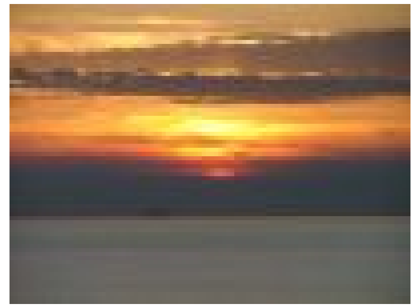
BELGIAN MATHEMATICAL SOCIETY

Comité National de Mathématique CNM

C W N M

NCW Nationaal Comite 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 59, September 15, 2006

Letter from the editor

Welcome to the "September 15, 2006 Issue" of our Newsletter!

I do hope you had a nice (and not too hot?) summer ... September is already running. Have a nice semester and enjoy this Newsletter!

Françoise

Contents

1 News from the BMS

Do not forget the (2006) General Assembly of our Society on September 23, 2006:

General Assembly of the BMS
Saturday September 23, 10:00
ULB, building NO, Room 9.06

Please also find here below some information about the *Belgian Center of Mathematical Studies* **(BCMS)**.

The Belgian Center of Mathematical Studies

The Belgian Center of Mathematical Studies was created in 1949 by a group of Belgian mathematicians at the initiative of Lucien Godeaux. It was financed by the Ministry of Education. Among its main activities was the organization of conferences on promising mathematical topics. Some of these left a lasting mark on the subject, as the conferences on fiber spaces (1951), algebra (1956), topology (1960) and algebraic groups (1962). The Center went into hibernation when the Ministry cancelled the financing. A revival attempt in the beginning of the eighties did not succeed. In the light of the new law on non-for-profit organizations it is advisable to wind up the Center.

According to the law the dissolution of the organization has to be decided by an extraordinary meeting of the members with two third of them present. If there is not a quorum, a second meeting can decide whatever the number of members attending. The first extraordinary meeting has been convened on 12 May 2006 and did not have a quorum. A second extraordinary meeting is

scheduled on 23 September 2006, 09:30, ULB

BEFORE the general meeting of the BMS and at the same venue, with the following **agenda:**

1. Dissolution of the association
2. Allocation of the assets of the association
3. Appointment of two liquidators.

Members of the Center are invited to contact one of the undersigned to receive the invitation to attend the meeting.

The secretary, Paul Henrard
Henrard@math.ucl.ac.be

The treasurer, Franz Bingen
fbingen@vub.ac.be

2 News from the NCM

Meeting organized by the NCM at the "Palais des Académies" on October 18, 2006:
- 14:30 A. Bultheel: *Powell-Sabin spline wavelets for geometric modelling*
- 15:15 Coffee / Tea
- 15:45 S. Gutt: *Symplectic Connections and Deformation Quantization*

3 Meetings, Conferences, Lectures

3.1 October 2006

Meeting organized by the NCM on

October 18, 2006: "Palais des Académies"

- 14:30 A. Bultheel: *Powell-Sabin spline wavelets for geometric modelling*
- 15:15 Coffee / Tea
- 15:45 S. Gutt: *Symplectic Connections and Deformation Quantization*

3.2 2007

The EMS is a member society of ICIAM (=International Congress on Industrial and Applied Mathematics); please note the

Congress ICIAM 2007, 16-20 July 2007 in Zurich

See information on the web pages at the address http://www.iciam07.ch/registration

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3.3 2008

5ECM, July 14-18, 2008
5th EUROPEAN CONGRESS of MATHEMATICS

Informations can be found at the address **http://www.5ecm.nl**

4 Summary of PhD theses

Dynamics of coronal loop oscillations

Tom VAN DOORSSELAERE, KUL, June 2006

Promotor: Stefaan Poedts
Co-promotor: Marcel Goossens

The solar corona (the outer layer of its atmosphere) is highly structured by the Sun's magnetic field and consists of billions of magnetic loops. After an explosive event, such as a solar flare or a coronal mass ejection, these coronal loops are observed to oscillate. The mechanism behind the rapid damping of these coronal loop oscillations is still subject of debate. An attractive explanation is to model these oscillations as fast quasi-mode kink oscillations, damped by resonant absorption. When this PhD thesis was initiated, only rudimentary mathematical models describing coronal loop oscillations were available. This thesis extends these simple early theoretical models in several ways. The basic model consists of a homogeneous loop, surrounded by a homogeneous plasma embedded in a homogeneous magnetic field. The two regions with homogeneous plasma density are connected with a thin transitional layer.

In the more advanced models developed and applied in this thesis, the 'thin' boundary layer covers a substantial part of the coronal loop. The resulting equilibrium is studied numerically. As a next step, we include the longitudinal curvature in the model. We obtain analytical expressions for the eigenmode and eigenfrequencies of such curved elongated structures. As a final improvement, we include longitudinal density stratification. The effect of the stratification is first studied analytically, and the results are then confirmed numerically.

Finally, we use the more advanced models to do coronal loop seismology. Taking observed values for the oscillation period and the damping time, we obtain a 1D solution curve in a 3D parameter space. Rather restricted ranges (errors at maximum 5 %) for the internal Alfvén speed are retrieved.

Asymptotics for non-intersecting Brownian motions using multiple orthogonal polynomials

Evi DAEMS, KUL, July 2006

Promotor: Arno Kuijlaars

In the thesis we consider n one-dimensional Brownian motions which start in $p > 0$ fixed points at time $t = 0$ and end in $q > 0$ fixed points at time $t = 1$, conditioned that the motions do not intersect in the whole time interval $(0, 1)$. Our main interest concerns the asymptotics of the Brownian motions: we want to know what happens when the total number of Brownian motions becomes very large.

To obtain the asymptotics, we use multiple Hermite polynomials of mixed type. These polynomials can be seen as a generalization of the usual Hermite polynomials, only now the orthogonality conditions are expressed with respect to two sets of weights. We show that the correlation functions of the positions of the Brownian motions at a time t between 0 and 1 can be described using these multiple orthogonal polynomials. We formulate a Riemann-Hilbert problem that characterizes the multiple orthogonal polynomials of mixed type. The correlation functions can now be expressed in terms of the unique solution of the Riemann-Hilbert problem for multiple Hermite polynomials of mixed type. For the asymptotic analysis of the Riemann-Hilbert problem we use the Deift/Zhou steepest descent method, which gives us the asymptotics of the local correlation functions.

In our research we only consider the case where all the Brownian motions start in two fixed points and end in two fixed points. When these points are sufficiently close to each other, we prove that the limiting mean density of the positions of the Brownian motions is supported on one interval at a time between two critical times, and on two intervals close to the time t=0 and t=1. The local correlation functions can in these cases be expressed in terms of the sine kernel at an interior point, and the Airy kernel near the edges of the support of the limiting mean density.

5 Miscellaneous

5.1 News from the ICM

The International Congress of Mathematicians in Madrid has just finished. Belgium was well represented by the following participants: *Raf Bocklandt (Antwerpen), Bram de Knock (Gent), Julia Dony (Brussel), Freddy*

Dumortier (Hasselt), Isabel Goffa (Brussel), Ann Lemahieu (Leuven), Luc Lemaire (Bruxelles), Dixan Peña Peña (Gent), Joseph A. Thas (Gent), Geert Van de Weyer (Antwerpen), Karin Verelst (Brussel) and Willem Veys (Leuven).

We are very proud to announce that prizes were awarded to two participants from the VUB.

Julia Dony was awarded the first prize in the section Probability and Statistics for her poster entitled "Weighted uniform consistency of kernel density estimators with general bandwidth sequences". The second prize in the Algebra section was won by Isabel Goffa for her poster "Noetherian semigroup algebras and maximal orders".

Congratulations to both of them! The posters can be found at the end of this newsletter.

5.2 Call for prizes

Call for the 2007 Fermat Prize for Mathematics Research.

For information on the conditions of the prize and timetable, please check the following web page **http://www.math.ups-tlse.fr/Fermat/** or the attached pdf file.
Electronic files of the announcement are available at: d.dallariva@math.ups-tlse.fr

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EMS Prizes

Call for Nominations of Candidates for Ten EMS Prizes at the Fifth European Congress of Mathematics (5ECM, Amsterdam, July 14-18, 2008). See also the pdf file at the end of this Newsletter.

5.3 Postdoc and PhD

VACANCIES AT EURANDOM Postdoctoral researchers and Ph.D. students

EURANDOM is the European Research Institute for the study of random phenomena. Research at EURANDOM covers stochastics and its applications, as well as its interfaces with other disciplines. Stochastics consists of statistics, probability and stochastic operations research. The core business of EURANDOM is fundamental research in an international environment, carried out by a non-tenured staff of junior researchers and senior advisors supplemented with an extensive programme of seminars, workshops and visitors.

Research at EURANDOM is clustered into thematically organized research programmes:
Queueing and Performance Analysis: Performance Analysis of Production Systems; Performance Analysis of Communication Systems, Queueing Theory, Multivariate Risk Modelling;
Random Spatial Structures: Critical Phenomena; Disordered Systems; Combinatorial Probability;
Statistical Information and Modelling: Statistical Signal and Image Analysis; Statistics in Biology and Statistics in Industry.

At present the junior staff consists of approximately twenty-five internationally recruited post-doctoral researchers and graduate students under the guidance of senior advisors. Vacancies at EURANDOM occur at any time during the year and are not restricted to the beginning of the academic year.

Postdoctoral appointments are typically for two years (but shorter periods can be discussed as well). Appointments for Ph.D. positions are typically for three to four years. Furthermore we welcome candidates who wish to apply for an external research grant, e.g. the Marie Curie Individual Fellowship from the European Union or for a research grant from European or American science foundations such as DFG, FWO, CNRS, EPSRC, NSF etc.). We have built up expertise with the application procedures consequently we are willing to help you with the application.

Candidates with a suitable mathematical background are invited to send a letter of application together with a curriculum vitae with full educational details to EURANDOM. Applicants for a post-doc position should also include a list of publications, a pre-print of a selected paper, and names and contact details of three academic referees. Applicants for a Ph.D. position should include information on their thesis. The complete package should be sent to:

Prof.dr.ir. O.J. Boxma, Scientific Director EURANDOM,
P.O. Box 513 5600 MB Eindhoven, The Netherlands

For further information have a look at our website www.eurandom.tue.nl or contact us at office@eurandom.tue.nl
Phone: +31 40 247 8100 / Fax: +31 40 247 8190

5.4 From UMH

Le Séminaire Interuniversitaire de **logique mathématique** tient ses séances hebdomadaires le jeudi à 11h et à 14h30; le programme est disponible à l'adresse **http://math.umh.ac.be/logic/seminars.htm**

Le Séminaire reprendra ses activités hebdomadaires

le jeudi 5 octobre à 14h30 à l'ULB,

local 2NO906, bâtiment NO, Campus de la Plaine.

Les étudiants de DEA désireux de participer à ce séminaire ou aux activités et cours du groupe de logique mathématique sont invités à cette première séance.

Le séminaire aura des activités décentralisées dans les différentes universités participantes. Pour plus d'information, consulter le site habituel http://math.umh.ac.be/logic/seminars.htm

5.5 ICM Madrid, 2006

The 2006 Fields Medals, Nevanlinna Prize and Gauss Prize

The winners of these awards were announced at the International Congress of Mathematicians in Madrid, on August 22. Here is the list of winners, with very brief citations.

The four Fields Medals were awarded to :

- Andrei OKOUNKOV for his contributions bridging probability, representation theory and algebraic geometry
- Grigori PERELMAN for his contributions to geometry and his revolutionary insights into the analytical and geometric structure of the Ricci flow
- Terence TAO for his contributions to partial differential equations, combinatorics, harmonic analysis and additive number theory
- Wendelin WERNER for his contributions to the development of stochastic Loewner evolution, the geometry of two-dimensional Brownian motion, and conformal field theory.

The Nevanlinna Prize, awarded since 1982 for work in mathematics in the information society was awarded to :

• Jon KLEINBERG for his work in a large range of areas from network analysis and routing, to data mining, to comparative genomics and protein structure analysis.

The Gauss Prize for applications of mathematics was awarded for the first time. Recognising that application may come much later than the mathematics themselves, there is no 40 years age limit for the recipient. The Prize was awarded to :

• Kiyoshi ITÔ for the development of stochastic analysis, in particular stochastic differential equations.

An account of the winners and their work can be found on : http://www.mathunion.org/medals/2006/

However, here are some informal comments from the Congress itself.

Grigori Perelman did not attend the Congress, indeed he declined to accept the Fields Medal. It is not the first time he refuses a prestigious prize, stating that he does not wish to appear as one of the leaders of the mathematics community.

Although it is not explicitly written in the citation, his main contribution is the proof of the *Poincaré Conjecture of 1904.*

Now this conjecture is also the object of one of the Clay foundation prizes of one million dollars, and it is unknown whether he will accept or decline that award.

The Poincaré conjecture is a purely topological question, asking if spheres of dimension three are characterised (like spheres of dimension two among other compact surfaces) by the fact that any continuous closed curve on them can be continuously deformed into a point. A natural extension of the conjecture to dimensions greater than or equal to five was proven by Smale in 1961. The case of dimension four was proven by Freedman in 1982. They used topological methods, but these methods have failed so far to give any idea in dimension three. Thirty years ago, Richard Hamilton initiated a programme to solve the conjecture by adding on the space a smooth structure, then a Riemannian structure, then deforming this structure along the solutions of a system of partial differential equations (the Ricci flow). These solutions tend to approach a metric of constant curvature, and so the given space is a sphere. However, the solutions don't always exist, in fact they develop singularities. Hamilton could treat some of these by cutting and pasting pieces of space to the given one before the singularities occur. But he couldn't treat all cases. By substantial new ideas, Perelman treated those other cases. Now Perelman did not submit his papers (around 60 pages) to a journal, but placed them on the web. Three pairs of mathematicians have since then produced manuscripts of around 500 pages spelling out all details of the proof. The opinion of the specialists, as told in Madrid, is that the conjecture is indeed proven, on the basis of preliminary work by Hamilton, by the work of Perelman.

Luc Lemaire

6 History, maths and art, fiction, jokes, quotations. . .

Le Père Henri Bosmans et la Société Mathématique de Belgique.

Comme annoncé dans les BMS-NCM NEWS de mars 2006 (p.5) deux journées se sont tenues à Bruxelles sur le Père Henri Bosmans SJ, historien belge des mathématiques. Elles donneront lieu à la publication d'un premier volume en 2007, lequel portera entre autres sur l'impact de ses travaux, sa formation, ses contacts scientifiques et religieux et les influences subies (en particulier Paul Mansion), son caractère, les écrits qu'il nous laisse (le volume contiendra une bibliographie de ses travaux publiés), et son rôle dans la vie scientifique de la Belgique: la Société Scientifique de Bruxelles, une organisation catholique militante, où le Pape en personne intervenait (au 19e siècle) dans la vie de la Société, et la Société Mathématique de Belgique.

Pour ce qui concerne plus précisément cette dernière, signalons que c'est la lecture d'archives jésuites qui apprit aux signataires de ces lignes le rôle d'Henri Bosmans dans la SMB, et les amena à lire les cahiers du Fonds Guy Hirsch mentionnés dans l'article de Luc Lemaire sur le site de la BMS. En bref : le Père Bosmans fut actif dans la SMB depuis au moins mai 1922, et président en tout cas du 20 octobre 1923 au 17 octobre 1925. Durant sa participation à la vie de la Société, quatre conférences portèrent sur des sujets d'histoire des mathématiques: deux par lui-même (°), et deux par Paul Ver Eecke, le célèbre traducteur belge de textes mathématiques grecs. Henri Bosmans participait activement aux discussions de la Société (sur en tout cas des questions d'enseignement secondaire, de théorie de la relativité, de théorie des nombres, de géométrie (les rôles de l'intuition et de l'axiomatique)) et parraina quatre nouveaux membres, dont l'un conjointement avec le chanoine Lemaître. La mort d'Henri Bosmans est mentionnée comme suit dans les cahiers : "Séance du 25 février 1928. En ouvrant la séance, M de la Vallée Poussin, président, rend un hommage ému à la mémoire du R.P. Bosmans, ancien président de la Société pour la période 1923-1925. Il rappelle la longue carrière professorale au Collège St Michel où il forma une pléiade d'élèves futurs ingénieurs et officiers. Il évoque les remarquables travaux sur l'histoire des mathématiques et le labeur infatigable de l'historien qui, presque aveugle, ne continuait pas moins ses patientes recherches. Il était d'ailleurs assidu de nos réunions mensuelles."

On savait par Lucien Godeaux lui-même (°°) combien celui-ci estimait Henri Bosmans, mais c'est émouvant de retrouver dans les archives jésuites une trace de la participation de Lucien Godeaux au discours qu'Henri Bosmans allait prononcer pour la fin de sa charge de président de la SMB.

Michel Hermans sj et Paul van Praag.

(°) "Le traité du Triangle arithmétique de Pascal" (20 octobre 1923) et "Une contreverse mathématique Franco-Belge au XVIe siècle: Viète et Adrien Romain" (17 octobre 1925. Que l'on pardonne au second signataire de mentionner la désignation lors de cette séance d'un nouveau Secrétaire adjoint : "M. Libois").
(°°) Esquisse d'une histoire des Sciences mathématiques en Belgique, Collection nationale, Office de publicité, Bruxelles, 1943, p.57.

Les signataires : Michel Hermans est historien et responsable des archives de la Province belge méridionale de la Compagnie de Jésus, et Paul van Praag (UMH) est ancien président de la SMB-BWG (1986-1988).

The above text will soon be translated in English and become part of "A brief history of the Belgian Mathematical Society" which can be read on our WEBsite http://bms.ulb.ac.be/cgi/history.php

Review of *The curious incident of the dog in the night-time*, a novel by Mark Haddon

Alain Valette

July 16, 2006

If you did enjoy Dustin Hofmann's extraordinary performance of an autistic person in the movie *Rain Man*, you are likely to love that novel. The author worked with autistic individuals, we are told. In this book, the author tells the story - written at the first person - of a 15-years old autistic kid, and succeeds in the *tour de force* of making it incredibly plausible and realistic: very convincingly, we see the outside world through the eyes and emotionally dissociated mind of Christopher Boone, the real world with all its absurdity and fears and danger.

Christopher lives in Swindon, England; he is a kid who relates better with animals than with humans. The story begins as he discovers the dead body of Wellington, his neighbours' dog: the poor thing has been killed with a garden fork. Since he loved the dog, Christopher decides to do some detective work and find out who killed the dog. His enquiry leads him to some astonishing discoveries. First, his own mother, whom he thought to be dead, is still alive and lives in London: Christopher's father, unable to tell him that his couple was splitting up, found no other solution to explain the mother's absence after she left home! Second, his father had an affair with the neighbour, a divorced lady: this relationship turning sour, they had an argument, after which Christopher's father grabbed a garden fork and killed the dog! Christopher then reaches the conclusion that he lives in the house of a murderer, so that his own life is in danger. He then takes the most difficult decision of his life: leave home, go to London, find his mother and live with her. The account of this one-day journey extends over 70 pages, and is the most mesmerizing part of the book. Indeed we can really feel the dismay and fears of this boy who never traveled on his own, and who is afraid of anybody not belonging to his family or school circles. After he reaches London and is told to take the tube, comes a frightening description of the overcrowded platform, the rush of air and the roaring noise produced by the train as it enters the station, and we are ready to find plausible that Christopher collapses on a bench for three hours, with eyes closed, before finding the strength to board a train that will take him to his final destination.

What does this book have to do with mathematics? Well, the book is full of maths and science! Indeed, (exactly like Dustin Hofmann's character in *Rain Man*) Christopher is a very clever kid, having learned a lot about maths, physics, astronomy, biology, and theoretical computer science. And when a situation from life reminds him of something scientific, he describes that piece of science in simple but precise words, trying to explain the basic ideas and not to hide them, using formulae when necessary. So, as the story proceeds, we also meet descriptions and opinions on expansion of the universe, prime numbers and Erathostenes'sieve, black holes, dynamics of animal populations and transition to chaos, working of the brain, Conway's "Soldiers game", special relativity, and right-angled triangles with integer sides. For example, chapter 101 (no worry: chapters are numbered after prime numbers!) is a detailed discussion of a famous puzzler, that baffled even some professional mathematicians: *"The quiz-master confronts you with three closed doors, one of which hides the new car you are after. Behind each of the other two doors, however, is standing a smelly goat. You will choose a door and win whatever is behind it. You decide on a door and announce your choice, whereupon the host opens one of the other two doors and reveals a goat. He then asks you if you would like to switch your choice. Is it to your advantage to switch?"* The counter-intuitive answer is that you have a probability of 2/3 of winning a car if you switch, against 1/3 if you don't switch.

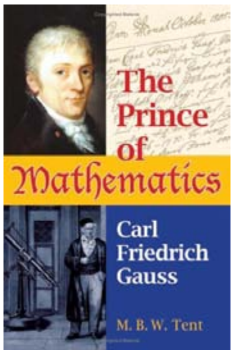
These pieces of science scattered through the book might seem to break the pace of the story; however they certainly add a plus to the book, as they give substance and credibility to Christopher's character. We understand better how someone with an utterly logical brain, a brain that works more or less like a computer, may find social interrelations complex, as those are largely based on understatements and second degree thinking. Here are the first few lines of Chapter 101: *"Mr Jeavons said that I liked maths because it was safe. He said I liked maths because it means solving problems, and these problems were difficult and interesting but there was always a straightforward answer at the end. And what he meant was that maths wasn't like life because* *in life there are no straightforward answers at the end. I know he meant this because this is what he said.*

This is because Mr. Jeavons doesn't understand numbers."

A colleague of mine claims, half-serious, that taste for maths is a mild form of autism. After reading that fascinating book, I really wondered whether he was right or wrong...

Mark HADDON, *The curious incident of the dog in the night-time*, Doubleday (a division of Random House, Inc.), 2003; ISBN 0-385-51210-4.

The Prince of Mathematics Carl Friedrich Gauss *M.B.W. Tent*, A K Peters, Wellesley, Massachusetts 2006 (236p.) ISBN 1-56881-261-2.

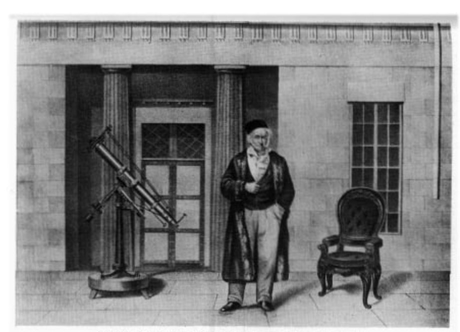


This biography of Gauss should perhaps be read before the novel *Het meten van de wereld* by Daniel Kehlmann [**1**]. Margaret Tent portrays a totally different picture of the person Carl Friedrich Gauss: he is nicer (it seems that Kehlmann read from his work for the Gauss-Gesellschaft and was told that the Gauss in his book was too harsh [**2**]). The book is written for a general audience and contains practically no mathematics (the most difficult formulas you'll encounter are a quadratic equation, some series and a statement of the Prime Number Theorem).

Part I, Child Prodigy (1777-1788), presents us with the young Gauss, well-known for his early summation of $1+2+3+\ldots+100$ (when he was seven years old he was given this sum by his teacher in class, and calculated it by reordering the terms: $(1+100)+(2+99)+(3+98)+\ldots+(50+51) = 50\cdot 101$, to the astonishment of the teacher), but even at three he corrects his father when he is doing a faulty calculation. After the episode with the sum, Gauss's teacher tells his assistant, Martin Bartels, who was responsible for cutting and sharpening the goose quills the children wrote with, to introduce Gauss to more difficult mathematics. Bartels was himself fascinated by mathematics and played an important role in the education of Gauss. In 1788 Gauss meets the Duke of Braunschweig who will be his patron and sponsor for most of his life.

Part II, The Dukes Protégé (1788-1798). At 15, while still in High School, Gauss discovered the Prime Number Theorem, and apparently formulated the method of least squares while doing so. That same year, he began studying at the Collegium Carolinum, with Professor Zimmerman, but it soon became obvious that he already knew all the mathematics that were taught at the Collegium. In 1795 he entered the University of Göttingen, where he befriended Wolfgang Bolyai (father of Janos). In 1796 he proved that the regular 17-gon is constructible by ruler and compasses, a fact that definitively marked him as a mathematician.

Part III, Gifted Astronomer, Father of a Young Family (1798-1814). In 1798 Gauss returned to Braunschweig, where in 1801 he published his Disquisitiones Arithmeticae. He made himself famous as an astronomer by calculating the orbit of the newly discovered planetoid Ceres. In 1805 he married Johanna Osthoff, who bore him three children, but who died in 1809 after giving birth to the third child Louis (Gauss named his children after famous astronomers, Louis after Carl Ludwig Harding) who did not survive her for long.


Ritmüller's portrait of Gauss on the terrace of the observatory

Gauss became director of the observatory at Göttingen and was forced to return there. In 1810 he married Minna Waldeck. They had three children of their own, the youngest one was Therese who took care of Gauss in his later life (Minna died in 1831).

Part IV, Surveyor of Hannover, Father of a Growing Family (1815-1832). During these years Gauss occupied himself with geodesy, and he became involved in a major mapping project. These were the years that he worked on non-euclidean geometry.

Part V, Magnetic Professor, Prince of Mathematics (1833-1855). Having written a paper on the magnetic forces within the earth, Gauss constructed a magnetic laboratory at Göttingen, which was used to measure magnetic forces. Together with Wilhelm Weber he established a Magnetic society for the propagation of information on magnetism. Hence the title of this part of the book. The two of them also built the first telegraphy system. Gauss died in his sleep in 1855.

In her book Margaret Tent places Gauss amidst his family, and although he may have been egocentric and obsessed by mathematics, in the picture we get of him he appears very human. Many of the stories told in his book are about his children, his mother, his friends, things we normally don't know anything about. This makes the book worth reading. As a novel? Or as a biography? It is not clear which of the stories that are told really happened. But don't worry about that. Read the book, it is worth your while. And you can finish it in 2 à 3 hours time.

[**1**] see the review in a previous Newsletter

[**2**] `http://www.kennislink.nl/web/show?id=146679`

Paul Levrie

Call for Nominations of Candidates for Ten EMS Prizes
Fifth European Congress of Mathematics

Principal Guidelines

Any European mathematician who has not reached his/her 35th birthday on 30 June 2008, and who has not previously received the prize, is eligible for an EMS Prize at 5ecm. A total of 10 prizes will be awarded. The maximum age may be increased by up to three years in the case of an individual with a 'broken carreer pattern'.
Mathematicians are defined to be 'European' if they are of European nationality or their normal place of work is within Europe. 'Europe' is defined to be the union of any country or part of a country which is geographically within Europe or that has a corporate member of the EMS based in that country. Prizes are to be awarded for work published before 31 December 2007.

Nominations of the Award

The Prize Committee is responsible for solicitation and evaluation of nominations. Nominations can be made by anyone, including members of the Prize Committee and candidates themselves. It is the responsibility of the nominator to provide all relevant information to the Prize Committee, including a résumé and documentation. The nomination for each award must be accompanied by a written justification and a citation of about 100 words that can be read at the award ceremony.
The prizes cannot be shared.

Description of the Award

The award comprises a certificate including the citation and a cash prize of 5000 euro.

Award Presentation

The prizes will be presented at the Fifth European Congress of Mathematics by the President of the European Mathematical Society. The recipients will be invited to present their work at the congress. (see www.5ecm.nl)

Prize Fund

The money for the Prize Fund is offered by the Foundation Compositio Mathematica.

Deadline for Submission

Nominations for the prize must reach the chairman of the Prize Committee at the following address, not later than 1 November 2007:
5ECM Prize Committee, Prof. R. Tijdeman, Mathematical Institute,
Leiden University, Postbus 9512, 2300 RA Leiden, The Netherlands.

e-mail: tijdeman@math.leidenuniv.nl
fax: +31715277101, phone: +31715277138

FERMAT PRIZE FOR MATHEMATICS RESEARCH

UNIVERSITÉ PAUL SABATIER

2007 AWARD

The FERMAT PRIZE rewards research works in fields where the contributions of Pierre de FERMAT have been decisive :

*** Statements of Variational Principles**
*** Foundations of Probability and Analytical Geometry**
*** Number theory.**

The spirit of the prize is focused on rewarding the results of researches accessible to the greatest number of professional mathematicians within these fields.

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Rules governing the award, candidacy formalities, etc. are available from the organising secretariat of the Fermat prize:

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Closing date for application forms : **30 June 2007**.

Weighted uniform consistency of kernel density estimators with general bandwidth sequences

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MSC: 60B12, 60F, 62G07

Section 13
Poster n° 792

1. Introduction

Let $*$ $X_1, X_2, \dots$ be d-dimensional and i.i.d random vectors with common density f,

$*$ $K : \mathbb{R}^d \to \mathbb{R}$ be a measurable and bounded *kernel*, i.e $\int K(s)ds = 1$ and $\|K\|_\infty =: \kappa < \infty$,

$*$ $f_{n,h}(t)$ be the ***kernel density estimator*** for $f(t)$ based on the sample $X_1, \dots, X_n$ and bandwidth $0 < h < 1$, i.e

$$f_{n,h}(t) := \frac{1}{nh}\sum_{i=1}^{n} K\left(\frac{t - X_i}{h^{1/d}}\right), \quad t \in \mathbb{R}^d.$$

!!! The choice of h is crucial for the consistency, and it should be chosen dependent on the data !!!

$\hookrightarrow$ if $h_n \searrow 0$ and $\frac{nh_n}{\log\log n} \to \infty$, we get a ***strongly consistent*** estimator of f, i.e $f_{n,h_n}(t) \xrightarrow{a.s} f(t)$.

When do we have $\|f_{n,h} - f\|_\infty \longrightarrow 0$ and at which rate?

2. Known consistency results

Uniform consistency

E. Giné and A. Guillou (2002)

For a bandwidth $h_n \searrow 0$ satisfying $\frac{nh_n}{\log n} \to \infty$ and $\frac{|\log h_n|}{\log\log n} \to \infty$, we have

$$\|f_{n,h_n} - \mathbb{E}f_{n,h_n}\|_\infty = O\left(\sqrt{\frac{|\log h_n|}{nh_n}}\right).$$

Uniform in bandwidth consistency

U. Einmahl and D. M. Mason (2005)

If f is bounded, we have with probability one,

$$\limsup_{n\to\infty} \sup_{\frac{c\log n}{n} \le h \le 1} \frac{\sqrt{nh}\|f_{n,h} - \mathbb{E}f_{n,h}\|_\infty}{\sqrt{|\log h| \vee \log\log n}} < \infty.$$

$\hookrightarrow$ *the consistency rate of a kernel density estimator based on either a statistical or deterministic bandwidth remains the same!*

Weighted uniform consistency

E. Giné, V. Koltchinskii and J. Zinn (2004)

Under some extra assumptions on f, we can infer that

$$\limsup_{n\to\infty} \sqrt{\frac{nh_n}{|\log h_n|}}\|\psi(f_{n,h_n} - \mathbb{E}f_{n,h_n})\|_\infty < \infty,$$

where $\psi : \mathbb{R}^d \to \mathbb{R}$ is an unbounded weight function satisfying among other properties $\|\psi f^\beta\|_\infty < \infty$ for some $0 < \beta < 1/2$, and where h_n is chosen to be $h_n = n^{-\alpha}L(n)$ for some $0 < \alpha < 1$ and slowly varying function L.

3. New consistency results

What about weighted uniform in bandwidth consistency?

Assume f to be continuous and bounded, and for *regularly varying* functions $a_n < b_n \to 0$, consider

$$\Delta_n := \sup_{a_n \le h \le b_n} \sqrt{\frac{nh}{|\log h|}}\,\|\psi(f_{n,h} - \mathbb{E}f_{n,h})\|_\infty, \quad n \ge 1.$$

Then under assumptions similar to those in the weighted uniform consistency case (GKZ, 2004), we can infer:

Theorem 1 (Stochastic boundedness)

Δ_n is stochastically bounded

$$\Updownarrow$$

$$\limsup_{t\to\infty} t\mathbb{P}\left\{\psi(X) > \sqrt{ta_t|\log a_t|}\right\} < \infty.$$

Theorem 2 (Almost sure convergence)

$$\limsup_{n\to\infty} \Delta_n \le C < \infty, \quad a.s.$$

$$\Updownarrow$$

$$\int_1^\infty \mathbb{P}\left\{\psi(X) > \sqrt{ta_t|\log a_t|}\right\} dt < \infty$$

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Noetherian Semigroup Algebras and Maximal Orders(ss 2), I.Goffa,791,20M25

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Example

$(Z, +, .)$ is a commutative ring with a nice algebraic structure:

1. UFD.
2. Every ideal is principal (PID).

Example

The polynomial algebra $K[X_1, ..., X_n]$ is also commutative with structure:

1. UFD.
2. Not a PID (for $n \geq 2$), but Noetherian.

Known results of algebras that are Noetherian.

Group Algebras

G polycyclic-by-finite group:

- $K[G]$ Noetherian.
- ONLY groups known with this property.
- Conjecture studied in [1],[7].

Semigroup Algebras

Noetherian cases known:

- Abelian finitely generated monoids [3].
- Monoids of I-type, quadratic algebras and set-theoretic solutions of Yang-Baxter equation [5],[2].
- Some submonoids of polycyclic-by-finite groups, for example $K[x_1, x_2, x_3]$ with $x_1x_2 = x_2x_1, x_1x_3 = x_3x_2, x_2x_3 = x_3x_1$. [6].

AIM: Investigate Algebraic Structures

Problem: When is semigroup algebra prime Noetherian maximal order?

Definition: A prime algebra R is a maximal order if:

- $R \subseteq R' \subseteq Q_{cl}(R)$ and $r_1R', R'r_2 \subseteq R$ with r_i regular $\Rightarrow R = R'$.

Known results of algebras that are maximal orders.

Group Algebras

G torsion-free polycyclic-by-finite group
$\Rightarrow K[G]$ a Noetherian maximal order and a domain [1]

Semigroup Algebras

In [6] the authors proved when algebra of submonoid of torsion-free finitely generated abelian-by-finite group is a Noetherian maximal order and a prime PI domain.

Our Results

Semigroup Algebras of IG-type

We characterize when $K[S]$ Noeth maximal order and domain with $S = \{(a, \phi(a)) \mid a \in A, \phi(a) \in G\}$

Prime PI Semigroup Algebras

We characterize when $K[S]$ prime Noeth PI maximal order, generalization of the results in [6] to the non-torsion-free case.

By A we mean an abelian monoid, by G a finite group, so we generalize the notion of a monoid of I-type.[4]

Remark: Minimal primes of S crucial for structure $K[S] \Rightarrow$ Description of all height one primes of $K[S]$ intersecting S

Now+Future: Extend results to arbitrary subsemigroups of polycyclic-by-finite groups.

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