BELGIAN MATHEMATICAL SOCIETY

Comité National de Mathématique   CNM

C **W** M
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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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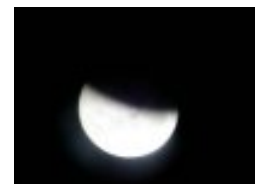Bld du Triomphe, B–1050 Brussels, Belgium

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BMS-NCM NEWS

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No 62, March 15, 2007

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Letter from the editor

Welcome

to this March15, 2007- Issue of our Newsletter!

Did you enjoy the "Moon Eclipse" during the first week-end of this month?

Regards, Françoise

Contents

1 News from the BMS

$\boxed{\textbf{\textit{Second Ph-D Day}}}$

Monday September 10, 2007–ULB

FIRST ANNOUNCEMENT . . . at the end of this Newsletter.

2 Meetings, Conferences, Lectures

2.1 March 2007

Bruno Ernst Symposium

Bruno Ernst (pseudoniem van Hans de Rijk, 1926) is de oprichter van de Volkssterrenwacht Simon Stevin, initiatiefnemer van de Nederlandse Zonnewijzerkring, oprichter van het natuurkundetijdschrift Archimedes en het wiskundetijdschrift Pythagoras. Om zijn verdiensten voor het onderwijs en de popularisatie van de wetenschap niet onopgemerkt voorbij te laten gaan is er op vrijdag 30 maart vanaf 13.00 uur een symposium in Leiden. Dit is met name bedoeld voor leraren wis- en natuurkunde, maar ook andere belangstellenden zijn welkom. Deelname en lunch (12.00 uur) zijn kosteloos, na aanmelding. Er is ruime gratis parkeergelegenheid aanwezig.

Website:

http://www.strw.leidenuniv.nl/cms/web/2007/20070330/info.php3?wsid=4

<div align="center">

2007 de la Vallée-Poussin Lectures
UCL

</div>

Professor **Ulrieke Tillman** (Oxford Univerrsity) will give a series of 5 lectures on the topology of moduli space in Louvain-La-Neuve (**26 to 28 March 2007**). The titles of the lectures will be

1. Introduction of moduli spaces and survey results
2. QFT and cobordism categories
3. The moduli operad
4. A proof of Mumford's conjecture
5. Beyond Mumford's conjecture

2.2   April 2007

<div align="center">

Linear Systems and Subschemes
April 11 - April 13, 2007
Ghent University, Belgium

</div>

Invited speakers:
Ciro Ciliberto, Lawrence Ein, Brian Harbourne, Andreas Knutsen, Antonio Laface, Emilia Mezzetti, Francesco Russo, Tomasz Szemberg, Fyodor Zak (to be confirmed).

Website: http://cage.ugent.be/linsyssub

Organizers: Luca Chiantini, Marc Coppens, Cindy De Volder, Jan Van Geel
Contact: cdv@cage.ugent.be

<div align="center">

43ste Nederlands Mathematisch Congres

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Op donderdag 12 en vrijdag 13 april 2007 wordt in het Gorlaeuscomplex in Leiden onder auspicien van het Koninklijk Wiskundig Genootschap het 43ste Nederlands Mathematisch Congres gehouden, gezamenlijk georganiseerd door de Universiteit Leiden en de Technische Universiteit Delft. Op dit congres zal o.a. de Ostrowskiprijs worden uitgereikt aan Green en Tao (winnaar Fieldsmedaille 2006). Voor het volledige programma en overige informatie zie
For more complete information, see at the address ***www.nmc2007.nl***

<div align="center">

Dynamics in Perturbations

on the occasion of the 60th birthday of Freddy Dumortier
Hasselt University
(23-25 april 2007, campus Diepenbeek), and KVAB (26-27 april 2007, Brussels)

</div>

Organizers:
Patrick Bonckaert, Magdalena Caubergh, Peter De Maesschalck, André Vanderbauwhede.

Subject:
recent trends in differentiable dynamical systems, in particular geometric, analytic and topological methods in pertubation and bifurcation theory of vector fields. Focus on: singular, Hamiltonian and other perturbations. Essentially the conference will emphasize on results in low dimensions.

Invited speakers include:
Jorge Sotomayor – Universidade de Sao Paulo
Floris Takens – RU Groningen
Carmen Chicone - University of Missouri-Columbia
Hiroshi Kokubu – Kyoto University
Jean-Pierre Francoise - Université P.-M. Curie, Paris VI
Chengzi Li – Beijing University
Christiane Rousseau – Universite de Montreal
Welington de Melo – IMPA, Rio de Janeiro

Henryk Zholadek – University of Warsaw
Douglas Shafer - University of North Carolina at Charlotte
Henk Broer – RU Groningen
Jaume Llibre - Universitat Autònoma de Barcelona
Robert Roussarie – Universite de Bourgogne, Dijon
Carles Simo – Universitat de Barcelona
Yulij Il'yashenko - Cornell University/MCCME Moscow

Homepage:
http://www.uhasselt.be/dysy/dynper/ Email: patrick.bonckaert@uhasselt.be

2.3   May 2007

Minicourse at UCL
The cobar construction: a modern perspective

Professor **Katryn Hess** (EPFL, Lausanne) will give a minicourse at Louvain-La-Neuve entitled The cobar construction: a modern perspective **(2 to 4 of May)**. The titles of the conferences are
1. The classical cobar construction
2. An operadic approach to the cobar construction
3. Application to multiplicative structures in equivariant cohomology
4. Application to homology algebras of double loop spaces

2.4   June 2007

Groupe de Contact FNRS
Analyse Fonctionnelle

FNRS Group– Functional Analysis–June 7-8, 2007

Following the tradition,

the FNRS group "Functional Analysis" will meet next June (Thursday 7, Friday 8).

The meeting will take place in the small town of

Esneux, in the "Domaine du Rond-Chêne"

The speakers are (alphabetical order):

- Jean-Marie AUBRY (U. Paris12-Créteil)

- Catherine FINET (U. Mons)

- David JORNET (U. Pol. Valencia)

- Thomas KALMES (U. Trier)

- Samuel NICOLAY (U. Liège)

- Aaron ZERHUSEN (U. Oldenburg)

For further information, please contact Françoise Bastin ULg (F.Bastin@ulg.ac.be)

2.5   July 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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POB 68 (Gustaf Hällströmink. 2b), FI-00014 University Helsinki, Finland
fax: +358-9-1915 1400

2.6   September 2007

The second PhD- day

organized by the BMS is scheduled on

Monday September 10, 2007.

It will take place at the ULB.

Young researchers (PhD students or young researchers with PhD) are kindly invited to present a communication. Please have a look at the pages of the society for more informations (http://bms.ulb.ac.be) or contact one of the members of the organizing committee:

F.Bastin (F.Bastin@ulg.ac.be)	A. Bultheel (Adhemar.Bultheel@cs.kuleuven.ac.be)
S. Caenepeel (scaenepe@vub.ac.be)	P. Cara (pcara@vub.ac.be)
E. Colebunders (evacoleb@vub.ac.be)	C. Finet (catherine.finet@umh.ac.be)
P. Godin (pgodin@ulb.ac.be)	H. Van Maldhegem (hvm@cage.rug.ac.be)

2.7   2008

8th German Open Conference on Probability and Statistics:
4-7 March 2008

The conference will be held in Aachen, Germany, 4-7 March 2008.

Continuing the series of Conferences in Marburg 1993, Freiberg 1996, München 1998, Hamburg 2000, Magdeburg 2002, Karlsruhe 2004, and Frankfurt 2006, which have become the major events in probability and statistics in Germany, the DMV-Fachgruppe Stochastik jointly with the RWTH Aachen University organizes the 8th German Open Conference on Probability and Statistics ("Aachener Stochastik-Tage 2008").

In the tradition of the previous conferences, it provides an international forum for presentation and discussion of new results in the area of probability and statistics. Participants from universities, business, administration, and industry are welcome.

Sections:

Stochastic Analysis; Limit Theorems and Large Deviations; Stochastic Geometry, Spatial Statistics, and Image Analysis; Random Discrete Structures and Analysis of Algorithms; Stochastic Processes: Theory and Applications; Time Series and Statistics of Stochastic Processes; Curve Estimation; Asymptotic Statistics; Stochastic Optimization and Operations Research; Data Analysis and Multivariate Statistics; Stochastic Models in Finance and Insurance; Statistical Methods in Finance and Insurance; Econometrics and Risk Analysis; Stochastic Models in the Natural Sciences; Statistics in Medicine and Biosciences; Stochastic Methods in Engineering

Plenary speakers will be:

N. Balakrishnan (McMaster University, Canada), Steven N. Evans (University of California at Berkeley, USA), Frank den Hollander (Universiteit Leiden, The Netherlands), Eva Riccomagno (Politecnico di Torino, Italy), and Aad van der Vaart (Vrije Universiteit Amsterdam, The Netherlands)

For a first announcement of the conference including more detailed information please visit the conference website http://gocps2008.rwth-aachen.de.

Contact information:

Email: gocps2008@stochastik.rwth-aachen.de

Programme committee:

Christine Müller (chair), Department of Mathematics, University of Kassel, D-34132 Kassel, Germany

Local organizing committee: Udo Kamps (chair), Institute of Statistics, RWTH Aachen University, D-52056 Aachen, Germany

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

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

3 Summary of PhD theses

An GERLO VUB, March 13, 2007

See the announcement at the end of the Newsletter

Koen VERHEYDEN
Numerical bifurcation analysis of large-scale delay differential equations
KU Leuven, March 12, 2007

<u>Advisors:</u> D. Roose and K. Lust

<u>Abstract</u>
This thesis considers the stability and bifurcation analysis of systems of delay differential equations (DDEs). We improve existing methods and implement additional algorithms. Most algorithms were derived for systems with point delays; but they can easily be extended to e.g. systems with continuous delays. Several topics are covered.

First, we consider the stability analysis of steady state solutions. Here, we focus our attention to an improvement of a linear multistep discretization scheme.We have used theoretical results on the location and numerical preservation of roots. Furthermore, we have argumented that computing characteristic roots accurately imposes other requirements on the linear multistep method used in the discretization than for accurate time integration. We also consider some spectral discretization methods.

Second, we overview the computation and continuation of solutions and bifurcation points of steady states and periodic solutions. We survey a general framework to construct determining systems for the computation of bifurcation points of co-dimension one. This framework also allows to handle DDE systems with continuous symmetries.

Finally, an efficient method for the computation of periodic solutions is presented: the collocation-Newton-Picard method which uses a variant of the Newton-Picard method to solve the linearized collocation systems, after an additional condensation step. This approach combines the advantages of collocation and single shooting methods. Moreover, by using multiple Newton-Picard steps per Newton iteration, the quadratic convergence of the Newton iteration can be maintained.

Furthermore, we illustrate the derived and implemented algorithms with some applications, among others the optimization of the spectrum of a steady state and the computation of stability charts of linear, timeperiodic DDE systems.

4 Miscellaneous

4.1 From VUB

Ingrid Daubechies (Princeton) is visiting ***VUB, March 10 - March 19 , 2007.*** Contact: pcara@vub.ac.be

4.2 From UMH

L'université de Mons-Hainaut (Mons, Belgique) annonce la vacance de deux postes de professeurs, l'un dans le domaine des mathématiques effectives, l'autre dans le domaine des probabilités et statistique. Les candidatures de jeunes chercheurs brillants sont les bienvenues.

L'entrée en fonction aura lieu au 1er octobre 2007. Veuillez noter que les enseignants désignés sont responsables de l'ensemble des cours annoncés dans la charge mais que les exercices sont totalement ou partiellement prestés par des assistants sous la responsabilité du titulaire.

Pour l'envoi des candidatures au rectorat de l'UMH, il est indispensable de suivre la procédure parue dans le moniteur belge. Les candidatures doivent parvenir au Rectorat de l'UMH avant le 4 avril 2007.

Des informations sur l'Université de Mons-Hainaut sont disponibles sur http://www.umh.ac.be et sur l'Institut de Mathématique de l'UMH sur http://math.umh.ac.be

Pour toute information complémentaire, n'hesitez pas à contacter l'Institut de Mathématique de l'UMH par email à l'adresse:

christian.michaux@umh.ac.be
Christian Michaux, président de l'Institut de Mathématique de l'UMH

4.3   Awards

Proposals for the

> ***award of most promising young researcher***
> ***in computer science and applied mathematics***

are awaited by ERCIM. The Cor Baayen Award is worth 5000 Euro and is awarded every year.
   See http://www.ercim.org/activity/cor-baayen.html.
   Deadline 15 April 2007. Nomination form available now.

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

Piano-hinged Dissections: Time to Fold! *Greg N. Frederickson*, A K Peters, Wellesley, MA, 2006 (320 p.), Hard cover, ISBN 978-1-56881-299-1, 49.00 USD.
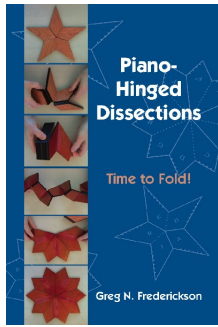
This is a sequel to the two previous books on dissections by the author [1-2] (both reviewed in this newsletter no. 44, September 2003). In the first book shapes (e.g. a square) were cut to separate (polygonal) pieces and puzzled together again to form another shape (e.g. a triangle). In the second book, extra constraints were introduced. Some of the vertices of the pieces were connected so that they form one or possibly more chains. Two connected pieces can only rotate in the plane around their joined vertex. The present book is a logical sequel. Now the pieces are connected along edges. Although the shapes are two-dimensional, one needs a third dimension to flip the pieces along the connecting hinges. Take for example a rectangular piece of paper that is twice as wide as it is high. Folding it along a vertical line in the middle, one obtains a double layered square; folding it along a horizontal line in the middle gives a double layered rectangle that is four times as wide as high. See the left of Fig. 2.

This is an example of how it is possible to unfold a double layered shape (a square) and refold it into another double layered shape (a rectangle). This is a trivial example of a piano-hinged dissection. Of course much more complicated examples are possible. Another simple example is shown in Fig. 1.
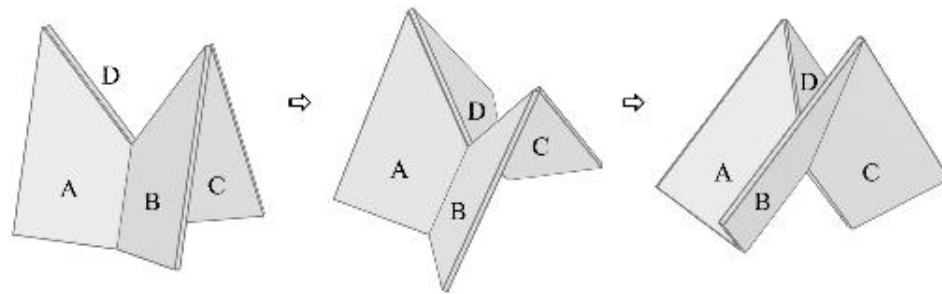

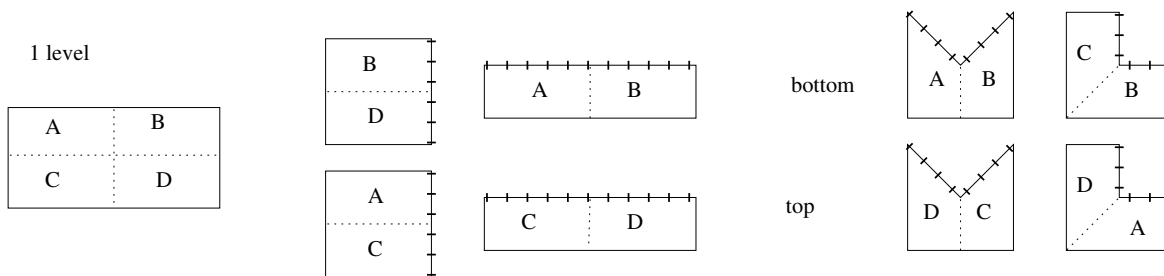Fig.1: A piano-hinged dissection. From a mitre to a gnomon. ©Greg Frederickson.

Fig.2: Notation for a very simple piano-hinged dissection (left) and for the mitre to gnomon (right).

The representation in Fig. 1 is a nice but rather unpractical way to represent in general all the cuts and hinges that are needed as well as the final arangements of the two shapes. This was solved in the following way. The previous (trivial) example of reshaping the square into a rectangle is represented on the left of Fig. 2. The mitre to gnomon example is on the right.
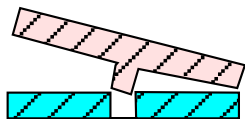
The dotted lines indicate hinges on the same level, the crossed lines indicate hinges between top and bottom level. Full lines are cuts (for the visible layer). The letters refer to the different pieces.

Fig.3: A tap into a hole needs rounding when the plates are hinged.

Just folding and cutting paper might be relatively simple. It becomes much more involved if the shapes are realized with thin wooden plates (with

a thickness that can not be neglected) and physical piano hinges (that can be attached to one side of the plates only). This implies that you can fold two hinged plates in one direction, but not in the other. Moreover there are physical limitations like in Fig. 3, where it is impossible to swing a tap into a tightly fitting hole if the tap is attached to a plate that is fixed by the hinge on the right. So here some rounding is needed to make things work.

Because essentially all the moves discussed need a three-dimensional space, it is sometimes difficult to give a clear explanation of the operations to be performed. This gave Frederickson the idea of including a cdrom on which he demonstrates the folding, decomposing and recomposing the dissections. Some are really complicated, and even if you see him doing it, it is sometimes impossible to see how all the pieces fall into place. At least it is a visual proof that the method does indeed work. It is quite funny if you see him fighting with a wooden model of a hinged dissection that is a loop consisting of 30 triangles hinged together. See Fig. 4. With this dissection it is possible to form a double layered square but also all 12 double layered letters from the pentomino alphabet *en.wikipedia.org/wiki/Pentomino*.
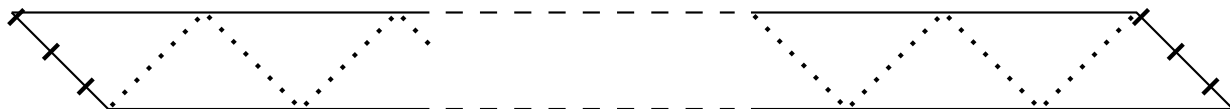

Fig.4: A piano-hinged loop of 30 isosceles right triangles. The left edge should be hinged to the right edge.

And there are many other of these geometrical puzzles. Some of them are relatively simple and are e.g., related to the way we fold a paper large map into some handy pocked sized format. Others, in fact most of them, are quite a challenge and are beautiful in their complexity. Some strategies for solving these puzzles are proposed.

Throughout the book reference is made to a manuscript by Ernest Irving Freese. In fact, this is a remarkable story. Freese was a Los Angeles architect who did this kind of puzzles and finished a manuscript about it in 1957. So he mentioned in a letter to a friend. Unfortunately he died before it ever got published. His widow never responded to people who tried to get hold of the manuscript. Later his son Bill did not find it, and hope was given up that it would ever be found. Only after Bill died in 2002, a cousin was cleaning up the house and found a letter by Frederickson inquiring about the manuscript and eventually, several months later, she did find the manuscript and this is how Frederickson got hold of it. Several drawings are reproduced in this book.
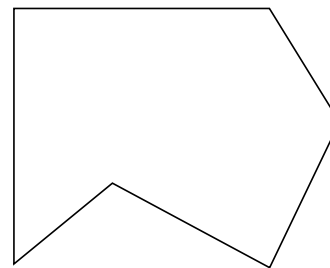

Fig.5: Double layered shape to be transformed into a square as a piano-hinged dissection.

More information, pictures, and additions can be found on the web page for the book which is *www.cs.purdue.edu/homes/gnf/book3.html*.

Finally, for those who have read this whole text through, here is a "simple" puzzle to be solved. The double layered shape in Fig. 5 has to be cut and equipped with piano-hinges such that it can be transformed in a double layered square. The solution can be found elsewhere in this Newsletter.

References

[1] G.N. Frederickson, Dissections: Plane & Fancy, Cambridge University Press, New York, 1997.
[2] G.N. Frederickson, Hinged Dissections: Swinging & Twisting, Cambridge University Press, New York, 2002.
[2] L. Pook, Flexagons inside out, Cambridge University Press, New York, 2003. (Revewed in this newsletter no. 46, January 2004.)

Adhemar Bultheel

THE BELGIAN MATHEMATICAL SOCIETY
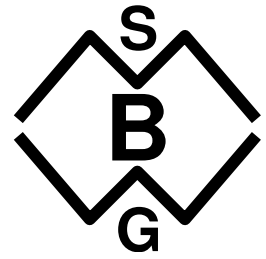
Young mathematicians,

TELL US WHAT YOU ARE DOING !

The Belgian Mathematical Society invites you to its second

PhD-Day

on **Monday, 10 September 2007**

at the **Université Libre de Bruxelles**
(Room **Forum E**, Campus Plaine, Boulevard du Triomphe, 1050 Bruxelles)

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 (to be announced)
11h15 Coffee
11h45 Poster presentations
12h45 Lunch (free for BMS members)
14h15 Oral presentations
16h15 Poster presentations
17h15 Drink and award for best poster

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

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

Vrije Universiteit Brussel

DOCTORAAT

DOCTOR IN DE WETENSCHAPPEN

Openbare verdediging tot het behalen van de academische graad van Doctor in de Wetenschappen

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Dinsdag 13 maart 2007
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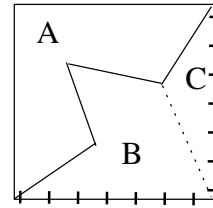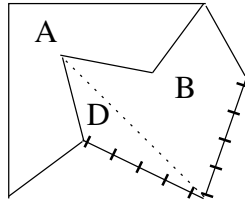**Campus Oefenplein**
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Titel van het proefschrift:

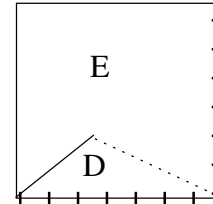**Separation, completeness and compactness in metrically generated theories**
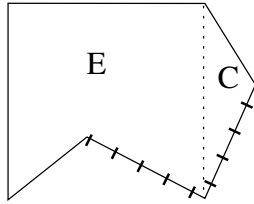
Promotor:

Prof. Dr. E. Colebunders

Prof. Dr. T. D'Hondt
Decaan Faculteit Wetenschappen

TOP

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Solution of the piano-hinged dissection puzzle elsewhere in this newsletter.