BELGIAN MATHEMATICAL SOCIETY

Comité National de Mathématique CNM

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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 93, May 15, 2013

Letter from the editor

Welcome to this May-edition of our Newsletter.
Next "regular" issue: September 15, 2013.
BUT a special one will be available before,
on the occasion of the PhD-day!!!

Regards, Françoise

Contents

1 News from the BMS & NCM

1.1 PhD-Day

The next

PhD-day of the BMS-NCM

will take place in Brussels (Academy) on

Monday September 09, 2013.

The WEBsite for this event is online: http://bms.ulb.ac.be/phdday/ and **registration is open**. You will find a poster at the end of this Newsletter.

1.2   Bulletin of the BMS - electronic version

We remind you that it is possible to convert your paper subscription to the Bulletin of the BMS into **the electronic version of the Bulletin.** *If you are interested, please contact Philippe Cara by e-mail* (pcara@vub.ac.be with bms@ulb.ac.be in cc) for details.

You will receive a special "subscriber code" with which you can register for the Bulletin of the Belgian Mathematical Society at Project Euclid (http://projecteuclid.org).

2   Meetings, Conferences, Lectures

2.1   May 2013

Chaire de la Vallée Poussin 2013

May 13-16, 2013
UCL

Professor **Yann Brenier** (Ecole Polytechnique) holds the "de la Vallée Poussin's chair" this year. He will give a series of lectures (May 13-16, 2013) around

"Convexité cachée en équations aux dérivées partielles non-linéaires"

2.2   June 2013

LLN Short course and workshop on
Homotpy theory, Categorification and Link Homology

June 6-7, 2013
UCL

The workshop aims in bringing together homotopy theorists and people working in categorification and Khovanov homology into a common ground in view of the recent developments on the interplay between these two subjects.

It will be held at the "Institut de Recherche en Mathématique et Physique" from the Université Catholique de Louvain, June 6-7, 2013 and will consist in a series of lectures aimed at graduate students in homotopy theory or link homology/categorification, followed by working and discussion sessions in the afternoon.

Speakers:
*Emmanuel Wagner (Univ. Bourgogne, France)
*Paul Turner (Univ. Geneva, Switzerland)

We may have some financial support for students. Interested students should apply to the organizer. For more details and registration please visit http://perso.uclouvain.be/pedro.vaz/LLNWorkshop.html

Thank you for forwarding this announcement to other people who might be interested.

We hope to see you here,
Best regards,

Pascal Lambrechts   Pedro Vaz

2.3   July 2013

Von Neumann Algebras and Measurable Group Theory

July 1-4, 2013
KU Leuven

From July 1 to July 4, 2013, the Department of Mathematics of KU Leuven organizes a conference on Von Neumann Algebras and Measurable Group Theory. The conference will take place at the Arenberg Castle near Leuven. All information including a registration form is available at http://wis.kuleuven.be/events/vnalg2013

<div align="center">

Variational methods and partial differential equations
on the occasion of Michel Willem's 60*th* **birthday**
July 11-12, 2013
Louvain-la-Neuve

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For more information: see the announcement at the end of this Newsletter.

2.4 September 2013

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Summer School on Category Theory and Algebraic Topology
September 12-14, 2013
UCL

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Cet événement est organisé par l'Université catholique de Louvain en collaboration avec l'Ecole Polytechnique Fédérale de Lausanne.

Les renseignements concernant l'organisation de la Summer School se trouvent à l'adresse
http://perso.uclouvain.be/tim.vanderlinden/ctat.html

See also the poster at the end of this Newsletter.

2.5 November 2013

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Analysis Meeting
on the occasion of the 60*th* **birthday of our colleague and friend**
Gilles Godefroy
Mons, November 4-5, 2013

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See the website at the address www.afo.ulg.ac.be/fb/meeting/gilles2013 and also the poster at the end of this Neswletter.

For more information:
Catherine Finet, UMons (catherine.finet@umons.ac.be)
Françoise Bastin, ULg (F.Bastin@ulg.ac.be)

3   PhD theses

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**Contributions to Recognizability: Self-generating Sets, Decidability,
Automaticity and Multidimensional Sets**

Anne Lacroix, University of Liège
14:00, May 28, 2013, Institute of Mathematics (B37)

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<u>Promotor:</u> M. Rigo, ULg

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<u>Summary</u>

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When we consider a numeration system, representing numbers allow us to pass from integers to words over finite alphabets and then, to transpose some questions from arithmetic to problems in formal language theory. In this context, regular languages, i.e., languages accepted by finite automata, are of particular interest. Finite automata are abstract machines only able to read words sequentially and to decide, in linear time according to the input, whether a word is accepted or not. In particular, they are interesting from the point of view of decidability, since many of their properties can be tested algorithmically, whereas these problems are generally undecidable for context-free languages. So if we want to take regular languages into account when we are interested in sets of numbers, it is natural to introduce the following notion. A set of integers is said to be recognizable for a given numeration system if the set of representations of its elements in this system is regular.

In this thesis, we study and answer several questions concerning recognizability of integer sets by finite automata. Each particular problem is the focus of a chapter.

First, we study the recognizability for integer base numeration systems of the so-called self-generating sets, initially introduced by C. Kimberling. These sets are defined by a set I of integers and a finite set F of affine

maps $\varphi_i : n \mapsto k_i n + \ell_i$. The set generated by I and F is the minimal subset X of $\mathbb{Z}$ containing I and such that $\varphi_i(X) \subseteq X$ for all i.

In the second chapter, we study the syntactic complexity of any ultimately periodic set and we use our results to give an alternative decision procedure for the following well-known decidability problem: *given an integer $k \geq 2$ and a deterministic finite automaton accepting the representations of elements of a set X in base k, decide whether the set X is ultimately periodic or not.*

Next, we give bounds on the automaticity of three different languages: the language of primitive words over a finite alphabet, the language of unbordered words over a finite alphabet and the language of representations of monic irreducible polynomials over a finite field. Automaticity is a measure of how close a non-regular language is to being regular.

Finally, we characterize the multidimensional sets that are recognizable in all abstract numeration systems. These numeration systems are given by a regular language L over the finite alphabet Σ and a total order over Σ. Then an integer n is represented by the $(n + 1)$-th word of the language L.

4   From EMS

4.1   Call for nominations or proposals

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**Call for nominations or proposals
of speakers and scientific events in 2014**

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The EMS has published the call for nominations or proposals of speakers and scientific events in 2014. Information on the calls and on the submission procedure is given at

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http://www.euro-math-soc.eu/node/3266

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Deadlines:
- For EMS Lecturer: May 31, 2013.
- For Joint Mathematical Weekends: August 31, 2013.
- For distinguished speakers: December 30, 2013.

4.2   Call for submission

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EMS Monograph Award: Call for submissions online

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On the occasion of its 10th anniversary the EMS Publishing House is pleased to announce the EMS Monograph Award. It is awarded every two years to the author(s) of a monograph in any area of mathematics that is judged by the selection committee to be an outstanding contribution to its field. The prize is endowed with 10.000 Euro, and the winning monograph is published by the EMS Publishing House in the series EMS Tracts in Mathematics.

Deadline for submission of manuscripts: June 30, 2013. Information:

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http://www.ems-ph.org/EMS_Monograph_Award.php

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5   Miscellaneous

5.1   Abel Prize 2013 to Pierre DELIGNE

Pierre Deligne will receive the 2013 Abel Prize from H.M. King Harald at an award ceremony in Oslo on May 21, 3013. For more information: http://www.abelprize.no/

Here is a short bibliography of Deligne
(part of the text on the pages at the address: http://www.abelprize.no/nyheter/vis.html?tid=57811):

Pierre Deligne was born in 1944 in Brussels, Belgium. He is Professor Emeritus in the School of Mathematics at the Institute for Advanced Study in Princeton, USA. Deligne came to Princeton in 1984 from Institut des Hautes Études Scientifiques (IHÉS) at Bures-sur-Yvette near Paris, France, where he was appointed its youngest ever permanent member in 1970.

Pierre Deligne is a research mathematician who has excelled in finding connections between various fields of mathematics. His research has led to several important discoveries. Deligne's best known achievement is his spectacular solution of the last and deepest of the Weil conjectures. This earned him both the Fields Medal (1978) and the Crafoord Prize (1988), the latter jointly with Alexandre Grothendieck.

Deligne's brilliant proof of the Weil conjecture made him famous in the mathematical world at an early age. This first achievement was followed by several others that demonstrate the extreme variety as well as the difficulty of the techniques involved and the inventiveness of the methods. He is best known for his work in algebraic geometry and number theory, but he has also made major contributions to several other domains of mathematics.

The Abel Committee says: "Deligne's powerful concepts, ideas, results and methods continue to influence the development of algebraic geometry, as well as mathematics as a whole".

5.2   From ULg

Faculté des Sciences, DER de Mathématique

Une charge à temps plein, indivisible, dans le domaine de la Statistique mathématique ou des Probabilités a été publiée au Moniteur belge en mai 2012. La date de clôture pour les candidatures est fixée au 21 juin 2013.

Tout renseignement complémentaire peut être obtenu auprès de la Faculté des Sciences (Mme Françoise Motte, +32 4 366 36 52, Francoise.Motte@ulg.ac.be).

Voir aussi à l'adresse http://www.ulg.ac.be/cms/$a_$16428/postes-academiques

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

THE BELGIAN MATHEMATICAL SOCIETY

Comité National de Mathématique   CNM

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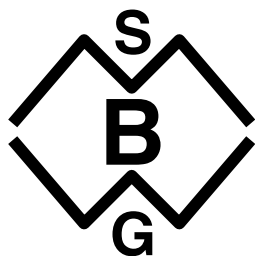
NCW   Nationaal Comite voor Wiskunde

Young mathematicians,
TELL US WHAT YOU ARE DOING !

The Belgian Mathematical Society invites you to its fourth

PhD-Day

on **Monday, 9 September 2013**

at the **The Royal Flemish Academy of Belgium
for Science and Arts**

(Paleis der Academiën – Hertogsstraat 1 – 1000 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 Godeaux Lecture
11h15 Coffee
11h45 Poster presentations
12h45 Lunch (free for BMS members)
14h15 Oral presentations
16h35 Poster presentations
17h25 Drink and award for best poster

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

`http://bms.ulb.ac.be/phdday`

Variational methods and partial differential equations
Louvain-la-Neuve, July 11-12, 2013

On the occasion of Michel Willem's 60th birthday

Confirmed speakers

Thomas BARTSCH (Gießen)

Silvia CINGOLANI (Bari)

Louis DUPAIGNE (Picardie)

Bernd KAWOHL (Köln)

Andrzej SZULKIN (Stockholm)

Susanna TERRACINI (Torino)

Zhi-Qiang WANG (Utah State)

Tobias WETH (Frankfurt)

Introductory minicourses for graduate students will be given on July 10, 2013.

Scientific and organizing comittee: T. Bartsch (Gießen), D. Bonheure, A. Gloria, J.-P. Gossez (Bruxelles), E. Lami Dozo (Bruxelles & Buenos Aires), J. Mawhin, A. Ponce, J. Van Schaftingen (Louvain-la-Neuve), D. Smets (Paris 6), C. Troestler (Mons).

http://sites.uclouvain.be/pde2013/

Summer School

Category Theory and Algebraic Topology

Louvain-la-Neuve
12–14 September 2013

Kathryn Hess Bellwald (EPFL)
Hopf-Galois theory and descent

Pascal Lambrechts (UCL)
Introduction to Goodwillie-Weiss manifold calculus

Gavin Seal (EPFL)
Lax algebras

uclouvain.be/math-ctat

École Polytechnique Fédérale de Lausanne
Université catholique de Louvain
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UCL
Université catholique de Louvain

EPFL
ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

BRMP

On the occasion of the 60th birthday of our colleague and friend GILLES GODEFROY

ANALYSIS MEETING
at the
UNIVERSITY OF MONS

November 4-5, 2013

Plenary speakers

M. CEPEDELLO   G. LANCIEN   H. PFITZNER

R. DEVILLE   D. LI   H. QUEFFELEC

S. GRIVAUX   S. NEUWIRTH

Organizing committee

F. BASTIN   C. FINET
L. SIMONS   C. ESSER

www.afo.ulg.ac.be/fb/meeting/gilles2013/

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Société Royale des Sciences de Liège

UPMC
SORBONNE UNIVERSITÉS

UMONS
Université de Mons

Université de Liège

Imagine Math, between culture and mathematics *Michelle Emmer (ed.)* Springer Verlag, 2012 (vii+289 p.), hard cover, ISBN 978-88-470-2426-7, €64.15
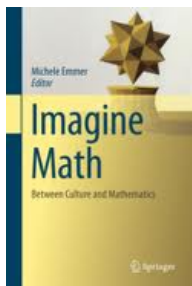
Michele Emmer

This is another book, edited by Michele Emmer that has all the characteristics of the books appearing in the *Mathematics and Culture* series[1]. Also here there is a plethora of subjects written by different authors ranging from mathematicians to musicians and all kinds in between. Style and subjects of the contributions vary with the authors. They all link up with mathematics on one hand and on the other with history, different kinds of art (music, literature, architecture, film,...), science, medicine, economics etc. Let me illustrate this with a number of examples.

A first chapter is a tribute to *Benoît Mandelbrot* with many quotes linking fractals with art. The next is about the restoration of the *Teatro Le Fenice* in Venice (destroyed by fire in 1996 - what's in a name) and the use of computer models. This brings us to an homage to *Andrea Pozzo*, a Baroque artist famous for his use of geometry and perspective in his frescos. Near the end of the book there is another homage to *Lucia Pacioli* who was also a pioneer in the use of perspective. The *trompe l'oeil* paintings on walls creating the illusion of a long gallery, or the painting on dome ceilings or paintings creating the illusion of a dome require great skill and mathematical exactness. You may also notice how an artist struggles with composition and perspective. While composition is all about ratios for example in the frame of a painting, this may contradict the laws of perspective, so that sometimes the result is a mixture of both.

Pozzo's brilliant trompe-l'oeil dome at Sant'Ignazio (1685)

From left to right: Hypatia of Alexandia, Emily du Châtelet, Maria Gaetana Agnesi, Sophie Germaine, Mary Fairfax Sommerville, Sonya Kovalevsky, and Emmy Noether.
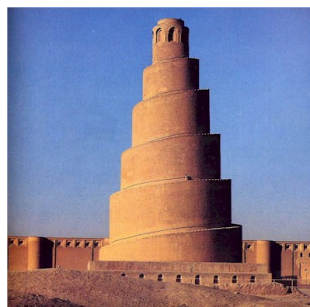
There are several contributions devoted to women in mathematics. Hypatia lived in Alexandria in the 4th century and was the first known woman to contribute to mathematics. She was brutally murdered for some obscure reasons, probably religious or political. There have been many other women in the course of history that contributed to the progress of mathematics. Emily du Châtelet (°1706, Paris) was a lover of Voltaire and translated Newton's work[2]. Maria Gaetana Agnesi (°1718, Milan) is known for the 'witch of Agnesi', a plane curve that she studied. She called it *verseria* (turning curve) but it was misunderstood as *avversiera* (wife of the devil). Hence the weird translation. Sophie Germaine (°1776, Paris), being a women she was denied admission to the *École Polytechnique*, but she studied mathematics on her own. She made for example a substantial contribution towards the solution of *Fermat's last theorem*. She was on the same level as Cauchy, Ampère, Navier, Poisson and Fourier, and considered to be the founder of mathematical physics, but probably less known just because she was a woman. In fact the official refused to

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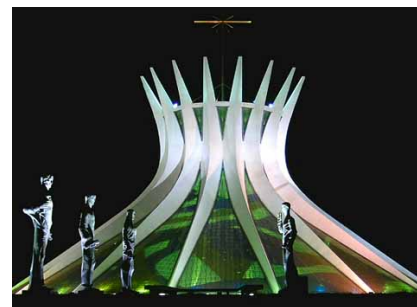[1]See reviews in this Newsletter issue 50 (November 2004) and 56 (January 2006).

[2]See review of Voltaire's riddle in this Newsletter issue 85 (December 2011).

write 'mathematician' on her death certificate and wrote 'property owner' instead. Mary Fairfax Sommerville (°1780, Jedburgh, Scotland) solved a problem about Diophantine equations and wrote several books about celestial mechanics, physical geography, and chemistry. She died at the age of 92. Sonya Kovalevsky (°1850, Moscow) writer of fiction and non-fiction, and Emmy Noether (°1882, Erlangen) founder of modern algebra, are probably more familiar names. Some thoughts about the current situation of women in mathematics are added.

In the collection of papers under the title 'mathematics and art' authors consider different aspects like the use of geometrical curves (spiral, helicoids) and surfaces (hyperboliods) in architecture or the role of mathematics in art throughout the past and how these mathematical rules also appear in nature. Also literature can be analyzed using mathematical structures and statistical analysis, but conversely, a set of generating rules may

Spiral Minaret in
Samarra Iraq 847 to 851

Cathedral of Brasília
by Oscar Niemeyer (1958)

also construct an artificial language. An analysis is given of the 'inescapable labyrinth' that *Jorge Luis Borges* created with mathematical precision in his story 'The library of Babel'.
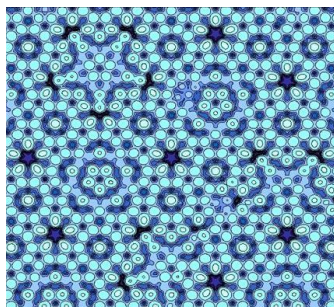

US Seal

quasi crystal

Plimpton 322 tablet

Under the part 'applications' we find essays about Lorentz knots, the statistics of words, leading numbers, games, aperiodic tilings (birth of quasi crystals). A brief numerologic analysis of the US Seal shows that the number 13 (there were originally 13 states) is omnipresent. *E Pluribus Unum* has 13 letters, there are 13 stars and 13 bumps in the circle above, the olive branch has 13 leaves and there are 13 arrows on the other side and 13 stripes in the shield. A contribution about a numerical model used for connecting artificial parts to the aorta falls under 'medical application'. Other links are found between differential equations and origami. The folding of the paper is considered to be a continuous map $f : \mathbb{R}^2 \to \mathbb{R}^3$, which can be analyzed by mathematical tools. A study of the number system of Mesopotamia is of historical nature. It is argued that the Mesopotamian period of about 3000 years is too long to consider the Babylonian mathematical system (tablet Pimpleton 233) as the sole representative of that period. Furthermore, there is not only a stage play about Hypatia (*Hypatia's Dream* by Massimo Vicenzi, 2009), but there are also films about or inspired by mathematics (like *Le Ruban de Moebius* by Edouard Blondeau[3]). It is also interesting to see how in the course of history the casting of characters playing the role of a mathematician in a movie has evolved (from Brigitte Bardot to Angelina Jolie). A final chapter is about the graphical representation of hidden rules that are used in music: visual art produced from music.

The book is about mathematics, but the formulas are only sporadically used. Theorems and proofs are fully absent. The texts are often written by non-mathematicians. Hence it is easily accessible for anyone having a general interested in mathematics and the interaction with many other aspects of science, society, and knowledge which are not the obvious engineering applications. The nice thing about it is that the interaction often goes both ways.   Adhemar Bultheel

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[3]Short film: 9'29 (2011). A French spoken version can be found on Youtube.