programme is as follows.

- 10h00** Welcome from the president of the Society  
**10h15** Plenary Lecture “Why Mathematics” by F. Buekenhout  
**11h15** Coffee  
**11h45** Poster presentations  
**12h45** Lunch (free for BMS members)  
**14h30** Oral presentations  
**16h30** Coffee  
**17h00** Poster presentations  
**18h00** Drink and award for best poster

We scheduled 2 hours (=  $6 \times 20$  min) of oral presentations and have room for many posters.

Any suggestion about this activity is welcome !

The organizing committee consists of

- |   |  |
|---|--|
| F. Bastin ( <a href="mailto:f.bastin@ulg.ac.be">f.bastin@ulg.ac.be</a> )              | A. Bultheel ( <a href="mailto:adhemar.bultheel@cs.kuleuven.ac.be">adhemar.bultheel@cs.kuleuven.ac.be</a> ) |
| S. Caenepeel ( <a href="mailto:scaenepe@vub.ac.be">scaenepe@vub.ac.be</a> )           | Ph. Cara ( <a href="mailto:pcara@vub.ac.be">pcara@vub.ac.be</a> )  |
| C. Finet ( <a href="mailto:catherine.finet@umh.ac.be">catherine.finet@umh.ac.be</a> ) | P. Godin ( <a href="mailto:pgodin@ulb.ac.be">pgodin@ulb.ac.be</a> )  |
| H. Van Maldeghem ( <a href="mailto:hvm@cage.ugent.be">hvm@cage.ugent.be</a> )         |  |

### EMS-SCM Joint Mathematical Week-end

September 16-18, 2005

Barcelona, Spain

This meeting is organised by the Catalan Mathematical Society, under the auspices of the EMS. You can register on-line and follow the progress of the organisation at <http://www.iecat.net/scm/emsweekend>

#### Topics and plenary speakers

- Combinatorics and Graph Theory, Béla Bollobás (Trinity College, Cambridge and University of Memphis)
- Dynamical Systems, Jean-Christophe Yoccoz (Collège de France)
- Evolution PDEs and Calculus of Variations, Henri Berestycki (Ecole des Hautes Etudes en Sciences Sociales, France)
- Module Theory and Representations of Algebras, Henning Krause (Universität Paderborn)
- Non-commutative Geometry, Alexey I. Bondal (Steklov Mathematical Institute, Moscow)

#### Organizing Committee

Marta Sanz-Solé (Chair), Universitat de Barcelona  
 Jaume Amorós, Universitat Politècnica de Catalunya  
 José A. Carrillo de la Plata, ICREA-Universitat Autònoma de Barcelona  
 Carles Casacuberta, Universitat de Barcelona Dolors Herbera  
 Universitat Autònoma de Barcelona Teresa Martínez-Seara  
 Universitat Politècnica de Catalunya Rosa Maria Miró-Roig  
 Universitat de Barcelona Marc Noy  
 Universitat Politècnica de Catalunya

#### Session co-organizers

Lidia Angeleri-Hügel (Università degli Studi dell'Insubria)  
 Xavier Cabré (ICREA- Universitat Politècnica de Catalunya)  
 Peter Cameron (Queen Mary, University of London)  
 Arnfinn Laudal (University of Oslo)  
 David Sauzin (CNRS, France)  
 Giuseppe Toscani (Università di Pavia)

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<http://orfeu.mat.ub.es>, phone: 34-934021655, fax: 34-934021601

**ESF Research Conference on  
Geometric Representation and Invariant Theory  
Algebraic Quantization and Deformations**

Spa, Belgium, 16-21 September 2005

Chair: Fred Van Oystaeyen (University of Antwerp, BE)

Deadline for applications (and for abstract submission): 17 June 2005.

Invited Speakers will include (list to be completed):

M. Brion (Grenoble Univ., FR); A. Joseph (Weizmann Institute, IL); L. Kauffman (UIC Chicago, US); B. Keller (Paris VII University, FR); P. Littelmann (Wuppertal Univ., DE); L. Le Bruyn (Antwerp Univ., BE); C. Menini (Ferrara Univ., IT); M. Nazarov (York Univ., UK); C. Procesi (Rome Univ., IT); M. Reineke (Münster Univ., DE); A. Rudakov (NTNU Gloeshaugen, NO); S. Silvestrov (Lund Univ. NO); A. Szenes (Budapest Univ. HU); M. Van den Bergh (Hasselt Univ. BE).

Scope: Recent developments in Noncommutative Algebra and Noncommutative Geometry will be discussed at this meeting. Particular areas of interest will be: interaction between Representation Theory, Algebraic Geometry, Invariant Theory, Quantum Group Theory etc... with application to Physics or effective computations. The emphasis will be on new emerging theories and applications, e.g. the geometry of path algebras and quiver varieties; the study of asymptotics of representations; quantization and deformation theory; geometric interpretations of the standard monomial basis for path theory and relations to crystal constructions; graded character theory in the O-category for semisimple Lie algebras; quantum invariants of maps between manifolds and problems concerning crossed braided categories; quiver-module and their cohomology in relation to the representation theory of Borchers algebras, etc. The general philosophy is to support the blending at a deeper level of noncommutative algebra with geometric and topological methods.

Financial support: A certain number of grants - covering the conference fee and possibly part of the travel expenses - will be available upon request

Contact person at the ESF: Mr. Rachid Adghoughi, Conference Organiser (radghoughi@esf.org)

## 2.5 October, 2005

### BUILDINGS, GROUPS and ALGEBRAS

A conference in honour of Jacques Tits

**Ghent, 14 and 15 October 2005**

First Announcement

On the occasion of the **75th birthday of Jacques Tits** we organize a conference in Gent. This conference will start on Friday, October 14 in the afternoon, and end in the early afternoon on Saturday, October 15. Each day there will be three one-hour lectures. We are happy that the following speakers agreed to give a talk:

- Pierre-Emmanuel Caprace (Bruxelles)
- Tom De Medts (Gent)
- Gopal Prasad (Ann Arbor)
- Bertrand Remy (Lyon)
- Jean-Pierre Serre (Paris)
- Richard Weiss (Boston)

There will be no registration fee. A conference dinner will be organized on Friday evening.

If you want to receive the second announcement (beginning of July) with more details about the programme, accommodation, travel information, etc., please send an email to

bmuehlherr@ulb.ac.be

You may also wish to visit the homepage of the conference, which is

<http://cage.rug.ac.be/hvm/conference.html>

and which will be updated from time to time.

The organizers,  
Bernhard Muehlherr & Hendrik Van Maldeghem

## 2.6 November, 2005

**Mathematical Analysis Day**  
**November 10, 2005**  
Ghent University

At the occasion of his retirement and his 65th birthday, the Clifford Research Group of Ghent University will honour its founder Richard Delanghe by a one day symposium "Mathematical Analysis Day".

Date: Thursday the 10th of November, 2005

Venue: "Het Pand", Onderbergen, 9000 Gent

Speakers: Christiane Carton-Lebrun, Simone Gutt, Jean Schmets, Walter Van Assche, Jan Van Casteren, Frank Sommen

Welcome coffee at 09:30, Lunch at 13:00, Closing reception at 17:00

You are all cordially invited to attending (free of charge). Please register by sending an email to [nds@cage.ugent.be](mailto:nds@cage.ugent.be) with subject line: MAD-registration

The organizers  
Fred Brackx, Hennie De Schepper, Frank Sommen  
Ghent University, Department Mathematical Analysis  
Clifford Research Group  
Galglaan 2, B-9000 Gent, Belgium

## 2.7 2006

**CANT'2006 International School and Conference**  
**on Combinatorics, Automata and Number Theory**  
Belgium, University of Liège, Department of Mathematics  
May 8-19, 2006

Aim:

The proposed international school is aimed at presenting and developing recent trends in Combinatorics (with emphasis on Combinatorics on Words), Automata Theory and Number Theory. On the one hand, the newest results in these areas shall benefit from a synthetic exposition, and on the other hand, emphasis on the connections existing between the main topics of the school will be sought. Concurrently to the school, there will be an international conference focusing on the same topics. Courses and lectures will be organized in the morning, while the afternoon sessions will be devoted to the conference.

Main Invited Speakers:

J.-P. Allouche (CNRS, Univ. Paris-Sud), Y. Bugeaud (Univ. of Strasbourg), F. Durand (Univ. of Picardie, Amiens), P. Grabner (Techn. Univ. of Graz), J. Karhumäki (Turku Univ.), H. Prodinger (Univ. of Stellenbosch), J. Sakarovitch (CNRS, ENS Télécom.), J. Shallit (Univ. of Waterloo), B. Solomyak (Univ. of Washington), W. Thomas (RWTH Aachen).

Format:

Five invited lecturers per week. Participants can decide to attend to one of the two weeks of this event. Talks will be selected on the basis of an extended abstract (max. 6 pages). Deadline for the submission of abstracts: April 1st, 2006. More details will be available in due time on the conference web site.

Organising Committee: V. Berthé (CNRS, Montpellier), M. Rigo, P. Lecomte (Liège).

Location: Institute of Mathematics, University of Liège, Belgium.

Information: e-mail: [M.Rigo@ulg.ac.be](mailto:M.Rigo@ulg.ac.be)

Web site: <http://www.cant2006.ulg.ac.be>



### 3 Summary of PhD theses

**Ellen Van Camp**

**Diagonal-plus-semiseparable matrices and their use in numerical linear algebra**

May 10, 2005

Department of Computer Science, K.U.Leuven

Advisor: Marc Van Barel

In linear algebra structured matrices are of great interest because they consume less storage than arbitrary matrices and the computational cost of algorithms involving structured matrices is less than for dense, non-structured ones. Several problems can also be translated into similar problems with structured matrices.

Diagonal-plus-semiseparable matrices form a class of such structured matrices. First we look for a suitable definition of this class of matrices and a corresponding representation. Other definitions used in the literature are discussed and the study of diagonal-plus-semiseparable matrices is motivated.

In Part I of this thesis a reduction algorithm that transforms any symmetric matrix into a similar diagonal-plus-semiseparable one is presented which has a Lanczos-Ritz convergence behavior and performs a kind of nested subspace iteration at each step. It has the advantage that the diagonal can be chosen freely.

Part II focuses on two basic problems in numerical linear algebra: the solution of linear systems and the symmetric eigenvalue problem. First, two fast algorithms for solving diagonal-plus-semiseparable linear systems are constructed. Next, three different techniques for solving the symmetric eigenvalue problem of diagonal-plus-semiseparable matrices are presented: an implicit QR-algorithm, three different divide-and-conquer algorithms and a Cholesky-LR-algorithm. The latter is only applicable when the symmetric diagonal-plus-semiseparable matrix is positive definite.

In a last part we introduce two higher rank extensions of semiseparable matrices together with a suitable representation. Any symmetric matrix can be transformed into a similar higher-order semiseparable one and this reduction algorithm has a block-Lanczos-Ritz behavior combined with a kind of nested subspace iteration at each step.

Numerical experiments are included and the software is made freely available on the internet.

**Tine De Cat**

**Translaties in enkelvoudig transitieve affine acties van nilpotente Liegroepen**

May 12, 2005

Mathematics KULAK

Advisor: Karel Dekimpe

Dit onderzoekswerk handelt over enkelvoudig transitieve en affine acties van nilpotente Lie groepen. Omtrent deze acties formuleerde Auslander in 1977 volgende conjectuur: voor iedere enkelvoudig transitieve affine actie van een nilpotente Lie groep  $G$ , bestaat er een niet-triviale deelgroep van  $G$  die actie uitoefent door middel van zuivere translaties. Een positief antwoord op dit vermoeden zou betekenen dat het mogelijk is om elke enkelvoudig transitieve affine actie van zo een groep  $G$  te construeren op een iteratieve wijze. Jammerlijk genoeg is het antwoord op Auslanders conjectuur negatief. Een eerste tegenvoorbeeld werd gegeven in 1986 door Fried. Nu geweten is dat deze conjectuur niet correct is, is het interessant om op zoek te gaan naar types van Lie groepen waarvoor de conjectuur wel voldaan is. Veel was daar nog niet over gekend. Men wist reeds dat de Auslander conjectuur voldaan was voor de abelse Lie groepen (Fried) en de oneven dimensionale filiforme Lie groepen (Medina en Khakimdjano). Anderzijds had men ook reeds een classificatie van alle translatieloze enkelvoudig transitieve affine acties van dimensie 4 en kleiner (Kim). In deze doctoraatsthesis hebben we verder gewerkt rond deze problematiek. We hebben een aantal constructiemethodes ontwikkeld voor translatieloze enkelvoudig transitieve affine acties. Hieruit blijkt dat deze in vrij algemene situaties wel degelijk voorkomen. We tonen aan dat de conjectuur van Auslander wel opgaat voor alle 2-stapsnilpotente Lie groepen met een 1-dimensionale commutatordeelgroep. In een volgende fase gaan we op zoek naar een classificatie van alle translatieloze en enkelvoudig transitieve affine acties van 5-dimensionale nilpotente Lie groepen. We komen tot het resultaat dat er 5-dimensionale nilpotente Lie groepen zijn die geen translatieloze acties toelaten, terwijl andere een eindig aantal dergelijke acties toelaten en nog andere oneindige families van dergelijke acties toelaten. Uit vorige resultaten bleek dat de conjectuur voor alle vrije nilpotente Lie groepen van dimensie 5 of minder voldaan is. Daar ze ook voldaan was voor de abelse, stellen we ons nu de vraag of deze conjectuur voldaan is voor alle vrije nilpotente Lie groepen. We onderzoeken de vrije 2-stapsnilpotente Lie groepen met  $k$  generatoren en we vinden dat de conjectuur voldaan is voor  $k=3$ , maar voor  $k$  oneven en meer dan 3 kunnen we een tegenvoorbeeld construeren. Tenslotte hebben we ook de situatie voor de filiforme Lie groepen verfynd en in detail uitgelegd.

**Karliën Vanden Branden**

**Robust methods for high-dimensional data, and a theoretical study of depth-related estimators**

May 13, 2005

Mathematics K.U.Leuven

Advisor: Mia Hubert

Part I Principal Component Analysis (PCA) is a dimension reduction technique that is especially very useful to reduce high-dimensional data sets to a lower dimension by means of a PCA-subspace. However, as this PCA-subspace is obtained by computing the eigenvectors of the empirical variance-covariance matrix, this approach is not robust. Therefore we propose a new robust PCA method that combines projection-pursuit ideas and robust covariance estimation. This robust PCA method can be used as a stand-alone function, but it can also be included in many other estimators as a kind of preprocessing step. We have studied two such applications in classification and in PLS regression.

Part II In Portnoy (2003) the standard regression quantile estimator has been extended to the case of censored data by introducing a reweighting scheme. We have proven that this estimator is consistent. However, this estimator has zero breakdown value as it is based on L1-ideas such that it can not cope with leverage points. Therefore we briefly introduce a new robust regression quantile estimator for censored data based on regression depth. To conclude we have also studied a new estimator of location and scale for univariate data based on the concept of regression depth (Mizera and Müller, 2004). We have shown that this new estimator contains a bounded influence function, and has a breakdown value of roughly 30%.

#### References

- Mizera, I. and Müller, C.H., Location-scale depth. Journal of the American Statistical Association, 99:949-966, 2004.
- Portnoy, S., Censored regression quantiles. Journal of the American Statistical Association, 98:1001-1012, 2003.

**Tijl De Bie**

**Semi-supervised learning based on kernel methods and graph cut algorithms**

May 23, 2005

Electrotechnical Engineering, K.U.Leuven

Promotor: B. De Moor

In this thesis, we investigate the application of established and advanced optimization techniques in a variety of machine learning problems. More specifically, we demonstrate how fast optimization methods can be of use for the identification of classes or clusters in sets of data points. We focus on so-called semi-supervised learning settings, where the learner is provided with limited class information (or supervision) for some of the data points.

As we will point out, the semi-supervised learning scenario is in fact more tailored to practical problem settings than the traditional supervised and unsupervised approaches (with classification and clustering respectively as their archetypical examples).

The algorithmic machinery we use and extend by the semi-supervised learning methods presented in this thesis, rests on recent achievements in two domains: the kernel methods domain, and the domain that studies graph cut problems as a means to do data clustering.

**Patrick Van gucht**

**Orthogonal rational functions: identification, realization, and computation**

May 30, 2005

Department of Computer Science, K.U.Leuven

Advisor: Adhemar Bultheel

In this thesis we explore the natural generalization of orthogonal polynomials (OPs) to the orthogonal rational functions (ORFs) with prescribed poles.

In the first place, we consider some theoretical generalizations. We describe the recurrence relations for these (strictly) proper ORFs and deduce a moment-based algorithm to compute the reflection coefficients that occur in the recurrence relations. Asymptotic behaviour of the ORFs on the support of the measure is described and therefrom we deduce a Bernstein equiconvergence theorem that states that the ordinary Fourier series and the

general ORF-Fourier series converge uniformly to each other. A rational generalization of Fejér's Theorem is a nice corollary. As a result of a relation between the ORFs on the unit circle and the interval, we only need to explore the circular case.

Next we deduce a linear algebraic approach to ORFs in the form of an inverse eigenvalue problem, which involves semiseparable and orthogonal matrices. By imposing some natural similarity in interpolation points and the poles of the ORFs all computations can be done using real numbers.

The numerical benefits of the orthogonality of the rational functions is pointed out and a state space description of the general ORFs is given.

## 4 Miscellaneous

### 4.1 From VUB

#### Vrije Universiteit Brussel

The Faculty of Sciences of the Vrije Universiteit Brussels invites applications for a

### Full-time Academic Position in Statistics

(WE/2005/010)

The vacancy concerns a tenure-track position in the Department of Mathematics.

#### Tasks

- **Teaching:** in the Bachelor and Master program of the Department of Mathematics (especially for the specialization "stochastics/financial mathematics") and possibly some service teaching for other departments and faculties. The candidate should be an excellent teacher. He/she would also supervise projects in the bachelor program and direct theses in the master program of mathematics.
- **Research:** The research area of the candidate should be STATISTICS with a proven record of excellence in one of the following areas: applied statistics, stochastic processes and applications, (actuarial) risk theory, financial mathematics and applications. Strong candidates in related areas also might be considered.
- **Other tasks:** It is expected that the candidate further strengthens the co-operation with other Departments of the University and that he/she substantially contributes to the Master specialization "stochastics/financial mathematics". An interest in actuarial sciences is a plus. The candidate will actively participate in all aspects of the Ph.D. program of the Department. The candidate should also attract external funding for research projects.

Teaching languages are Dutch and English. Non-Dutch speaking candidates are encouraged to apply as well; a training period may be considered for such candidates.

**Starting date:** October 1, 2005 or later depending on the constraints of the candidate. Candidates should apply within **1 month** after publication of this vacancy in the Belgisch Staatsblad. (This date will be posted on the website <http://www.vub.ac.be//DWIS/>). **Diploma:** The candidate should have a Ph.D. degree in mathematics or statistics. **Contact person:** Prof. Eric Jespers, Chair, Department of Mathematics e-mail: [efjesper@vub.ac.be](mailto:efjesper@vub.ac.be) tel. +32-2-6293493

#### Application procedure

Applications (including a CV, a list of publications, names of 3 referees) should be sent to the Rector, Vrije Universiteit Brussel, Pleinlaan 2, B-1050 Brussel, BELGIUM preferably with a copy or e-mail with DOC/TEX file to Ms. K. Segers, Department of Mathematics, Faculty of Sciences, Vrije Universiteit Brussel, Pleinlaan 2, B-1050 Brussel, Belgium ([kasegers@vub.ac.be](mailto:kasegers@vub.ac.be))

## 4.2 From ULB

### UNIVERSITE LIBRE DE BRUXELLES OUVERTURE D'UN POSTE EN GEOMETRIE DIFFERENTIELLE

Moyennant l'accord des autorités, l'Université Libre de Bruxelles annoncera prochainement l'ouverture en octobre 2005 d'un poste de chargé de cours au Département de Mathématique dans le domaine de la géométrie différentielle. Les candidats sont invités à prendre contact dès maintenant avec un des membres de cette unité, en joignant leur Curriculum Vitae. Après une première sélection, certains candidats seront invités au début de l'année 2005 à faire des exposés et séjourner brièvement à l'université.

Pour plus de renseignements, ou pour annoncer votre candidature, veuillez contacter:

Frédéric Bourgeois (Frederic.Bourgeois@ulb.ac.be - +32 2 650 58 40)

Simone Gutt (sgutt@ulb.ac.be - +32 2 650 58 38), ou

Luc Lemaire (llemaire@ulb.ac.be - +32 2 213 35 46)

Université Libre de Bruxelles

Département de Mathématique

Campus Plaine CP 218, Bd du Triomphe, 1050 Bruxelles - Belgique

## 4.3 From ULg

### Call for Nominations Prizes of the Liege Royal Society of Sciences

The Liege Royal Society of Sciences calls for nominations for prizes awarded by a foundation honouring the 150th anniversary of its foundation. These international prizes are intended for researchers less than thirty-five years of age.

Four prizes of 2,500 EUR each will reward a corpus of work published either by a single author or in collaboration. One of the four prizes, in honour of Lucien Godeaux, will be awarded in the field of mathematics.

Requests for information on how to make nominations should be directed to: Professor J. Aghion, c/o Secretariat of the Royal Society of Sciences of Liege, Institute of Mathematics of the University of Liege, 12 Grande Traverse, Sart Tilman Bat. B 37, B-4000 Liege 1, Belgium (e-mail: jaghion@ulg.ac.be).

The deadline for applications is October 1st, 2005.

## 4.4 From UA

Available:

### Professorship in Applied Mathematics University of Antwerpen.

The deadline for application is June 9, 2005. More information can be found at the address

[http://www.ua.ac.be/main.asp?c=\\*VACATURES&n=26936&ct=026198&e=t68303](http://www.ua.ac.be/main.asp?c=*VACATURES&n=26936&ct=026198&e=t68303)

## 5 Maths and art, fiction, ...

## Art and Math exhibit

Institut Henri Poincaré, Paris

January - June 2005

Organized by Claude P. Bruter



The organization of this conference was opened on January 24 in the Institut Henri Poincaré in Paris.



Irène Rousseau,  
Mosaïque hyperbolique  
©photo John Sullivan

Arts and sciences have always had a love-hate relationship. Hard core scientists are believed not to be sensible for organic beauty, and “real” artists are supposed to hate any constraint that may be imposed by the rigidity of a mathematical system.

However, since ancient history, mathematics has been an art and art has flirted with mathematical structures. Think of the golden section in ancient architecture, the work of Leonardo da Vinci, the magic square in Dürer’s ‘Melancholia’, the hypercube in Dali’s ‘Crucifixion’ (aka ‘Corpus Hypercubus’), Escher’s tessellations. And there is so much more. Think of the music by Bach but also the musical ‘Fermat’s Last Tango’, the many math-related novels that were already reviewed in this newsletter, but also many science fiction novels, and stage plays like Auburn’s ‘Proof’ and movies like Greenaway’s ‘Drawing by numbers’ or ‘A beautiful mind’ of Ron Howard, and this list could be continued.



John Robinson,  
Creation,  
©photo John Sullivan

This is not an observation to be neglected. This can be used to the benefit of mathematics. Just note that if you find something about mathematics in a newspaper or if mathematics is (directly or indirectly) mentioned in the media, apart from Einstein or Fermat, then an image or a sculpture or ‘fancy pictures’ are an efficient way to catch people’s attention. Remember the success of fractals and the eye-catching Julia and Mandelbrot sets. And it seems that the popularization of mathematics is more and more interested

in exploiting this link between mathematics and art.

The annual conferences on ‘mathematics and culture’, mainly embodied by Michele Emmer and coworkers resulted in best-selling books published by Springer. Thus it is not surprising that several organizations trying to promote mathematics are also involved in topics that are on the border of arts and mathematics. I just mention ISAMA<sup>1</sup> (The International Society of the Arts, Mathematics, and Architecture), IS-MCA<sup>2</sup> (International Society for Mathematical and Computational Aesthetics), ISIS<sup>3</sup> (International Society for the Interdisciplinary study of Symmetry), the Goudreau Museum of Mathematics in Art and Science<sup>4</sup>, and Google will give a zillion



Philippe Charbonneau,  
Biconique 5  
©photo John Sullivan

<sup>1</sup><http://www.isama.org/>

<sup>2</sup><http://www.rci.rutgers.edu/~mleyton/ISMA.htm>

<sup>3</sup><http://www.mi.sanu.ac.yu/vismath/isis0.htm>

<sup>4</sup><http://www.mathmuseum.org/>

more of these links.

Claude Bruter has been interested in mathematics, art, visualization, education and the interplay between those. He organized a conference on this topic in Maubeuge (2000) and is editor of the proceedings: *Mathematics and Art*, Springer 2002. He is also the founder of ARPAM<sup>5</sup> (Association pour la Réalisation et la Gestion du Parc de Promenade et d'Activités Mathématiques).

An amazingly large number of artists and mathematicians were brought together in this exhibition. There are 5 participants who present themselves as an artist (usually with no specific mathematical education), there is an architect, a software engineer, and there are 10 mathematicians. The exhibits include sculptures, paintings, and often computer generated images or paintings inspired by them. The works of art by the mathematicians is most often the result of an attempt to visualise a certain process, just like the about 20 years ago the exhibition by Peitgen and his coworkers using the fractals and Mandelbrot sets.

For those who do not have the occasion to visit the exposition in the Institut henri Poincaré, let me mention that it will move to the Ecole Polytechnique from July to September 2005. And if you still can not go to Paris in that period, and for the impatient, you can have a look at the website <http://www.hermay.org/IHP><sup>6</sup> or order the catalogue (48 pages) from the librarian of the Institute Poincaré Liliane Sweig [zweig@ihp.jussieu.fr](mailto:zweig@ihp.jussieu.fr). Note however that several links of the web page do not work properly, but with some imagination, it is often possible to reconstruct the correct address.

Adhemar Bultheel

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<sup>5</sup><http://arpam.free.fr/>

<sup>6</sup>Hermay is a non profit organization for the promotion of art.

## SECOND ANNOUNCEMENT

### JOINT BeNeLuxFra CONFERENCE in MATHEMATICS

#### JOINT MEETING OF THE BELGIAN, DUTCH, LUXEMBOURG AND FRENCH MATHEMATICAL SOCIETIES

This meeting will take place on the Sterre Campus (Krijgslaan 281) of Ghent University (Belgium) from May 20 (Friday) to May 22 (Sunday), 2005.

#### 1. MAIN SPEAKERS

The plenary talks will be given by:

**Frederic Campana** (Université de Nancy)  
**Yves Benoist** (Ecole Normale Supérieure, Paris)  
**Jan Willem Klop** (Vrije Universiteit Amsterdam)  
**Françoise Point** (FNRS and Université de Mons-Hainaut)

The fifth plenary lecture will be the **Brouwer Lecture**. The Brouwer Medal Award Winner is

**Lucien Birgé** (Laboratoire de Probabilité, Université Paris VI)

Furthermore, there are evening leisure-lectures by

**Jean Doyen** (Université Libre de Bruxelles)  
**Burkard Polster** (Monash University, Melbourne)

#### 2. SPECIAL SESSIONS

There will be ten Special Sessions, and one extra intended also for high school teachers. We list the sessions, the organizers, and the speakers that are already fixed:

##### I. Geometry

a. *Differential Geometry* organized by Simon Gutt, Norbert Poncin and Martin Schlichemaier [speakers: Christian Duval (Marseille), Klaas Landsman (Nijmegen), Eric Leichtnam (Paris), Mohsen Masmoudi (Nancy), Pierre Mathonet (Liege)]

b. *Algebraic Geometry* organized by Olivier Debarre [speakers: Cinzia Casagrande (Pisa), Hélène Esnault (Duisburg-Essen), Gerard van der Geer (Utrecht) and Mihai Paun (Strasbourg)]

##### II. Applied Mathematics

a. *Coding Theory and Cryptography* organized by Henk van Tilborg and Anne

Canteaut [speakers: Magali Bardet-Turel (Paris), Daniel Augot (INRIA-Rocquencourt), Christopher Wolf (Leuven), An Braeken (Leuven), Ellen Jochemsz (Eindhoven), Reinier Bröker (Leiden), Ludovic Perret (ENSTA, Paris)ENSTA, Paris]

b. *Mathematical Statistics* organized by Richard Gill, Marc Hallin and Pascal Massart [speakers: Gérard Biau (Montpellier), Eric Cator (Delft), Roel Braekers (Diepenbeek), Jon A. Wellner (Washington), Davy Paindaveine (Bruxelles) and Patricia Reynaud (Paris)]

##### III. Analysis

a. *Harmonic Analysis* organized by Alain Valette, Carine Molitor-Braun and Bachir Bekka [speakers: Stefaan Vaes (Paris), Bertrand Remy (Lyon), Emmanuel Breuillard (IHES), Yves de Cornulier (EPFL and Neuchâtel)]

b. *Partial Differential Equations* organized by Paul Godin and Gilles Lebeau.

##### IV. Miscellaneous

a. *Computer Science* organized by Bert Hoogewijs and Jan Willem Klop, with subsession (Friday) *Math applied* organized by Rik Janssen [speakers include Sara Van Langenhove (Gent), Geert Vernaeve (Gent), Gudron Geuze (Nijmegen), Marie-Colette van Lieshout (CWI Amsterdam), D. Vidovic (Delft), Man Nguyen (TUEindhoven), Arie de Niet (RUGroningen), Brenny van Groesen (Twente) and Karel Keesman (Wageningen)]

b. *History of Mathematics* organized by Gerard Alberts, Maarten Bullynck and Catherine Goldstein [speakers: Albrecht Heffer (Gent), Steven Wepster (Utrecht), Liliane Alfonsi (Paris), Maarten Bullynck (Gent), Danny Beckers (Nijmegen-Maastricht), Frédéric Brechenmacher (Paris) and—to be confirmed—Karin Reich (Hamburg)]

##### V. Algebra

a. *Non Commutative Algebra* organized by Jacques Alev and Lieven Le Bruyn [speakers: Iain Gordon (Glasgow), : Olivier Schiffmann (Paris), Markus Reineke (Munster) and Raf Bocklandt & Geert Van de Weyer (Antwerp)]

b. *Model Theory* organized by Zoe Chatzidakis and Françoise Point [speakers: Lou van den Dries (Urbana), Johannes Nicaise (Leuven/Bordeaux), Alexandre Rambaud (Paris), Marcus Tressl (Regensburg), Franck Benoist (Paris) and Zahidi Karim (Antwerp)]

**Extra Session** on *Education* organized by Dirk Siersma, mainly on the Project PISA (Program for International Student Assessment) of the OESO [speakers include Rainer Kaenders (Nijmegen) and Dirk Janssens (Leuven)]

#### 3. SCHEDULE OF THE MEETING

##### Friday, May 20

11.30 h – 13.30 h: Registration

13.45 h – 14.00 h: Opening Ceremony

14.00 h – 15.00 h: **Yves Benoist**

Coffee & tea

15.30 h – 17.30 h: Special Sessions a

17.45 h – 18.45 h: **Jean Doyen**, Mathematics Cinema Show

##### Saturday, May 21

08.00 h – 09.00 h: Registration

09.00 h – 10.00 h: **Françoise Point**  
 Coffee & tea  
 10.30 h – 12.30 h: Special Sessions b + Extra Session  
 13.30 h – 14.25 h: Annual Meeting of the KWG.  
 14.00 h – 14.25 h: General Assembly of the BMS.  
 14.30 h – 16.00 h: Special Sessions a + Extra Session  
 Coffee & tea  
 16.30 h – 17.30 h: **Burkard Polster**, Mathematical Bell Ringing  
 17.45 h – 19.00 h: Brouwer Medal Ceremony/Brouwer Lecture by **Lucien Birgé**  
 19.00 h – 20.00 h: Reception  
 20.15 h: Conference Dinner.

#### Sunday, May 22

09.00 h - 10.00 h: **Jan Willem Klop**  
 Coffee & tea  
 10.20 h - 11.50 h: Special Sessions b  
 12.00 h - 13.00 h: **Frederic Campana**  
*Closing of the meeting*

#### 4. REGISTRATION, PROCEEDINGS AND FURTHER INFORMATION

The **Bulletin of the Belgian Mathematical Society Simon Stevin** will publish a special issue for the proceedings of the conference containing invited papers of the plenary speakers and some speakers in the special sessions. The submission of the latter papers is organized through, handled and decided by the session organizers.

The **registration fee** for the conference, to be paid on arrival, is 15 EURO and covers the Coffe/Tea breaks. Non-members of the Belgian Mathematical Society will have the opportunity to order a copy of the Proceedings at the price of 10 EURO (per copy).

To **register** for the conference, just visit the URL <http://cage.ugent.be/bnlf/> and click on registration. You will then be required to fill in a short form. If you want us to book for you a hotel room, then you can complete the appropriate items on the registration form. We have made some pre-reservations already. The prices of the rooms vary between 65 and 87 EURO per night. In order to simplify administration, we will fill the rooms according to increasing prices. After registration, you will receive an email with the details of your reservation, which you will then have to confirm. Note that normally the prices are higher, especially in the center of the old town, but a substantial discount has been given because of the number of rooms we could already confirm. Note also that we do not ask for prepayments, but we count on the fact that people who register will also show up!

The **deadline for registration is April 1, 2005**. After this date, one can still show interest to attend the conference, but one has to take care of his/her own hotel reservation.

**Travel directions** can be found on <http://cage.ugent.be/foto/map.html> (the location is *Departments of Pure Mathematics*).

**Gent/Ghent** is a historic city with a lot of places to visit! If you want to explore the possibilities, or you want to find out more about the town, then go to <http://www.gent.be/>.

The **conference dinner** will take place on **Saturday evening, May 21**. During the conference there will be opportunities to register and pay for this dinner.

You may also wish to visit the **homepage** of the conference, which is

<http://cage.ugent.be/bnlf/>

and which will be updated from time to time.

#### 5. SCIENTIFIC ORGANIZING COMMITTEE:

A. Hoogewijs (Ghent University), F. Loeser (Ecole Normale Supérieure, Paris), C. Molitor-Braun (University of Luxembourg), H. te Riele (Centrum voor Wiskunde en Informatica, Amsterdam), H. Van Maldeghem (Ghent University)

#### 6. LOCAL ORGANIZING COMMITTEE:

B. Hoogewijs and H. Van Maldeghem (both Ghent University)

#### FINANCIAL SUPPORT:

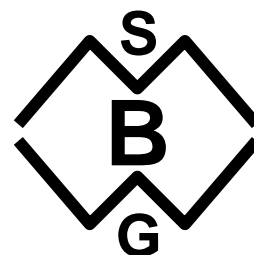
1. Fonds Simon Stevin – Ghent University
2. Fund for Scientific Research – Flanders (Belgium)
3. Fonds National de la Recherche Scientifique (Belgique)
4. Scientific Research Network FWO “Fundamental Methods and Techniques in Mathematics”.
5. The organizing national Mathematical Societies.

#### 7. Satellite Meetings

A. There will be a “groupe de contact FNRS” on Logic and Model Theory on Friday morning, May 20, also taking place in Gent, Room Emmy Noether, S25, Krijgslaan 291. It is organized by Françoise Point. More information at <http://www.logique.jussieu.fr/www.point/>. Speakers are Françoise Delon (C.N.R.S., Paris 7), Paola d’Aquino (Seconda Università di Napoli) and Alex Wilkie (Oxford, United Kingdom).

B. Seminar Social Choice Theory. Also on Friday morning in Gent, Room 7, S22, Krijgslaan 281. Organized by Harry De Swart (more information: [h.c.m.deswart@uvt.nl](mailto:h.c.m.deswart@uvt.nl)). Speakers are Peyton Young (Johns Hopkins, Baltimore) and Rob Bosch (Netherlands).





**Young mathematicians,**

**TELL US WHAT YOU ARE DOING !**

The Belgian Mathematical Society invites you to its first

# PhD-Day

on **Monday, 12 September 2005**

at the **Vrije Universiteit Brussel**

(Room **D.2.01** 'promotiezaal', Campus Etterbeek, Pleinlaan 2, 1050 Brussel)

On this day we give the opportunity to all Belgian PhD students to present their research and to get to know their colleagues from all over the country.

## PROGRAMME OF THE DAY

- 10h00** Welcome from the president of the Society
- 10h15** Plenary Lecture "Why Mathematics" by F. Buekenhout
- 11h15** Coffee
- 11h45** Poster presentations
- 12h45** Lunch (free for BMS members)
- 14h30** Oral presentations
- 16h30** Coffee
- 17h00** Poster presentations
- 18h00** Drink and award for best poster

For more information and registration (deadline is July 1):

<http://bms.ulb.ac.be/phdday>