

BELGIAN MATHEMATICAL
SOCIETY

Comité National de Mathématique CNM

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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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*Letter from the editor**Welcome*

to the January 15, 2009- Issue of our Newsletter

Best wishes for this New Year!!

Regards, Françoise

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1 News from the BMS

Please find all the information (leaflet) at the end of this Newsletter for

the renewal of you membership to our society!

A bank document should also be available in this envelop.

Many thanks for your support

2 Meetings, Conferences, Lectures

2.1 June 2009

FNRS Functional Analysis Group

June 4-5, 2009, Esneux (domaine du Rond-Chêne)

This is the first announcement. More informations will be available in next Newsletters.
Contact: F.Bastin@ulg.ac.be

ULg, June 2009

- 1-5 June 2009 : **CANT'09, International school on Combinatorics, Automata and Number Theory**

<http://www.cant.ulg.ac.be/cant2009/index.html>

- 8-12 June 2009 : **International Conference, AutoMathA : from Mathematics to Applications.**

<http://www.cant.ulg.ac.be/automatha/index.html>

2.2 July 2009

26th Journées Arithmétiques

July 6-10, 2009 in Saint-Etienne, France

See the page

<http://ja2009.univ-st-etienne.fr/>

Early registration: February, 1, to April, 30, 2009

Plenary Speakers:

Matthew Baker (Georgia Institute of Technology, Atlanta)
Laurent Berger (École Normale Supérieure de Lyon)
Yann Bugeaud (Université de Strasbourg)
Alain Connes (Collège de France, Paris)
Jean-Marie De Koninck (Université Laval, Québec)
Manfred Einsiedler (Ohio State University, Columbus)
Jerzy Kaczorowski (Adam Mickiewicz University, Poznan)
Laurent Lafforgue (Institut des Hautes Études Scientifiques, Paris)
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Michael Stoll (Universität Bayreuth)
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Katia Consani, (Johns Hopkins, USA)
Pierre Liardet, (Université de Provence, France) [Chair]
Richard Pink, (ETH Zürich, Suisse)
Paula Tretkoff (née Cohen), (Texas A&M, USA)
Jerzy Urbanowicz, (IMPAN, Pologne)
Gerard Van der Geer, (Université d'Amsterdam, Hollande)

Organizing Committee:

D. Essouabri, F. Foucault, G. Grekos, F. Hennecart, F. Pellarin, O. Robert

Email: ja2009@univ-st-etienne.fr

2.3 September 2009

**Workshop in Nonlinear Elliptic PDEs,
a celebration of Jean-Pierre Gossez's 65th birthday,
September 2, 3 and 4 2009**

The meeting will take place at the Université Libre de Bruxelles in the Amphitheater Solvay from Wednesday morning to Friday noon.

Please visit the website of the workshop at <http://wnpde09.ulb.ac.be>

Mail address of the workshop : WNPDE09 - ULB CP214 - Boulevard du Triomphe, 1050 Bruxelles - Belgium

3 Summary of PhD theses

Orthogonal rational functions: quadrature, recurrence and rational Krylov

Karl Deckers (K.U.Leuven)

February 4, 2009, 2 pm, Arenberg Castle, Heverlee

Advisor: A. Bultheel

Abstract

Orthogonal rational functions (ORFs) with prescribed poles are a natural generalization of orthogonal polynomials. Many results have already been generalized to the rational case. However, there are less cases in which explicit expressions are known for the ORFs. Moreover, the theory of orthogonality on a subset of the real line has so far been restricted to the case of rational functions with all real poles.

In the first part of this thesis, we derive new explicit expressions for ORFs and extend existing expressions to the case of arbitrary complex poles. We then use these expressions to obtain equations for the nodes and weights in rational quadrature formulas associated with the Chebyshev weight functions on the unit circle and on the interval.

In the second part, we generalize the three-term recurrence for ORFs on a subset of the real line to the case of arbitrary complex poles, and give a Favard-type theorem for rational functions generated by such a three-term recurrence. As an application, we study associated rational functions based on the three-term recurrence with shifted recurrence coefficients. Next, we prove a relation between ORFs on the unit circle and on the interval. To conclude this part, we then use this relation to study different types of convergence, and to derive asymptotic formulas for the recurrence coefficients, for ORFs on the interval.

Finally, in the last part of this thesis we study the relation between ORFs and the rational Lanczos method for Hermitian matrices.

4 Miscellaneous

4.1 Francqui Chair

International Francqui Chair for Erik Demaine

Erik D. Demaine (born February 28, 1981, in Halifax, Nova Scotia), is an associate professor of Computer Science at the Massachusetts Institute of Technology.

His childhood was spent traveling North America with his father, Martin Demaine, an artist and sculptor; he was home-schooled. Erik entered Dalhousie University at the age of 12, and completed his bachelor's degree when only 14.

His Ph.D. dissertation, a seminal work in the field of computational origami, was completed at the University of Waterloo. This work was awarded the Governor General's Gold Medal from the University of Waterloo and the NSERC Doctoral Prize, 2003, for the best Ph.D. thesis and research in Canada (one of four awards).

More recently, he has been awarded a MacArthur Fellowship. He joined the MIT faculty in 2001, at age 20, reportedly the youngest professor in the history of the Massachusetts Institute of Technology where he is a member of the Theory of Computation group in the Computer Science and Artificial Intelligence Laboratory.

Demaine has published more than 150 papers and was an invited speaker at numerous conferences. More details can be found on his excellent website at <http://erikdemaine.org/>

Professor Demaine was awarded a 2007–2008 International Francqui Chair by the Francqui Foundation (<http://www.francquifoundation.be>).

He will give a series of lectures:

- 19/11, 16h: Inaugural lecture ULB *Mathematics meets Art, Puzzles, and Magic: Fun with Algorithms*
- 2/12, 16h: UCL *(Theoretical) Computer Science is Everywhere*
- 19/2, 16h: VUB *Origami, Linkages, and Polyhedra: Geometric Folding Algorithms*
- 5/3, 16h: Gembloux *Linkage Folding: From Erdős to Proteins*

For abstracts and details, see <http://www.ulb.ac.be/di/francqui2008/> or contact Philippe Cara (pcara@vub.ac.be)

There will also be two workshops:

- Folding workshop: March 19–21, ULB item Khipu workshop: April 23–24, UCL

To participate, please contact Philippe Cara (pcara@vub.ac.be)

4.2 From EMS

European Mathematical Society - New web site - Job offers

The European Mathematical Society is developing a new web site, with address

<http://www.euro-math-soc.eu/>

Note in particular that an important feature will be a list of positions open in mathematics in Europe.

4.3 From VUB

Here are some news from the VUB (more info: pcara@vub.ac.be):

- Prof. **I. Daubechies** (Princeton) will visit the VUB from **12 to 19 February 2009**
- Thursday

February 19th, 2009 at 16h00

International Francqui Chair Lecture by Erik Demaine (MIT):

“Origami, Linkages, and Polyhedra: Geometric Folding Algorithms”

Vrije Universiteit Brussel, campus Etterbeek, Auditorium Qd

More info at <http://www.ulb.ac.be/di/francqui2008/>

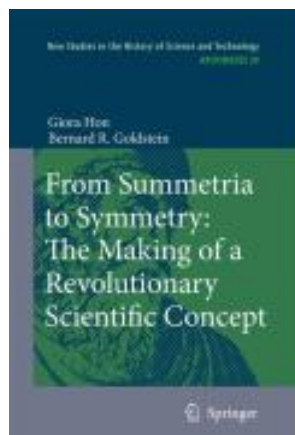
Erik Demaine entered university at 12 and was appointed assistant professor at MIT at the record age of 21. He is interested in all kinds of both deep and entertaining research topics, including the algorithmic complexity of games, the theory of origami, protein folding, algorithmic foundations of robotics, graph theory, and many other things. He has hundreds of coauthors around the world.

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

03/03/2009... square root day!

See http://en.wikipedia.org/wiki/Square_root_day

From *Summetria* to Symmetry: The making of a revolutionary scientific concept Giora Hon and Bernard R. Goldstein. Archimedes: new studies in the history of science and technology Springer, 2008 (xvi+335) hard cover, ISBN 978-1-4020-8447-8.



The authors of this book present a somewhat controversial and surprising claim: The modern (mathematical) notion of symmetry was not known to men until 1794 when Adrien-Marie Legendre defined an equality of solid angles by symmetry. From his *Éléments de géométrie*, the quote is

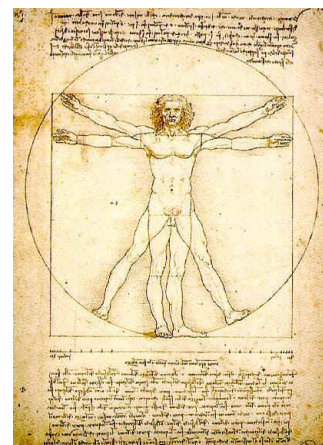
Two equal solid angles which are formed (by the same plane angles) but in reverse order will be called *angles equal by symmetry*, or simply *symmetrical angles*.

It seems hard to believe that in the long history of science and art, this notion of symmetry did not exist. The authors claim that the concept of symmetry is not innate to the human nature. Otherwise, it would appear in the (scientific) literature of all ages, and that, they prove in this book, is not the case. Not all authors agree with them. So, the statement of their claim and the problem with opposing statements is formulated in the first chapter. Before Legendre, the word symmetry with our present scientific meaning is not used, while after Legendre, it is omnipresent. If Legendre had used another word, we would probably be using that word for what we now call symmetry. The mathematical concept of symmetry was not intrinsic in the use of that word before Legendre, otherwise, Euler and Kant for example who were very close to a definition or tried very hard to define it, would have succeeded in giving a precise formulation, but they never did.

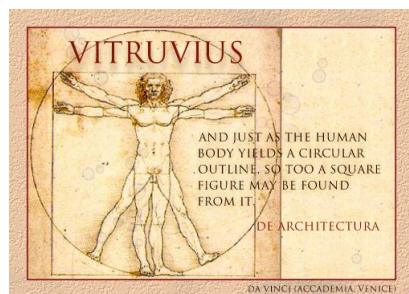
Symmetry in its current meaning refers to a mathematical entity which is invariant under certain classes of transformations. These classes of transformations relates symmetry to group theory. But that came only later with Galois. It is essential to realize that symmetry is a mathematical, and not an aesthetical concept.

Of course the word symmetry (or the old Greek *summetria*) does appear in many texts. So what is then the meaning of this word, if not corresponding to our modern mathematical concept? And what should be said about a prominent presence of symmetry in our material world (architecture, human body,...)?

With many citations of the original texts, the authors prove that symmetry before Legendre was mostly used as a general etymological category. For example for the Greek (Plato, Euclid, Achimedes), *summetria* meant something like “proportional”. The Euclidian algorithm is formulated in terms of lengths of an interval that are commensurable. Asymmetry thus meant something like “relative prime”. Computing the greatest common divisor of two integers is how the Euclidean algorithm is known to most of us. Archimedes, was most interested in “equilibrium”, but he never linked this with symmetry.



Vitruvius man



Of course Vitruvius (1st century BC) is the first candidate to be linked to symmetry. Everybody knows the Vitruvius man, redrawn by many others, among which Da Vinci. The work of Vitruvius has been dominantly influential on aesthetics and especially on architecture till the 18th century. The ancient notion of symmetry explained above, survived, and the medieval translations of Euclid’s *Elements* used the Latin “commensurable” to translate the Greek *summetria*.

Symmetry was not as such an important concept in mathematical writings, but it played an essential role in many texts about aesthetics. There it had the meaning of “well proportioned” and was associated with “beautiful” or “good”. That became quite clear in Vitruvius’s *De architectura*.

Symmetry refers to the fact that all parts of a building, the human body, or even a machine should all be in proper “proportion”. Symmetry properties in architecture and in the human body can also be understood as “correspondence between left and right”, but it never referred to a specific part. It was a global property of the body or the temple as a whole. This notion persisted. Dürer (1471-1528) e.g. writes his *Vier Bücher von menschlicher Proportion*.

In another chapter, the authors switch to Italian and French architecture, where they explain that the most common translation of symmetry shifts from “proportion” to “correspondence”. There is a “correspondence” between different parts of a building and the building as a whole, in which we recognise vaguely the meaning of proportional and of commensurable. The first to use “corresponding” in this context was Leon Battista Alberti



Claude Perrault



The Louvre in Paris by C. Perrault

(1404-1472). Later Sebastiano Serlio (1475-1554) uses both: proportion (as in Vitruvius) and correspondence (as in Alberti) and links both. The same type of shift can be observed in the French texts about architecture.

The most significant publication in this respect is the translation of Vitruvius's *De architecture* by Claude Perrault (1613-1688). This contains the foundations of Renaissance with its strict symmetric architecture. Perrault also uses correspondence (*rapport*) to indicate that windows on the left should correspond to windows on the right, the same number and at the same distance, but the symmetry of the windows themselves is not required.

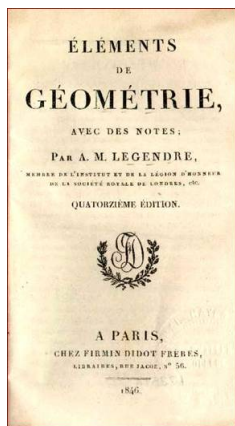
Denis Diderot (1713-1784) in his *Encyclopédie*, includes a definition of symmetry to mean commensurable, and in an essay of 1751 about architecture and painting, it is clear that he mixes the old Vitruvian meaning and the meaning of Perrault in the sense of a symmetry with respect to a vertical line.

The astronomers of the early modern times: Copernicus (1473-1543) and Galileo (1564-1642), use the word symmetry in traditional Vitruvian sense while Kepler (1571-1630) and Leibniz (1646-1716) hardly use the word. These astronomers were strongly involved with the concept “harmony” and although there is a strong relation with symmetry, the authors of this book keep strictly to their histographical paradigm (only the use of the word symmetry is important) and consider these two concepts as definitely distinct.



Adrien-Marie Legendre

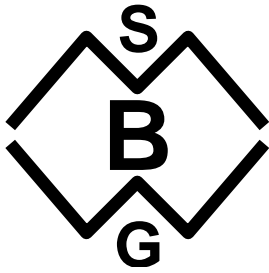
In natural history of the period 1738-1815, symmetry was only used as a tool for taxonomy and not elaborated as a concept. In botany, the terms was hardly used, “regular” was more common. In crystallography Haüy considered the symmetry of a crystal as a global property, although he was the first to define axes of symmetry.



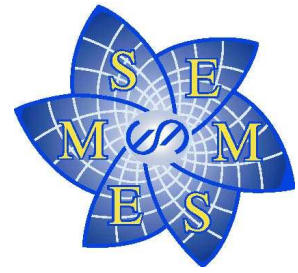
Much closer to a definition came Euler (1707-1783) and Kant (1724-1604). Euler was interested in his practical problem (the dual representation of celestial constellations), and did not consider it in a more abstract setting. Kant attempted to undermine Leibniz's theory in favor of Newton's by proving that absolute space has a reality of its own. In his demonstration he comes very close to a definition when he considers the forming of a mirror image, but he calls this image the “incongruent counterpart”. However from his further writings, the authors conclude that this concept is for Kant different from what symmetry is to us. Kant eventually failed in his attempt and later moves to metaphysical arguments.

Finally, it is Legendre in his study of three-dimensional geometry, who formulates the definition of symmetrical angles given above. It was actually a problem in Euclid's *Elements* concerning solid angles, brought up by Robert Simson (1687-1768) that brought Legendre to this statement. He was the first to define equality (of solid angles) even though the two bodies can not be superimposed. The step to symmetry in polyhedra and the further development of our modern concept of symmetry was then just a matter of time.

Quite different from Legendre's use in geometry, was the use of symmetry in probability by Laplace and in algebra by Lacroix. Cauchy used the word in geometry and algebra, but did not link the two concepts. Also in physics the term appears and was used by many. However, it had different meanings in different contexts, some of which linked up with older interpretations. The use of the word symmetry in the early 19th century was sometimes confusing and it took a while before group theory entered the arena and brought some structure.



**Belgian
Mathematical
Society**



**European
Mathematical
Society**

Be a member of the
Belgian Mathematical Society (BMS)
and of the
European Mathematical Society (EMS)

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You will receive five times a year ***BMS-NCM NEWS***, the Newsletter of the ***BMS*** and of the National Committee for Mathematics (***NCM***), containing information on what's going on in mathematics in Belgium.

You will receive the "**Bulletin of the *BMS* - Simon Stevin**", a periodical containing peer reviewed papers as well as book reviews.

You will benefit from reciprocity agreements with the AMS, DMV, LMS, RSME, SMF, SBPMef, VVWL and WG.

As a member of the *EMS*

You will receive a Newsletter of high interest containing papers, interviews, European meeting announcements, book reviews, . . .

You will benefit from a discount on the "**Journal of the *EMS***".

As a member of the *BMS* and the *EMS*

You are taking part in the mathematical life in Belgium and in Europe.

You give the two Societies the possibility to develop their actions: organizing meetings and lobbying with the authorities.

You provide more strength to the two Societies, enabling them to promote mathematics and its financing.

The *BMS* and the *EMS* help you

The ***BMS*** has conceived and promoted the on line access to the **Zentralblatt** in the Belgian Universities.

The ***EMS*** seeks to promote mathematics in the program of the European Union.

Activities of the *BMS* and of the *EMS*

The *BMS* has been active in organizing international congresses. **2001** Liège: joint DMV-*BMS* meeting. **2003** Brussels: conference on Mathematics and Genomics. **2004** Tilburg: joint conference with the Dutch Mathematical Society. **2005** Gent: joint meeting with SMF and the three BeNeLux Societies. **2005, 2007, 2010** Brussels: Ph.D. day. October 15, 2008 symposium “The mathematics of ranking” (Royal Academy), December 4–5, **2009** Leuven: joint meeting with the London Mathematical Society.

The *BMS* and the National Committee for Mathematics has published official standpoints in the BaMa discussion and in the use of the Science Citation Index and Impact Factors for the evaluation of mathematicians. This has been approved by the *EMS*.

The activities of the *EMS* are numerous and of high quality with the organization of the European Congress of Mathematics (ECM) every four years (Paris in 1992; Budapest in 1996; Barcelona in 2000, Stockholm in 2004, Amsterdam in 2008, 6th ECM, Krakow, July 2–7, 2012), with the Forum Mathématique Diderot, with the publication of the *Journal of the EMS*. The *EMS* as also created its own publishing house and offers a large and well-maintained collection of non-commercial journals and books on *EMIS*, the European Mathematics Information Service (www.emis.de).

Committee of the *BMS* Stef Caenepeel (VUB) (president)

Françoise Bastin (ULg) (vice-president, editor of BMS-NCM NEWS)

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Frédéric Bourgeois (ULB)

Further information on the *BMS* and on the *EMS*:

<http://bms.ulb.ac.be/> (*BMS*) and <http://www.euro-math-soc.eu> (*EMS*).

BMS and *EMS* membership dues for 2009

BMS membership:

EUR 20.00

BMS + *EMS* membership:

EUR 43.00

Note that the *EMS* membership fee of **EUR 23** is allowed only to persons belonging to an *EMS* corporate member society. The *EMS* individual membership fee is 60 EURO otherwise.

For details on memberships: <http://bms.ulb.ac.be/membership/reciproc.php>

Dues are to be paid on account number **000-0641030-54** (for EU members not residing in Belgium: IBAN BE42 0000 6410 3054; BIC BPOTBEB1)

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Payment by credit card (EUROCARD, MASTERCARD, VISA) is also accepted but *BMS* members residing in Belgium at the time of billing are invited not to use it .

Registration:

Use the Membership Application form below or **register on line** at <http://bms.ulb.ac.be/membership/appl-form.php>

The last year you have paid your membership dues can be found on the address label.

Membership Application/Renewal Form 2009

to be sent to
Belgian Mathematical Society
c/o Jan van Casteren
Campus Plaine, CP. 218/01
Bld. du Triomphe, B-1050 Brussels.

Name:
Address:
Postal code: City: Country:
E-mail:
Occupation: Place of Work :

Please tick the appropriate lines:
 I want to be an ordinary member of the **BMS** (EUR 20.00).
 I apply for a BMS reciprocity membership (EUR 18.00); I am a member of the
(see page 1 for the list of the reciprocating societies).

In addition to my BMS membership, I want to be a member of the EMS (add EUR 23.00).
 I do not agree that the Newsletter BMS-NCM News be sent to me by e-mail (as an attached .pdf file). Members are strongly advised to have the Newsletter sent by e-mail.

I do not agree that my affiliation and e-mail address are published.
affiliation:
address:
e-mail:

I do not agree that my affiliation and e-mail address are made available on the web site of the BMS.

I shall pay my dues, which in total amount to,...EURO on account number **000-0641030-54** of the BMS: (for EU members not residing in Belgium: IBAN BE42 0000 6410 3054; BIC BPOTBEB1)

Please charge my credit card to the amount of,...EURO
 VISA EUROCARD MasterCard

Card number:

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Expiration Date:

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Date: Cardholder's signature: