



CMS NOTES de la SMC

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FROM THE LONG RANGE PLAN STEERING COMMITTEE *Nancy Reid, University of Toronto*

*Update on the Long Range Plan for Mathematics and Statistics – Summer 2011
Submitted on behalf of the steering committee for the Long Range Plan (LRP),
Nancy Reid, Chair*

The steering committee for the long range plan has been meeting regularly since September, 2010.

This update is based on presentations given at the CMS summer meeting on June 4 and the SSC Annual Meeting on June 12. A presentation to CAIMS is scheduled during the ICIAM meeting in Vancouver in July.

During February and March, members of the steering committee visited several departments of mathematics, statistics, and mathematics/statistics across the country. The committee also solicited discussion documents through a general call. We received about 30 such documents, all posted at <http://longrangeplan.ca/>, under the "Community Consultations" tab. The feedback from our communities has been very helpful and will inform the text in the plan. Some of the concerns we heard include the following:

- In evaluations of grant proposals, highly qualified personnel (HQP) assessment needs to consider size of the department and existence of graduate programs. Having HQP count for 1/3 of the total points penalizes small departments, and is not always relevant for the success of the research program. Merit evaluation seems to be unstable from year to year and within years.
- Many are worried by the apparent trend to fewer, larger, grants: mathematics and statistics needs a broad base of support. Undergraduate research

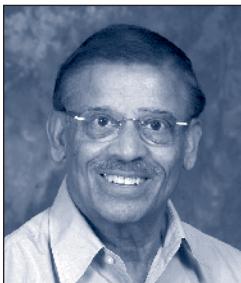
at small places is very important for our pipeline. The research capacity built at small places in danger of disappearing. The trend to less research support at small universities may possibly have larger negative impacts on women in mathematics.

- The proposed envelope model might lead to further shrinking of Discovery Grants: Institutes are important but shouldn't encroach on the discovery grant funds – how will these be protected in an envelope model? How will new activities, e.g. new institutes, be funded?
- Interdisciplinary work is at risk of falling through the cracks. We heard this about biostatistics, actuarial science, and machine learning in particular, but there are also similar concerns in applied mathematics. Some interdisciplinary mathematical scientists are leaving the mathematics and statistics evaluation group, as all other groups have higher average grants.
- Institutes are not having as much impact in statistics: the National Program for Complex Data Structures created a better sense of community, and its model for support was better suited to statistics. How might such an activity fit into the envelope without damaging DG funding?

Once the 2011 grant results were announced in April, we had another problem. There is deep concern across

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'The covers of this book are too far apart.'

- Capsule book review of a book by Ambrose Bierce

A parent of a prospective freshman student asks why a big, bulky and expensive volume is prescribed as the first-year calculus text. He recalls that, when he was a student, texts were considerably smaller, and adds that statistics, physics, chemistry and economics texts are also equally bulky. Further he wonders whether our students would need to read about 550 pages of material in each such text during a short term of 12 weeks. Do students really need such big texts? We are thinking specifically here of texts published by the main North American publishers.

On the average one would estimate that an industrious student might need to work with about 42 pages a week. Most students wouldn't be inclined to do so. In fact, one may wonder to what extent or how well students read their texts these days. Instructors hardly prescribe portions of the texts for reading. Have publishers and authors of text books carried out studies on how students react to bulky texts?

It is well known that students look for easy ways to avoid reading texts; they resort to guide books with solved problems. Student guides are usually available, published by the same publishers of the prescribed texts. Such guides are also getting bigger and more expensive.

Lecturers of calculus and linear algebra classes expect their students to understand the lectures and follow up with reading the prescribed parts of concerned texts. Ideally diligent students are expected to read their texts in advance before attending the instructor's lectures. But students can hardly come prepared in such a way because doing so for each of their classes is a time-consuming chore.

That first-year calculus book can cost \$170 even from Amazon, and over two hundred dollars from the bookstore. Even the paperback study guides sell for \$70 or so.

The cost for a textbook is far more than what most publishers charge for hardback books on obscure topics that sell only a thousand or so copies. Calculus textbook sales can be in the hundreds of thousands for one edition, and would be far higher if the publishers did not bring out almost-identical editions, just different enough to make life difficult for any student using the old version, every few years. A mass-market book that sold this many copies would sell for \$40 or so in hardback, and would soon appear in paperback at \$20 or less.

Some case can be made for specially durable bindings for upper-level texts which can be expected to form part of the

professional libraries of their users long after the course is over. But first-year calculus texts are not written in a style that makes a good reference for an experienced mathematician; their explanations are over-long, and frequently hobbled by attempts to avoid advanced terminology. Most of us get far more out of (say) our old differential equations or ring theory textbooks than the book that got us through Calc I.

It is hard to avoid the conclusion that textbook prices are artificially high, taking advantage of a market where the decision to use a book is made by somebody who does not have to buy it. Perhaps the use of the sort of super-heavy coated stock that would normally be reserved for coffee-table fine-art books has something to do with this peculiar marketing model; it certainly has nothing to do with mathematics.

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« L'endos et le verso de ce livre sont trop éloignés l'un de l'autre »

- Un compte rendu de livre en capsule par Ambrose Bierce

Un parent d'un étudiant qui s'apprête à entamer sa première année demande pourquoi on exige d'acheter un gros livre encombrant et coûteux pour le cours de calcul infinitésimal. Il se souvient qu'à l'époque de ses propres études, les manuels de classe étaient bien moins volumineux et ajoute que les manuels de statistiques, de physique, de chimie et d'économie sont également volumineux. Il se demande, en outre, si nos étudiants auraient besoin de lire quelque 550 pages de texte dans chacun des manuels au cours d'une courte séance de 12 semaines. Les étudiants ont-ils vraiment besoin de manuels aussi volumineux? Nous parlons ici des textes publiés par les principales maisons d'édition d'Amérique du Nord.

On peut estimer qu'en moyenne, un étudiant ambitieux ait à assimiler environ 42 pages de texte par semaine. La plupart des étudiants ne seraient pas portés à le faire. En fait, on pourrait se demander dans quelle mesure les étudiants lisent leurs textes de nos jours ou à quel point ils assimilent bien ce qu'ils lisent. Les enseignants imposent rarement des sections de texte à lire dans leur cours. Les maisons d'édition et les auteurs des manuels de cours ont-ils fait des études pour savoir comment les étudiants réagissent à des textes volumineux?

On sait très bien que les étudiants cherchent des moyens faciles d'éviter de lire des textes. Ils ont recours à des guides où les problèmes ont déjà été solutionnés. Les guides étudiants sont habituellement publiés par les mêmes maisons d'édition qui sont responsables des manuels de cours exigés. Ces guides prennent aussi du volume et sont de plus en plus coûteux.

Les chargés de cours de calcul infinitésimal et d'algèbre linéaire s'attendent à ce que les étudiants comprennent les exposés et fassent le suivi en lisant des sections prescrites des manuels en question. Idéalement, on s'attend à ce que les étudiants diligents lisent leurs textes avant de venir au cours. Les étudiants peuvent difficilement se préparer ainsi au cours parce que de telles lectures pour chacun de leur cours monopolisent une trop grande partie de leur horaire.

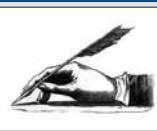
Ce manuel de cours de calcul infinitésimal de première année peut coûter 170 \$ même si on l'achète sur Amazon ou plus de 200 \$ en librairie. Même les guides étudiants sans couvert rigide coûtent environ 70 dollars.

Le prix d'un manuel de cours dépasse largement ce qu'exigent la plupart des maisons d'édition pour des ouvrages à couvert rigide sur des sujets obscurs dont le tirage n'est que de 1 000 exemplaires environ. Les ventes de manuels de calcul infinitésimal peuvent s'élever à des centaines de milliers d'exemplaires pour une seule édition. Ce chiffre serait bien

plus élevé si les maisons d'édition ne publiaient pas, après quelques années, des versions pratiquement identiques, mais suffisamment différentes pour compliquer la vie à tout étudiant se servant d'une ancienne édition. Le prix d'un livre à grande diffusion qui se vendrait à un pareil nombre d'exemplaires serait d'environ 40 \$ en version couverture rigide. Sa version de poche ne tarderait pas à être proposée et serait vendue 20 \$ ou moins.

On pourrait justifier en quelque sorte des reliures particulièrement résistantes pour des manuels de cours de prestige qui pourraient faire partie de la bibliothèque professionnelle de l'usager bien après la fin du cours. Mais les manuels de calcul infinitésimal de première année ne sont pas de style à représenter un bel ouvrage de référence pour un mathématicien chevronné : les explications sont trop longues et sont bien souvent fastidieuses parce qu'on a évité d'employer un vocabulaire avancé. La plupart d'entre-nous avons bien plus tiré profit, disons-le, de nos vieux manuels d'équations différentielles ou de théorie des anneaux que le manuel qui nous a permis de réussir le cours de calcul infinitésimal I.

On peut difficilement ne pas conclure que les manuels de cours sont vendus à des prix élevés par dessein, parce qu'il s'agit d'un marché où la décision d'employer un manuel quelconque est prise par une personne qui n'a pas à l'acheter. Se pourrait-il que l'emploi de la sorte de papier couché de très fort calibre habituellement réservé aux beaux livres grand format sur les beaux-arts soit responsable de ce modèle de mise en marché particulier? Ça n'a certainement rien à voir avec les mathématiques.



Letters to the Editors Lettres aux Rédacteurs

The Editors of the NOTES welcome letters in English or French on any subject of mathematical interest but reserve the right to condense them. Those accepted for publication will appear in the language of submission. Readers may reach us at notes-letters@cms.math.ca or at the Executive Office.

Les rédacteurs des NOTES acceptent les lettres en français ou anglais portant sur un sujet d'intérêt mathématique, mais ils se réservent le droit de les comprimer. Les lettres acceptées paraîtront dans la langue soumise. Les lecteurs peuvent nous joindre au bureau administratif de la SMC ou à l'adresse suivante: notes-lettres@smc.math.ca.

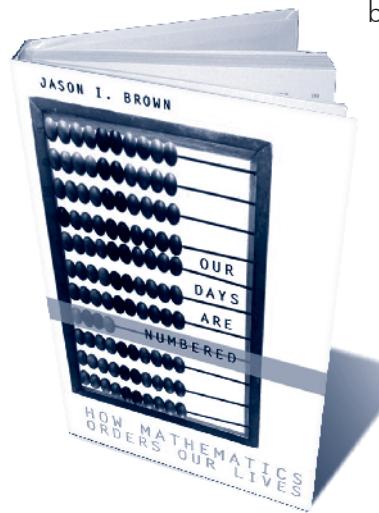
Our Days Are Numbered

by Jason Brown (McClelland & Stewart, 2009)
304 p., \$32.99 ISBN 978-0771016967.

Reviewed by Chelluri C.A. Sastri, Dalhousie University

Lately there have appeared several books describing the ubiquity of mathematics in our lives and making the claim that **some** knowledge of mathematics, not far above the high school level, combined with a bit of sophistication, would help us manage our lives better. The claims have been so forceful and frequent that they produced an inevitable reaction: an Op-Ed article in *The Washington Post* (October 23, 2010), in which a mathematician, no less, asks: "How much math do we really need?" The book under review, although it makes the claim mentioned earlier, arose in an unusual context: the author, Jason Brown, is a musician as well as a mathematician – he is a guitar player and a singer and a song writer – who, like many lovers of the **Beatles**, the knowledgeable ones, anyway, was for a long time intrigued by the mystery surrounding the beginning of their song **A Hard Day's Night**. Combining his musical and mathematical abilities, he managed to solve the puzzle a few years ago and earned, as he puts it, his fifteen minutes of fame. This was a genuine accomplishment, and he tells the story of how he did it in Chapter 12 of the book. Indeed, it is the best and most substantial part of the book. This does not mean that the rest of the book is devoid of content or meaning, not at all. It is the case, however, that there are parts of the book that are weak or seem forced so that the book as whole gives an impression of unevenness.

The book, which is aimed at lay people who may not have a mathematical background much beyond the high school level, is structured as a series of mathematical meditations that occur in the course of a single day in the author's life: it begins with the alarm going off in the morning and Brown trying to get a few more winks of sleep and ends with him going to bed late at night – he says he is a nighthawk. In between, the events of the day, as they happen, trigger a train of mathematical thoughts which range far and wide and provide grist for his mill. The sweep is so impressive as to seem somewhat unrealistic: this reviewer, for one, does not know anybody who, in the span of a single day, can dream up so much mathematics, even if it is not advanced, and come up with several interesting examples, as Brown does. Be that as it may, there indeed are some interesting examples. To mention a few, there is one about measuring the heart rate while doing physical exercise: if there are two ways of counting the beats and if a certain error occurs on each count, then, Brown points out, the method that involves counting fewer beats is preferable because the smaller the number of



beats counted, the smaller the total error. Another example shows how cereal manufacturers manipulate the definition of serving sizes in order to get away with the claim that a particular cereal doesn't contain any trans fats even though it may contain just a little less than 0.2 grams of them per serving; this is because government regulations allow them to claim that there are no trans fats as long as the amount present is under 0.2 grams. A third example shows how to use the pigeonhole principle to prove that every rational number has either a finite or repeating infinite decimal expansion. And there are others.

The book is written in a chatty, colloquial style and does not contain any formal definitions or statements of theorems. Presumably this is because Brown doesn't want to scare or intimidate the reader, which is good, up to a certain point. The problem is that the style is so easygoing that it sometimes slips into vagueness or downright inaccuracy. This happens quite a bit in the discussion on probability (Chapter 4). In fact, there are significant problems with that chapter.

The book deals mainly with the uses of mathematical reasoning and of mathematics itself, although there is a brief discussion, in Chapter 11, of the idea of beauty in mathematics. Similarly infinity is mentioned as an important concept and is used in some examples – in divergent series, for instance – but no attempt is made to explain the concept in any depth or its history. Although fractals are introduced, there is no mention of Cantor. As for the uses of mathematics, some of the examples discussed, such as the one in Chapter 6 where utility functions are used to choose between having a romantic dinner with one's spouse and taking a client out to dinner so as to clinch a deal, seem far-fetched.

The style of writing, being colloquial and easygoing, sometimes results in a poor choice of words. For instance, here is a sentence from p.156: "There is a principle, which most mathematicians ascribe to, called *Occam's Razor*, that states that when you create a model or a theory, simplest is best." Clearly the word needed here is "subscribe," rather than "ascribe." A much worse example,

Continued on page 6

Pattern Theory

David Mumford et Agnès Desolneux, A.K. Peters, 2010
375 p., \$79.95 ISBN 978-1568815794.

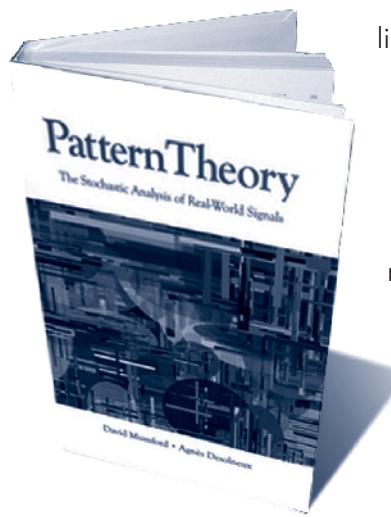
Commenté par Jean-Michel Morel, ENS Cachan

L'ambition de ce livre est à la mesure d'un défi que s'est lancé le vingtième siècle en même temps que l'invention des ordinateurs. Il s'agit de créer de l'Intelligence Artificielle. Depuis le livre de David Marr, (Vision, 1982) on savait que ce projet de savants pressés (Marvin Minsky prévoyait l'avènement du robot superintelligent pour 2001) avait buté sur la formalisation de la perception.

Émule de Minsky, Marr découvrit dès 1980 combien il est difficile à un programme de trouver dans une image les objets les plus simples, des photos de cubes par exemple. Inspiré des rêves de l'I.A., le robot Hal du film de Stanley Kubrick (2001 l'Odyssée de l'Espace sorti en 1968) est capable de lire sur les lèvres des cosmonautes qu'il supervise, et de profil encore! Mais nous sommes en 2011, et où sont les robots intelligents?

Ce sont des mathématiciens (Turing, Von Neumann) qui concurent les premiers ordinateurs et furent aussi les premiers promoteurs de l'intelligence artificielle. Le problème de Hal, lire sur les lèvres peut être pris comme fil conducteur pour décrire le livre de deux autres mathématiciens, Agnès Desolneux et David Mumford. Leur premier chapitre modélise le texte écrit par la méthode insur-passée de Markov et Shannon, qui permet à la fois d'analyser et de synthétiser du texte, et qui sert de fondement à la traduction automatique. Leur second chapitre traite de l'analyse, de la segmentation et de la synthèse de la voix et de la musique. Le troisième chapitre passe à la reconnaissance du texte écrit, le quatrième à l'analyse texturale du son et des images, et le cinquième traite de la reconnaissance des visages et de leur suivi quand ils changent d'expression.

Il y a bien donc là tous les ingrédients pour équiper Hal. Mais, cela marche-t-il? -Heu..., notre siècle a rejoint la sagesse, n'est-ce-pas, et aucun docteur Frankenstein ne prétendra que l'on peut assembler les six chapitres du livre de Mumford et Desolneux pour donner vie au monstre. Non, nous avançons plus doucement, mais plus sûrement. La méthode de Viola et Jones analysée dans le chapitre 5 permet déjà de détecter des visages et elle équipe bon nombre de nos caméras digitales, mais elle ne permet pas (encore) de lire les sentiments des gens sur leur visage. La traduction automatique introduite au chapitre 1 ne battra pas de longtemps les traductions de Poe par Baudelaire, mais elle équipe aujourd'hui bon nombre de logiciels et de scanners. Les modèles bayésiens de reconnaissance d'écriture analysés dans le chapitre 3 servent, oui, déjà, à



lire automatiquement des milliards de chèques et d'adresses postales. Et la méthode SIFT inventée par David Lowe à l'Université de Colombie Britannique a résolu le problème de retrouver en une fraction de seconde une image sur le web parmi des milliards d'autres, grâce à l'analyse multiéchelle des images (traitée dans le chapitre 6).

Avec sa maturité, cette science nouvelle qu'est la reconnaissance des formes a adopté le rythme plus lent mais moins illusoire que suit la physique: modéliser mathématiquement, expérimenter, progresser. Le programme proposé par Pattern theory, ne fait rien d'autre. Il expose une pensée mathématique unifiée autour du programme de Ulf Grenander. Ce programme se résume en une phrase: pour analyser correctement une perception, il faut être capable de la simuler sur ordinateur, c'est à dire de la synthétiser, elle et toutes ses variantes.

C'est un programme redoutable: pour reconnaître la voix, il faudrait donc être capable de synthétiser une voix artificielle. Pour reconnaître une forme, il faudrait en avoir le modèle si complet que l'on puisse en reproduire toutes les variantes. L'immense mérite de Pattern Theory est d'arriver à présenter cette théorie avec le juste équilibre entre la rigueur et la pédagogie mathématique, et une modélisation accessible d'objets aussi complexes que la voix, l'écriture, le langage ou les visages.

La modélisation est inévitablement, comme le montrent les auteurs, probabiliste. Elle fait de ce livre une très belle introduction à la modélisation stochastique, mais aussi aux représentations mathématiques nécessairement très différentes d'objets de très différentes natures. Le choix d'une base de Fourier locale sur laquelle on décompose un son a peu à voir avec le choix d'une base pour décomposer une image (par ondelettes), ou d'une base adaptée aux visages et à leurs variations d'illumination. La gamme des modèles stochastiques présentés va du simple au complexe avec des prodiges de pédagogie.

Les auteurs proposent une modélisation en « boucle ouverte », où le modèle mathématique s'enrichit de la confrontation numérique constante entre l'observé et sa

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BOOK REVIEW

Our Days Are Numbered *Continued*

at least in the reviewer's opinion, is "amount of coins" on p.94. Now, sadly, the use of "amount" for "number" is gaining currency among the general public. Even the venerable *New Yorker*, that bastion of good writing, is not free of it: a while ago, the author of an article in the *Talk of the Town* spoke of the "amount of immigrants." But when a mathematician does it, it really hurts. The lack of care sometimes also results in sentences in which the tenses of the verb don't agree, as in "But numbers, and in particular, statistics, can and have been used ..." (p.81) or "If the interest rate has and will be 10% per year ..." (p.212)

There are flashes of humour throughout the book. Some of them work beautifully. Here are a couple of good examples: explaining the pigeonhole principle, Brown says, "Why mathematicians would be moving pigeons in and out of pigeonholes is another matter (we are a strange lot)." (p.84); in a discussion of perspective (p.231), Brown tells the story of his sister and his younger brother once playing tetherball in the backyard: "My sister slammed the ball, and it hit my brother in the face. He grabbed his nose with both hands as blood poured down his arms and dripped from both elbows. My sister, distraught, ran into the house, and screamed, "*Why does everything always happen to me?*" He adds, "Perspective really is everything."

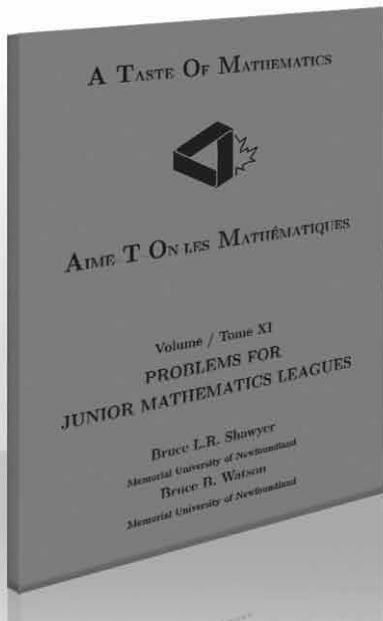
To sum up, the book not only tells the story of Brown's work as a musical sleuth but also contains some interesting observations and insights on the connection between mathematics and our day-to-day lives. It would certainly benefit from a clean-up, though.

Pattern Theory *Suite*

version synthétisée. En passant, les auteurs montrent leur fermeté scientifique et s'opposent aux modèles clos, qui rejettentraient la prise en compte des nouvelles perceptions. L'exemple est donné d'un enregistrement où l'on veut reconnaître des consonnes et voyelles. Mais, d'un coup, quelqu'un tousse: un modèle bayésien acceptable devra être capable de phagocytter cette nouveauté. Les auteurs égratignent aussi à juste raison les nombreuses théories d'analyse du son et de l'image qui font fi de la complétude, et commencent par essayer d'extraire du signal quelques invariants, pour jeter aux orties le reste de l'information.

Chaque chapitre commence par une brillante introduction des pré-requis mathématiques de chaque modèle avec une perspective historique captivante, avant de passer à la modélisation proprement dite, puis de livrer les algorithmes et une liste d'exercices.

Ce livre est-il à lire si on s'intéresse à l'avenir des mathématiques dans cette nouvelle science qu'est la perception artificielle? Oui absolument. Ce livre recouvre-t-il tout ce qu'on peut dire sur le sujet? Non absolument pas. Le sujet de la perception artificielle connaît aujourd'hui un développement passionnant où des théories se confrontent et nous conduisent à repenser en permanence nos outils mathématiques, comme le permit au vingtième siècle la mécanique quantique. Aussi, ce livre doit être mis entre les mains de tous les jeunes chercheurs désirant travailler sur la perception artificielle.



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Function Theory: Interpolation and Corona Problems

By Erick T. Sawyer

Fields Institute Monographs v. 25

ISBN 978-0-8218-4734-3

ix + 203pp. American Math. Society 2009

This monograph contains the lecture notes for a graduate course on Function Theory given by the author at the Fields Institute in 2008. The reader is led from Lennart Carleson's deep results on interpolation and Corona problems in the unit disk to modern analogues in the disk and the ball. The emphasis is on introducing a diverse array of techniques needed to discuss these problems rather than producing an encyclopedic summary of various achievements. Techniques from classical analysis and operator theory include duality, Blaschke products, purely Hilbert space arguments, bounded mean oscillation, best approximation, boundedness of Beurling transform, estimates on solutions to the delta-bar equation, the Koszul complex, use of trees, the complete Pick property, and the Toeplitz corona theorem. An extensive appendix recapitulates background material in functional analysis and function theory on the disk.

Polyhedral and Semidefinite Programming Methods in Combinatorial Optimization

By Levent Tunçel

Fields Institute Monographs v. 27

ISBN 978-0-8218-3352-0

x + 219pp. American Math. Society 2010

Since the early 1960s, polyhedral methods have played a central role in both the theory and practice of combinatorial optimization. From the early 1990s, a new technique, semidefinite programming, has been increasingly applied to combinatorial optimization problems. The semidefinite programming problem deals with optimizing a linear function of matrix variables, subject to finitely many linear inequalities, and the positive semidefinite condition on some of the matrix variables. On certain problems, such as maximum cut, maximum satisfiability, maximum stable set and geometric representations of graphs, semidefinite programming techniques yield important new results. This monograph provides the necessary background to work with semidefinite optimization and programming techniques, usually drawing parallels to the development

of polyhedral techniques and with a special focus on combinatorial optimization, graph theory and lift-and-project methods. The reader is thus enabled to develop rigorously the necessary knowledge, tools and skills to work in the area that is at the intersection of combinatorial optimization and semidefinite optimization. The prerequisites include some exposure to linear optimization and familiarity with computation complexity theory and analysis of algorithms. Important open problems, exciting new directions and connections to other areas in mathematical sciences are provided.

Mathematics in historical context

By Jeff Suzuki

Mathematical Association of America, 2009

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x + 409pp

The author states in the Introduction that the book emerged from a discussion he had with Don Albers of MAA who asked "What would Newton see, if he looked out of the window?" and thus suggested the idea of describing the world of great mathematicians. The focus of the book is on how mathematics fits always into its ambient culture. Very little actual mathematics is discussed so that the book is not a textbook on the history of mathematics. Yet the author successfully provides part biography, part mathematics, and part history thus enabling the reader a good background to the history of mathematics.

The chapters are divided according to geographic regions making it easier for the reader to understand how the mathematicians of a country took part in that country's life. Some examples of descriptions given are: (i) some of the complex relationships between mathematicians, their mathematics and the society, (ii) how world events shaped the lives of mathematicians like Archimedes and de Moivre, (iii) how artistic conventions inspired some of the mathematical investigations of Abu'l-Wafaa and al Khayyamii, (iv) how Newton and Poincaré affected the political events of their times, (v) how mathematical concepts like the irrationality of the seventh root of 2 drove cultural development.

The book can be used as a supplemental text to a history of mathematics course. The author has published articles and books on historical topics and on the history of mathematics. He was the recipient of Carl B. Allendoerfer award from MAA for an article of expository excellence.

"The Adrien Pouliot Award was inaugurated in 1995 to recognize individuals or teams of individuals who have made significant and sustained contributions to mathematics education in Canada." The 2010 recipient of this award was Miroslav Lovric. This issue of Education Notes features an expanded version of Miroslav Lovric's Pouliot Lecture, presented at the 2010 CMS Winter Meeting in Vancouver.

Thinking about Math ...

Miroslav Lovric, McMaster University

"The children now love luxury; they have bad manners, contempt for authority; they show disrespect for elders [...] contradict their parents, chatter before company, gobble up dainties at the table, cross their legs, and tyrannize their teachers."

[Attributed to Socrates by Plato, according to William L. Patty and Louise S. Johnson, *Personality and Adjustment*, p. 277 (1953).]

Most of us agree with this message: young people—in particular, our students—are quite different, definitely not like us; we have strong anecdotal evidence to support our claim (as Socrates did; I don't believe he conducted sound statistical research). But—in what ways are young people different? What's going on in the brain of an 18-year old who sits in our classes? What do first-year university math majors expect, and hope for? What reasons led them to decide to study math? Why do some math majors switch into other programs soon after they start, frustrated and disappointed, not succeeding in the one thing they thought they liked and were good at?

Where do I look for answers to these questions, and to many more that I have in mind as I'm preparing for another year of teaching undergraduate math? My teaching schedule includes a large mathematics for life sciences course (that many think of as a service course), and a small calculus class for students (math and stats majors) in our direct-entry mathematics and statistics program.

Another important question comes to mind: who will my students become in five or six years? I need to think of ways to prepare them, the best I can, for their transition into the "real world". In our global society, they will compete for jobs not only with their peers from Canadian or North American universities and colleges, but also with young people working presently on their degrees halfway across the globe.

Here is a small sample of things I found, facts and evidence, that inform my thinking and decisions and make me understand things better.

In 2006, the Science Learning Centre in London, England surveyed about 11,000 students aged 11-15 for their views of science and scientists. (I am not aware of a similar

survey conducted in Canada.) About 70% of the surveyed students said that they do not imagine scientists as "normal young and attractive men and women." Although many of them agree that science is "very important work" and that scientists work "creatively and imaginatively," a very small number plan to actually study science to become a scientist. The reasons revealed all usual stereotypes, perhaps best summarized in the response, "Because you would constantly be depressed and tired and not have time for family." The survey of my Integrated Science students in 2010 echoes these views: in words of one student, "The mathematician is lonely and trying to figure out a math problem; still working at 1 am."

The math itself has an image problem. My M.Sc. student discovered that a number of high school students who are good at mathematics (by high school standards) and who enroll in our honours math program, do not have a sound idea about what mathematics really is. The clash between incoming first-year students' views on mathematics, shaped by little else beyond their high school experience, and the reality and the demands of university-level mathematics courses leaves many casualties. Bruised, with doubts in their abilities, a significant number of students leave our math program for other sciences, or decide to move completely away from sciences.

Evidence points to the fact that students study less than what we expect. "Only about 11 percent of full-time students say they spend more than 25 hours per week preparing for their classes—the amount of time that faculty members say is necessary to succeed." [The Chronicle of Higher Education, 26 November 2004]. A survey of my Arts and Science students agrees: the answers to the question "How much time, on average, do you spend on math per week (not counting lectures and tutorial)?" averaged about 3 hours a week, with a maximum of all replies being 5-6 hours (my expectation, that I am explicit about, is 8 to 9 hours per week).

The limits on space do not allow me to continue in this way, but I think the message is emerging: the issues are complex; the data and adequate analysis are not easy to find. As I review journals in math education I realize that the tertiary math education research is sparsely populated. In particular, the research on tertiary mathematics teaching practice is hard to come by.

Important side note: I'm willing to do (and have done) some research, I have graduate students who are interested in studying math education at the tertiary level – the problem is funding. It's time for NSERC to include math education as an area of funding (within their Discovery Grants program). In his plenary at the CMS Winter meeting in Vancouver in 2010, Dr. Carl Wieman, a Nobel laureate and a leader of the Carl Wieman Science Education Initiative (CWSEI) at UBC emphasized the importance of research in education. The mission of CWSEI is to support "exploration of useful and efficient ways to incorporate research on learning science and measuring the learning of science into the standard educational practices of departments and faculty" [<http://www.vpacademic.ubc.ca/CarlWieman/>].

So, having some pieces of a big puzzle (and wishing I had more), how do I move on, plan my teaching, or make changes and adjustments to my current practices? A few thoughts, ideas, in no particular order of significance:

(1) We need to emphasize the importance of effort and hard and consistent work. Three hours a week of studying math do not suffice, and the solution is not to give more homework. Students must work more, and take initiative. Surveys that I have conducted with first-year Science Inquiry students show that they are not at all aware that learning is their responsibility. I need to talk about this in my math classes, and be explicit about what I expect from my students.

As well, I need to address common attitudes that many students hold toward math and their ability to do (well in) math. When a student tells me "I have never been good at math," the first question that comes to my mind is: "Have you tried really hard?" A student will readily accept the fact that to become a good hockey player or a good concert musician one needs to practice every day, for years – however, for some reason this thinking does not extend to math. I am aware of the fact that part of the problem lies in students' beliefs about their own intelligence (studied, for instance, by Carol Dweck, professor of psychology at Stanford University). Here, I need good research to tell me how to help a student convert (using Dweck's terminology) from an "entity theory view" that intelligence is unchangeable, to the "incremental view," i.e., believing that intelligence can be modified/increased through effort. In his book *Bounce: The Myth of Talent and the Power of Practice*, Matthew Syed quotes a study showing that the area of the brain responsible for finger movement is much larger in pianists than in others. However, it did not start this way, but rather grew with practice.

(2) I need to learn, as much as I can, about the students in my "calculus for math majors" course: about their experiences with mathematics, their expectations and beliefs about university mathematics. The attrition from our math and stats program is quite high. I am thinking about suggesting that we use supplementary applications, hoping the answers might reveal important facts about our applicants' attitudes and beliefs about mathematics (supplementary applications are common practice in some programs at McMaster). In this way, we might be able to pick students who are better suited for our program, as well as help some avoid frustration and disappointment early in their lives as university students.

(3) We need to rework the curriculum. Instead of thinking about each course as a box, let's think more globally: what do we want our students to know by the end of their undergraduate years? What math skills should they possess? A suggestion -- create two lists: (a) the material that is planned to be covered, and (b) the list of topics and skills that extend beyond each individual course, or are deemed significant for some other reason (such as epsilon-delta, constructing proofs, numeric skills, simple programming in Maple or Matlab, and individual research projects and presentations). In planning each course, topics from list (a) are matched with adequate items from list (b). For instance, introduce the epsilon-delta machinery in the first year (to prove continuity in simplest cases, such as linear, quadratic and the square root functions), then review, add

harder examples and simple two-variable cases in the second-year vector calculus. In this way, by the time they start a real analysis course, students will build some experience working with this challenging topic. In first-year courses, students need to be exposed to the idea of proving and proofs, but in a learning-from-experts mode: reading proofs, understanding the steps involved, and being able to reproduce some proofs. Next, students work on constructing simple proofs (in all courses they take), slowly advancing toward more complex proofs in upper years.

(4) I find the conversations with high school teachers revealing and extremely useful; as well, the more I learn about teachers, the higher my regard and appreciation are for the work they do. Learning about the implementation of high school curriculum from Ontario Ministry of Education documents, and hearing about it from those on the front lines are two completely different realities. What we learn from teachers informs our decisions about redesigning our first-year courses. For instance, we need to fill the gaps in students' knowledge of basic geometry (not just conic sections), and spend time developing experience in working with complex numbers. As well, it helps to know that, for instance: in high schools (in Ontario), proofs are not done at all—students are required to "verify" that the rules make sense by looking at examples and identifying patterns; students are no longer taught that $\sqrt{x^2} = |x|$, because it's confusing (?); students do not see any formal logic (not even simplest facts, such as that $P \rightarrow Q$ is true does not mean that $Q \rightarrow P$ is true); and so on.

(5) Instead of contrived, artificial applications, I try to discuss good, real applications that might actually stimulate students' interest in math. High school textbooks (and to an extent university calculus textbooks) are full of "applications," "everyday math problems," and "career applications," that are supposed to show relevance of mathematics in one's life. I find many of them non-interesting, to say the least. (For a case study of real-life irrelevant examples (but good math problems!) see U. Dudley, *What is Math For, Notices of the AMS*, May 2010, 57(5), 608-613). What I prefer to do is to take time and build a context within which I discuss applications. In my life sciences math class, I take a full lecture to discuss the model of a blood flow through a vessel, use extreme values to discuss vascular branching and then connect with related phenomena, such as neuronal branching. I give a lecture about math in weather forecasting, emphasizing mathematics used there; that is, I show a system of equations that describe convection, then show how these equations are discretized so that numeric methods and computers can be used to solve them. Although I tell my students that this stuff is not going to be on a test, I notice that students do listen! Even if they just remember the key words: weather forecasting, mathematics, derivatives and equations, numeric, and computers, I believe the lecture is a success.

[...]

We all know that discussions about math never end. Unfortunately, I'm running out of space, and need to stop—in the hope that you found something useful, interesting or intriguing in this article.

On Vortices in Ginzburg-Landau Minimizers

Lia Bronsard*

April 4, 2011

The original Ginzburg–Landau (GL) model was a variational description of superconductivity with highly successful applications in physics, but it also engendered some important mathematical ideas in the calculus of variations, analysis, and geometry. Its success led to the development of a family of GL-type models, which apply to phase transitions and singular structures, such as vortices, domain walls, or dislocations in superfluidity, Bose-Einstein Condensation (BEC), and ferromagnetism.

Let $\Omega \subset \mathbb{R}^2$ be a smooth, bounded domain, and $\Psi \in H^1(\Omega; \mathbb{C}^n)$, $n \geq 1$, the Sobolev space of functions that are twice integrable with weak derivatives in $L^2(\Omega; \mathbb{C}^n)$. We define the GL energy functional

$$F_\epsilon(\Psi) = \int_{\Omega} \left\{ \frac{1}{2} |\nabla \Psi|^2 + \frac{1}{\epsilon^2} W(\Psi) \right\} dx, \quad (1)$$

where $W(\Psi) \geq 0$ is the potential, with $W(\Psi) = 0$ on a manifold $\Sigma \subset \mathbb{C}^n$. We seek minima (or critical points) of F_ϵ , subject to a boundary condition.

For $\Psi: \Omega \rightarrow \mathbb{C}$ and $W(\Psi) = \frac{1}{4}(|\Psi|^2 - 1)^2$, this problem has been studied in detail, starting with the work of Bethuel, Brézis, and Hélein [5]; we denote by $G_\epsilon(\Psi)$ the functional F_ϵ for this potential. We expect that, as $\epsilon \rightarrow 0$, the minimizers of F_ϵ converge in some weak topology Ψ_ϵ to Ψ_* , with $W(\Psi_*) = 0$ a.e. Hence, Ψ_* should take values in Σ ($|\Psi_*| = 1$ in the case studied in [5]) and be a harmonic map minimizing the Dirichlet energy $\int_{\Omega} |\nabla \Psi|^2 dx$. If we impose Dirichlet boundary conditions $\Psi_\epsilon = g|_{\partial\Omega}$, $g: \partial\Omega \rightarrow \Sigma$, $\deg(g; \partial\Omega) \neq 0$, then the winding number, $\deg(\Psi_*; \partial\Omega) \neq 0$, and Ψ_* have singularities that are the *vortices*.

In certain applications one considers wave functions $\Psi = (\psi_+, \psi_-) \in H^1(\Omega; \mathbb{C}^2)$ with two components. For such systems, we ask whether there are new types of singularities and what is the structure of minimizers Ψ_ϵ near the limiting singularities. In recent work with Alama and Mironescu, [3, 4], we chose

$$W(\Psi) = \frac{1}{4}(|\Psi|^2 - 1)^2 + \frac{\beta}{4}(|\psi_+|^2 - |\psi_-|^2)^2,$$

with $\beta > 0$, a potential used in studying ferromagnetic superconductors and two-component BEC. W vanishes on a 2-torus $\Sigma \subset \mathbb{S}^3 \subset \mathbb{C}^2$ parametrized by two real phases $\Psi = \left(\frac{1}{\sqrt{2}}e^{i\alpha_+}, \frac{1}{\sqrt{2}}e^{i\alpha_-} \right)$. Thus, a Σ -valued map $\Psi(x)$ carries a pair of integer-valued degrees

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around any closed curve C , with $\deg(\Psi; C) = [n_+, n_-]$, where $n_+ = \deg(\psi_+; C)$ and $n_- = \deg(\psi_-; C)$.

To illustrate the results, we take a simple but revealing example. Let $\Omega = D = D(0, 1)$ be the unit disk, and consider minima of F_ϵ over the space \mathbf{H} , consisting of all functions $\Psi \in H^1(D; \mathbb{C}^2)$ with the symmetric boundary condition

$$\Psi|_{\partial D} = \frac{1}{\sqrt{2}} (e^{i\theta}, e^{i\theta}). \quad (2)$$

The degree on the boundary is $[n_+, n_-] = [1, 1]$, and the energy expansion of [2] shows that the minimizers Ψ_ϵ converge to a Σ -valued harmonic map in D with a single limiting vortex at the origin. Thus, minimizers produce a compound vortex with winding in each phase near the origin. For $\epsilon > 0$ small, we ask whether the zeros of the two components coincide. It is easy to verify that if u_ϵ minimizes G_ϵ (the classical GL energy) with symmetric boundary condition, $u_\epsilon|_{\partial D} = e^{i\theta}$, then $U_\epsilon = \frac{1}{\sqrt{2}}(u_\epsilon, u_\epsilon)$ is a critical point of F_ϵ with boundary data (2). But is U_ϵ minimizing F_ϵ ? The answer depends on the value of β . To see this, we define the spin $S = \frac{1}{2}(|\psi_-|^2 - |\psi_+|^2)$ and note that $W(\Psi) = (|\Psi|^2 - 1)^2 + 4\beta S^2 = 2 \left[\left(|\psi_+|^2 - \frac{1}{2} \right)^2 + \left(|\psi_-|^2 - \frac{1}{2} \right)^2 \right] + 4(\beta - 1)S^2$. The following results are proved in [4].

Theorem 1. *Let u_ϵ and $U_\epsilon = \frac{1}{\sqrt{2}}(u_\epsilon(x), u_\epsilon(x))$, as above.*

- (i) *If $\beta \geq 1$, then U_ϵ minimizes F_ϵ with Dirichlet condition (2) for every $\epsilon > 0$.*
- (ii) *If $0 < \beta < 1$, then for all sufficiently small $\epsilon > 0$, U_ϵ is not the minimizer of F_ϵ with boundary condition (2).*

The proof is based on comparisons between the vortex core energies and on our previous results in [1, 2, 3].

To understand the core structure of vortices, we blow up the solution at scale ϵ around the vortex center. After rescaling and passing to the limit, we obtain an entire solution in all of \mathbb{R}^2 to the elliptic system

$$\begin{aligned} -\Delta\psi_+ &= (1 - |\Psi|^2)\psi_+ + \beta(|\psi_-|^2 - |\psi_+|^2)\psi_+, \\ -\Delta\psi_- &= (1 - |\Psi|^2)\psi_- - \beta(|\psi_-|^2 - |\psi_+|^2)\psi_-. \end{aligned} \quad (3)$$

Solutions to (3) obtained by blowing up minimizers in Ω satisfy an integrability condition $\int_{\mathbb{R}^2} W(\Psi) dx < \infty$, as for the classical GL equation. While these solutions have infinite energy measured in the entire \mathbb{R}^2 , they do inherit a local energy minimizing property, identified by De Giorgi. Let $F_1(\Psi, \Omega)$ be the GL energy (1) with $\epsilon = 1$.

Definition 2. *Ψ is a locally minimizing solution of (3) if the integrability condition above holds and if, in every bounded regular domain $\Omega \subset \mathbb{R}^2$, $F_1(\Psi; \Omega) \leq F_1(\Phi; \Omega)$ holds for every $\Phi = (\varphi_+, \varphi_-) \in H^1(\Omega; \mathbb{C}^2)$ with $\Phi|_{\partial\Omega} = \Psi|_{\partial\Omega}$.*

For the classical GL equation in \mathbb{R}^2 ,

$$-\Delta\psi = (1 - |\psi|^2)\psi,$$

the unique nontrivial locally minimizing solution is (up to symmetries) the degree-one equivariant solution, $u = f(r)e^{i\theta}$, with $f(0) = 0$. In [3] we proved that the solutions with degrees $[n_+, n_-] = [1, 0]$ or $[0, 1]$ at infinity are locally minimizing entire solutions and that these vortex solutions are “coreless,” i.e. $|\Psi| > 0$, but that the spin $S \neq 0$.

For degrees $[1, 1]$ at infinity, it is not clear whether or not a locally minimizing solution exists for (3). For $\beta > 1$, we can show that the locally minimizing solution is of the form $\Psi^* = \frac{1}{\sqrt{2}}(u(x-a)e^{i\phi_+}, u(x-a)e^{i\phi_-})$, where ϕ_\pm are real constants, $a \in \mathbb{R}^2$ is constant, and u is as above. But for $0 < \beta < 1$, we only know that a locally minimizing solution with $\deg(\psi_\pm^*, \infty) = 1$ must have $|\Psi^*| > 0$ in \mathbb{R}^2 . In particular, the GL solution is *not* locally minimizing for (3). Then, for $0 < \beta < 1$, local minimizers with degree pair $[n_+, n_-] = [1, 1]$ must have distinct zeros in each component and resemble a gluing together of two simple vortex solutions (of degrees $[1, 0]$ and $[0, 1]$) studied in [3].

These results have an important implication for the Dirichlet problem: the minimizer in the disk $\Omega = D$ with symmetric boundary condition (2) has a single GL-type vortex (with both components vanishing at the origin) for $\beta \geq 1$, but for $0 < \beta < 1$ each component vanishes separately, and $|\Psi_\epsilon|$ is bounded away from zero. From the analysis of the renormalized energy done in [1, 2], the zeros of ψ_+ and ψ_- must tend to the origin as $\epsilon \rightarrow 0$. It is an interesting open question to determine the rate at which they coalesce as $\epsilon \rightarrow 0$. If the mutual distance between the zeros in each component is of the order of ϵ , then blowing up at scale ϵ produces a locally minimizing solution to (3) with degree pair $[1, 1]$ at infinity. Necessarily, this local minimizer is non-equivariant, with separated zeros in each component. On the other hand, if no locally minimizing solution exists with degree pair $[n_+, n_-] = [1, 1]$, then the distance between the two vortices in the boundary-value problem must necessarily be much larger than ϵ , and the compound vortex breaks down into a distinct pair of $[n_+, n_-] = [1, 0]$ and $[n_+, n_-] = [0, 1]$ vortices for $\epsilon > 0$.

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The Curved n -Body Problem and the Geometry of the Universe

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In the 1830s, Bolyai and Lobachevsky saw a connection between geometry and physics, whose laws depend on the shape of space. Their discovery of the hyperbolic plane, in which we can draw two parallels to a straight line through a point outside it, made them question whether the universe is Euclidean. Gauss checked if the sum S of the angles of a triangle formed by 3 mountain peaks corresponds to an elliptic ($S > 180^\circ$), flat ($S = 180^\circ$), or hyperbolic ($S < 180^\circ$) space, but his measurements proved inconclusive. Since we cannot reach distant stars, Gauss's method is of no practical use for cosmic triangles either.

Some recent results, however, point out at a new approach towards answering this question, [2], [3], [4]. The equations of motion of the classical Newtonian n -body problem can be extended, in a meaningful physical way beyond their Euclidean setting, to spaces of constant curvature $\kappa \neq 0$, i.e. the sphere \mathbb{S}_κ^3 , for $\kappa > 0$, and the hyperbolic space \mathbb{H}_κ^3 , for $\kappa < 0$. If we could prove the existence of solutions specific to each of \mathbb{R}^3 , \mathbb{S}_κ^3 , and \mathbb{H}_κ^3 , then we'd only have to decide whether the observable celestial orbits unfold in an Euclidean, elliptic, or hyperbolic universe.

We start with the 2-dimensional case, whose generalization to 3 dimensions is easy to do. It turns out that a convenient model for \mathbb{H}_κ^2 is the upper sheet of a hyperboloid of two sheets, in which the geodesics are the hyperbolas that result from the intersection of this surface with planes passing through the origin of the frame. The differential equations of this "curved" n -body problem of masses m_1, \dots, m_n are

$$\ddot{\mathbf{q}}_i = \sum_{\substack{j=1 \\ j \neq i}}^n \frac{m_j |\kappa|^{3/2} [\mathbf{q}_j - (\kappa \mathbf{q}_i \odot \mathbf{q}_j) \mathbf{q}_i]}{[\sigma - \sigma(\kappa \mathbf{q}_i \odot \mathbf{q}_j)^2]^{3/2}} - (\kappa \dot{\mathbf{q}}_i \odot \dot{\mathbf{q}}_i) \mathbf{q}_i, \quad i = \overline{1, n},$$

where $\mathbf{q}_i = (x_i, y_i, z_i)$ is the position vector of the body of mass m_i , $\sigma = 1$ for $\kappa > 0$, $\sigma = -1$ for $\kappa < 0$, and \odot is the dot product $\mathbf{a} \odot \mathbf{b} := a_x b_x + a_y b_y + \sigma a_z b_z$ of $\mathbf{a} = (a_x, a_y, a_z)$, $\mathbf{b} = (b_x, b_y, b_z)$. The position vectors and the velocities also satisfy the constraints $\mathbf{q}_i \odot \mathbf{q}_i = \kappa^{-1}$ and $\mathbf{q}_i \odot \dot{\mathbf{q}}_i = 0$, $i = \overline{1, n}$.

It turns out that there are orbits in \mathbb{S}_κ^2 that don't exist in \mathbb{H}_κ^2 or \mathbb{R}^2 , such as the fixed points of the equations of motion. Indeed, if we arrange three bodies of equal masses, with zero initial velocities, at the vertices of an equilateral triangle inscribed in a great circle of the sphere, the bodies won't move. But fixed points are undetectable because, as

astronomers know, the radius of an elliptic universe would be many times larger than the depth we can reach through our current telescopes.

In \mathbb{H}_κ^2 there are orbits with no analogue in \mathbb{S}_κ^2 or \mathbb{R}^2 . To see this, consider the branch B of the hyperbola obtained when the plane yz intersects the upper sheet of the hyperboloid. Take two planes parallel and equidistant to yz ; they cut the upper sheet of the hyperboloid along two congruent non-geodesic branches of hyperbolas, A and C . Now imagine a plane containing the x axis and rotating about it. While this plane moves, its intersection with the upper sheet of the hyperboloid generates a rotating geodesic branch of a hyperbola, $H(t)$. Place 3 bodies of equal masses at the intersection of $H(t)$ with A , B , and C , respectively. The bodies lie on this moving geodesic and slide along the curves A , B , C , maintaining constant mutual distances. This orbit, which resembles 3 jet planes flying in formation, exists in \mathbb{H}_κ^2 . Alas, it is unstable, so the chances to find it in nature are nil.

There exist solutions in \mathbb{R}^3 with no correspondent in \mathbb{H}_κ^3 or \mathbb{S}_κ^3 , such as the Lagrangian orbits of the 3-body problem, for which the bodies lie at the vertices of a rotating equilateral triangle. These motions occur in \mathbb{R}^3 for any values of the masses, but only for equal masses in \mathbb{H}_κ^3 or \mathbb{S}_κ^3 . The former orbits show up in our solar system, the triangle Sun-Jupiter-Trojans among them. So for solar-system distances, the universe is basically flat. This conclusion may come as no surprise, but it is good to have a mathematical proof of it. Future findings of new theoretical orbits and their possible discovery in nature might help us better understand the shape of the physical space.

Apart from practical aspects, the curved n -body problem reveals unexpected solutions of mathematical interest. In \mathbb{S}_κ^3 , for instance, some recent investigations prove the existence of orbits that maintain constant mutual distances and move on Clifford tori, [1]. A Clifford torus is a 2-dimensional surface lying in \mathbb{R}^4 and \mathbb{S}_κ^3 . Indeed, if we define this torus as

$$\{(r \cos \theta, r \sin \theta, \rho \cos \phi, \rho \sin \phi) \mid r^2 + \rho^2 = \kappa^{-1}, 0 \leq \theta, \phi < 2\pi\},$$

then the distance from the origin of the frame to any of its points is

$$(r^2 \cos^2 \theta + r^2 \sin^2 \theta + \rho^2 \cos^2 \phi + \rho^2 \sin^2 \phi)^{1/2} = (r^2 + \rho^2)^{1/2} = \kappa^{-1/2},$$

i.e. the radius of \mathbb{S}_κ^3 . Unlike the standard torus embedded in \mathbb{R}^3 , the Clifford torus is a flat surface. Moreover, it splits \mathbb{S}_κ^3 into two solid tori, which are congruent when $r = \rho$. Some orbits of the curved 4-body problem lying on regular tetrahedra move along these surfaces while performing two rotations, each relative to a plane of \mathbb{R}^4 . In \mathbb{H}_κ^3 , analogue orbits rotate on cylinders centred around geodesics.

These results show some connections between branches of mathematics, as well as non-trivial applications in astronomy, and raise hopes that the curved n -body problem contains many interesting, yet undiscovered, properties.

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- A signed nomination statement from a present or past colleague, or collaborator (no more than three pages) having direct knowledge of the nominee's contribution;
- A short curriculum vitae, no more than five pages;
- Two to four letters of support in addition to the nomination;
- Other supporting material may be submitted, no more than 10 pages.

A nomination can be updated and will remain active for three years.

The complete nomination dossier must arrive at the CMS Executive Office no later than **November 15, 2011**. All documentation should be submitted electronically, preferably in PDF format, by the appropriate deadline to dbaward@cms.math.ca.

Le prix David-Borwein de mathématicien émérite pour l'ensemble d'une carrière rend hommage à un mathématicien qui a fait une contribution exceptionnelle et soutenue aux mathématiques canadiennes.

Le dossier de candidature comprendra les éléments suivants :

- une lettre de mise en candidature signée par un collègue ou un collaborateur actuel ou des années passées (trois pages maximum) qui connaît très bien les réalisations de la personne proposée;
- un bref curriculum vitae, maximum de cinq pages;
- de deux à quatre lettres d'appui, en plus de la mise en candidature;
- tout autre document pertinent, maximum de 10 pages.

Toute mise en candidature est modifiable et demeurera active pendant trois ans.

Le dossier complet doit parvenir au bureau administratif de la SMC au plus tard le **15 novembre**. Veuillez faire parvenir tous les documents par voie électronique, de préférence en format PDF, avant la date limite à prixdb@smc.math.ca.

CMS Excellence in Teaching Award for post-secondary undergraduate teaching in Mathematics

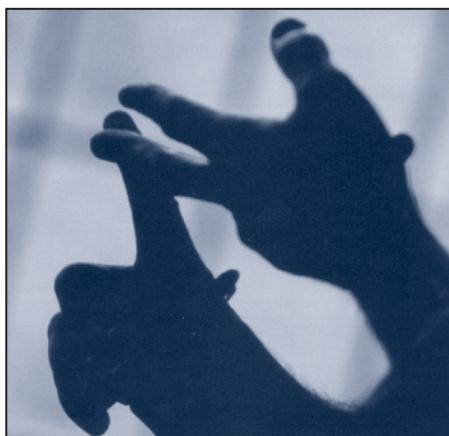
Prix d'excellence en enseignement de la SMC pour l'enseignement collégial et de premier cycle universitaire en mathématiques

Recognizing sustained and distinguished contributions in teaching. Full-time university, college, two-year college, or CEGEP teachers in Canada with at least five years teaching experience at their current institution can be nominated.

For details regarding nomination procedure, please visit:

cms.math.ca/Prizes/info/et

Deadline for nomination:
November 15, 2011



Ce prix récompense des contributions exceptionnelles et soutenues en enseignement. Il s'adresse aux professeures et professeurs d'université, de collège ou de cégep au Canada ayant au moins cinq ans d'expérience dans leur institution présente.

Pour les détails sur la procédure de mise en candidature voir :
smc.math.ca/Prix/info/et

Date limite pour soumettre une candidature :
15 novembre 2011

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RAPPORT DE L'ÉVÉNEMENT CONGRÈS CANADIEN DES ÉTUDIANTS EN MATHÉMATIQUE 2011

15 AU 19 JUIN 2011, À L'UNIVERSITÉ LAVAL, QUÉBEC, QC

Résumé du CCÉM 2011:

Le CCÉM 2011 a eu lieu à l'Université Laval, dans la ville de Québec. Plus de 160 étudiants ont participé au congrès et près de 80 d'entre eux ont donné des présentations. Les principaux sujets choisis pour les exposés étaient les mathématiques pures et appliquées, la statistique, l'informatique, la physique et la finance. Le congrès a duré 5 jours durant lesquels les participants ont pu assister aux différentes présentations étudiantes et à 8 conférences plénières données par des professeurs et des professionnels de partout dans le monde. Les conférenciers étaient:

- Frédéric Gourdeau (Université Laval)
- Pamela Gorkin (Université Bucknell)
- Aurélie Labbe (Université McGill)
- Thomas Brüstle (Université de Sherbrooke)
- Jean-Marie De Koninck (Université Laval)
- Yves Demay (Université de Nice)
- Yvan Saint-Aubin (Université de Montréal)
- Frederick Rickey (United States Military Academy)



Les participants ainsi que les conférenciers ont eu droit à une trousse de délégués, une tasse et un t-shirt de l'événement. Le banquet d'ouverture a eu lieu au Pub Universitaire de l'Université Laval. Un souper de trois services de même qu'une consommation étaient fournis aux participants et aux conférenciers intéressés. Le banquet de fermeture s'est déroulé à l'Atrium du Pavillon Charles-De Koninck de l'Université Laval. Les étudiants ont eu droit à un buffet varié et à une consommation gratuite. De l'alcool et du jus de fruits étaient vendus sur place à moindre coût. Les participants ont eu droit à des collations tout au long de l'événement et trois dîners étaient inclus dans le prix d'inscription.

Objectifs atteints:

Notre principal objectif était d'organiser un événement écoresponsable. Nous avons fait en sorte de respecter les critères nécessaires pour obtenir le statut d'événement écoresponsable à l'Université Laval. De plus, nous avons accueilli plus de 160 participants provenant de 26 universités à travers le Canada. Dans ce sens, notre objectif de participation a été plus qu'atteint. Nous avons aussi été en mesure d'inviter 8 conférenciers dont deux provenaient de l'extérieur du Canada. De plus, l'événement a permis de faire connaître la ville de Québec par l'intermédiaire d'articles et de produits locaux offerts aux participants. Finalement, nous pensons avoir été capable de maintenir le même niveau de qualité que le CCÉM 2010 à Waterloo tout en offrant une touche unique à l'événement.

Impact de l'événement:

Le congrès a permis de faire connaître l'Université Laval auprès de nombreux étudiants canadiens au premier cycle. Pour plusieurs, l'Université Laval est donc devenue une alternative potentielle pour des études graduées en sciences et génie. De plus, nos efforts pour organiser un événement écoresponsable nous ont permis de réduire les impacts négatifs de notre congrès sur l'environnement. Plusieurs étudiants et conférenciers ont souligné le souci de la consommation locale qui s'est manifesté par le choix de t-shirts fabriqués au Québec et de produits du terroir donnés aux conférenciers.

Finalement, il va sans dire que le congrès a contribué au rayonnement du département de mathématiques et statistique ainsi qu'à celui de l'Université Laval.



EVENT REPORT

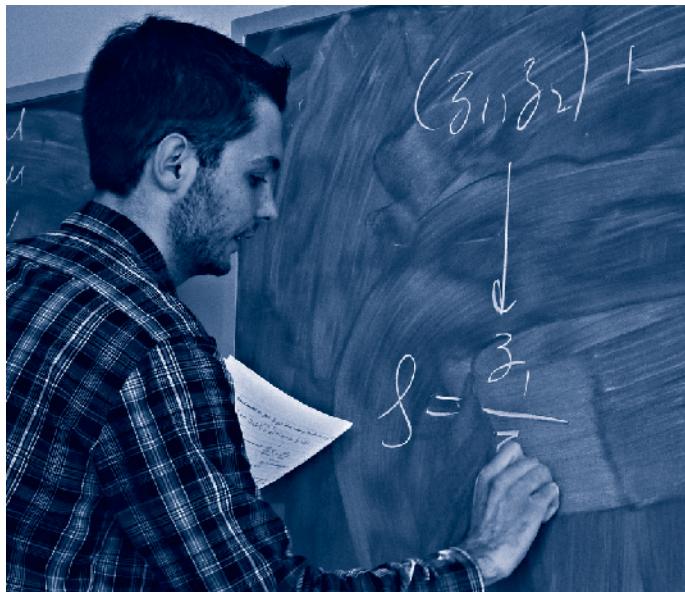
CANADIAN UNDERGRADUATE MATHEMATICS CONFERENCE 2011

JUNE 15 TO 19, 2011, AT LAVAL UNIVERSITY, QUEBEC CITY, QUEBEC

Summary of CUMC 2011:

CUMC 2011 was held at Laval University in Quebec City. More than 160 students participated in the conference, and nearly 80 of them gave presentations. The main subjects chosen for the presentations were pure and applied mathematics, statistics, informatics, physics, and finance. The conference lasted five days, during which time the participants attended various student presentations and eight plenary lectures given by professors and professionals from around the world. The keynote speakers were as follows:

- Frédéric Gourdeau (Laval University)
- Pamela Gorkin (Bucknell University)
- Aurélie Labbe (McGill University)
- Thomas Brüstle (University of Sherbrooke)
- Jean-Marie De Koninck (Laval University)
- Yves Demay (University of Nice)
- Yvan Saint-Aubin (University of Montreal)
- Frederick Rickey (United States Military Academy)



Both the participants and speakers received a delegates kit, which included a cup and an event t-shirt. The opening banquet was held at the university pub at Laval University. Participants and interested speakers enjoyed a three-course meal and a beverage. The closing banquet took place in the Atrium of Charles-de Koninck Pavilion at Laval University. Students enjoyed a buffet meal and a free beverage. Alcoholic beverages and fruit juices were available for

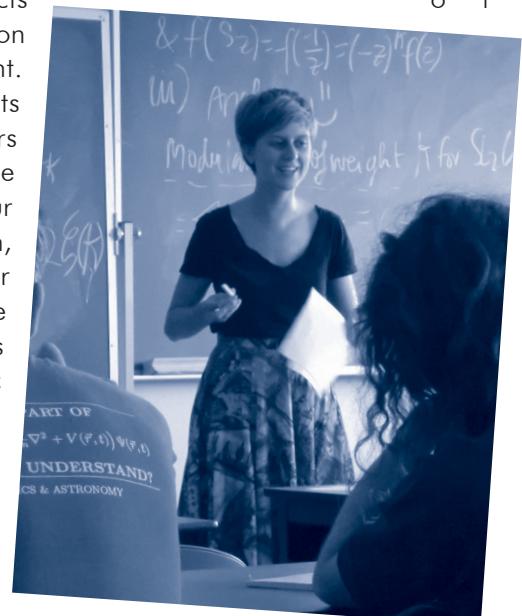
purchase on the premises at a minimum cost. Snacks were available to the participants all throughout the event, and three lunches were included in the registration price.

Objectives achieved:

Our main objective was to organize an eco-responsible event. We took measures to ensure that we respected the criteria for obtaining the status of eco-responsible event at Laval University. In addition, we hosted more than 160 participants from 26 universities across Canada. In this sense, we surpassed our participation objective. We were also able to invite 8 conference speakers, two of whom came from outside Canada. What is more, the event was also a chance to promote Quebec City through the intermediary of local articles and products offered to participants. And finally, we feel that we were able to maintain the same level of quality as CUMC 2010 in Waterloo, while still putting our own unique twist on the event.

Impact of the event:

The conference gave us a chance to promote Laval University to the many undergraduate students from Canada in attendance. For many, Laval University thus became a potential alternative for their graduate studies in science and engineering. In addition, through our efforts to organize an eco-responsible event, we were able to reduce the negative impacts our conference on the environment. Several students and speakers commented on the care taken to favour local consumption, through, for example, the choice of t-shirts made in Quebec and the gifts of traditional local products for the speakers.



And finally, it is clear the conference helped to raise the profile of both the mathematics and statistics departments, and that of University Laval itself.

RÉUNION D'HIVER SMC 2011 CMS WINTER MEETING

Saturday Samedi December 10 décembre	Sunday Dimanche December 11 décembre	Monday Lundi December 12 décembre
8:00 – 16:00 - Registration 9:30 – 16:00 - Exhibits 9:30 - 16:00- Poster Session	8:00 – 16:00 - Registration 9:30 – 16:00 - Exhibits 9:30 - 16:00- Poster Session	8:00 – 14:00 - Registration
8:15 – 8:30 Opening		
8:30 – 9:20 Plenary Lecture	8:00 – 10:00 Scientific Sessions	8:00 – 10:00 Scientific Sessions
9:30 – 10:00 Break		
10:00 – 11:30 Scientific Sessions	10:00 – 10:30 Break	10:00 – 10:30 Break
	10:30 – 11:20 Plenary Lecture	10:30 – 11:20 Plenary Lecture
11:30 – 12:20 Prize Lecture	11:30 – 12:20 Prize Lecture	11:30 – 12:20 Prize Lecture
12:30 – 14:00 Break	12:30 – 14:00 Break	12:30 – 14:00 Break
14:00 – 15:00 Scientific Sessions	14:00 – 15:00 Scientific Sessions	14:00 – 16:00 Scientific Sessions
15:00 – 15:50 Plenary Lecture	15:00 – 15:50 Plenary Lecture	
15:50 – 16:00 Break	15:50 – 16:00 Break	
16:00 – 17:30 Scientific Sessions	16:00 – 17:30 Scientific Sessions	
18:00-19:00 Public Lecture	18:30 - 19:15 Reception (cash bar)	
20:00 – 22:00 Student Social	19:15 – 22:00 Banquet	(updated July 20, 2011)

RÉUNION D'HIVER SMC 2011 CMS WINTER MEETING

December 10 – 12, 2011

Delta Chelsea Hotel, Toronto

Host: Ryerson University, York University

10 – 12 décembre 2011

Hôtel Delta Chelsea (Toronto)

Hôtes : Université Ryerson, Université York

Prizes | Prix

Coxeter-James Prize | Prix Coxeter-James
Iosif Polterovich (Montreal)

Doctoral Prize | Prix de doctorat
Adrien Pouliot Award | Prix Adrien-Pouliot

G. de B. Robinson Award | Prix G. de B. Robinson

Graham Wright Award for Distinguished Service
Prix Graham Wright pour service méritoire

Public Lecture | Conférence publique

Kumar Murty (Toronto)

Sessions

The following sessions have been confirmed:

Les sessions suivantes ont été confirmées :

Applied Analysis | Analyse appliquée

Org: Peter Gibson (York), Michael Lamoureux (Calgary)

Algebraic Combinatorics | Combinatoire algébrique

Org: Nantel Bergeron (York), Mike Zabrocki (York)

Analytic Number Theory and Diophantine

Approximation | Théorie analytique des nombres et approximation diophantienne

Org: Cameron Stewart (Waterloo)

Complex Networks | Réseaux complexes

Org: Jeannette Janssen (Dalhousie), Paweł Prałat (Ryerson)

Designs, Factorizations and Coverings

Designs, factorisations et revêtements

Org: Peter Danziger (Ryerson), Lucia Moura (Ottawa),
Brett Stevens (Carleton)

Discrete Geometry | Géométrie discrète

Org: Walter Whiteley (York)

Financial Mathematics | Mathématiques financières

Org: Matt Davison (Western), Marcus Escobar, Sebastian Ferrando, Pablo Olivares (Ryerson), Luis Seco (Toronto)

Fluid Dynamics | Dynamique des fluides

Org: Serge D'Alessio (Waterloo), Katrin Rohlf, J.P. Pascal (Ryerson University)

Plenary Speakers | Conférences plénierées

Hermann Eberl (Guelph)
Christina Goldschmidt (Warwick, UK)
Gordon Swaters (Alberta)
Chris Wild (Auckland)
Hugh Woodin (Berkeley)
Craig Tracy (UC Davis)

Scientific Directors | Directeurs scientifiques

Anthony Bonato
abonato@ryerson.ca, T: 416-979-5000 ext. 4912

Juris Steprāns
steprans@yorku.ca, T: 416-736-5250

History and Philosophy of Mathematics

Histoire et philosophie des mathématiques
Org: Tom Archibald (SFU), Craig Fraser (Toronto),
Menolly Lysne (Toronto)

Mathematical Biology | Biologie mathématique

Org: Kunquan Lan (Ryerson), Jianhong Wu (York)

Mathematics Education | Éducation mathématique

Org: Walter Whiteley (York)

Operator Algebras | Algèbres d'opérateurs

Org: George Elliott, Zhiqiang Li, Henning Petzka,
Adam Sierakowski, Aaron Tikuisis (Toronto)

Probability | Probabilité

Org: Tom Salisbury (York), Jeremy Quastel (Toronto)

Quantum Information | Information quantique

Org: David Kribs (Guelph), Ashwin Nayak (Waterloo),
Bei Zeng (Guelph)

Set Theory | Théorie des ensembles

Org: Ilijas Farah (York)

Contributed Papers | Communications libres

Org: to be confirmed | à venir

Student Poster Session

Présentations par affiches pour étudiants

Org: to be confirmed | à venir

DU COMITÉ DE DIRECTION DU PLAN À LONG TERME

Nancy Reid
Université de Toronto



Bilan du plan à long terme pour les mathématiques et les statistiques – Été 2011

Présenté au nom du comité de direction chargé du plan à long terme (PLT), Nancy Reid, présidente

Les membres du comité de direction chargé du plan à long terme se réunissent régulièrement depuis le mois de septembre 2010. Le présent bilan est fondé sur les présentations données au cours de la réunion d'été de la SMC le 4 juin et de la réunion annuelle de la SSC, le 12 juin. Une présentation à la SCMAI est prévue au cours de la réunion de l'ICIAM, qui aura lieu à Vancouver, au mois de juillet.

Aux mois de février et mars, les membres du comité de direction ont visité plusieurs facultés de mathématiques, de statistiques et de mathématiques/statistiques à travers le pays. Le comité a également demandé qu'on lui présente des documents de discussion dans le cadre d'un appel général. Nous avons reçu environ 30 documents, chacun publié à l'adresse <http://longrangeplan.ca/>, sous l'onglet « Consultations auprès des milieux ». Les commentaires de nos intervenants ont été fort utiles et contribueront à orienter le contenu du plan. Voici quelques-unes des préoccupations soulevées :

- Dans le cadre de l'évaluation des propositions concernant les subventions, l'évaluation du personnel hautement qualifié (PHQ) doit tenir compte de la taille du département/faculté et de l'existence d'un programme d'études de cycles supérieurs. Le fait que le PHQ représente le tiers des points au total pénalise les petits départements/facultés, et la réussite du programme de recherche n'est forcément tributaire du PHQ.
- L'évaluation du mérite ne semble pas être uniforme d'une année à l'autre et au cours d'une même année. De nombreuses personnes s'inquiètent de la tendance qui semble se dessiner, soit une tendance en faveur de bourses moins nombreuses, mais plus importantes : les mathématiques et la statistique doivent avoir un soutien large. La recherche de premier cycle dans de petits établissements est très importante pour le maintien de notre domaine. La capacité de recherche faisant partie intégrante de petits établissements risque de disparaître. La tendance en faveur d'une réduction de l'appui accordé à la recherche dans les petites universités pourrait avoir des effets négatifs plus importants pour les femmes en mathématiques.

- Le modèle à enveloppes proposé pourrait entraîner une diminution supplémentaire des subventions à la découverte : les établissements sont importants, mais ne devraient pas empiéter sur les fonds des subventions à la découverte – comment pourra-t-on les protéger dans un modèle à enveloppes? Comment les nouvelles activités, par exemple, les nouveaux instituts, seront-elles financées?
- Le travail interdisciplinaire risque d'être laissé pour compte. C'est ce qu'on a entendu au sujet de la biostatistique, de la science actuarielle et de l'apprentissage-machine en particulier, mais on note des préoccupations semblables vis-à-vis des mathématiques appliquées. Certains scientifiques mathématiciens interdisciplinaires quittent le groupe d'évaluation des mathématiques et des statistiques parce que tous les autres groupes obtiennent des bourses moyennes plus élevées.
- Les instituts n'ont pas autant d'effets sur les statistiques : le National Program for Complex Data Structures a créé un plus grand sentiment d'appartenance, et son modèle de soutien était mieux adapté aux statistiques. Comment une telle activité ferait-elle partie de l'enveloppe sans nuire au financement des subventions à la découverte?

Dès qu'on a annoncé les résultats des subventions de 2011 au mois d'avril, un autre problème s'est manifesté. On craint fortement dans le milieu que le cadre d'évaluation actuel est défectueux. Plusieurs facteurs ont contribué à nuire aux résultats du concours cette année; le secret et la rigidité au CRSNG n'ont fait qu'empirer les choses. L'élection a aussi nuit au partage d'information. Lorsque le calme est revenu, on a cru constater une baisse du nombre de candidats financés qui revenaient et du nombre de chercheurs en début de carrière par rapport aux dernières années. Les candidats financés qui revenaient viennent ajouter leurs fonds au budget et les chercheurs en début de carrière attirent des fonds du budget général réservé aux subventions à la découverte. Si d'autres groupes comptent un nombre relativement plus élevé de chercheurs en début de carrière, certains fonds sont détournés des mathématiques et des statistiques afin de réduire les pressions. Ainsi, quelque trois millions de dollars ont

DU COMITÉ DE DIRECTION DU PLAN À LONG TERME SUITE

été distribués en subventions comparativement à 3,5 millions l'an dernier. On décrit bien la situation dans le blogue du Comité de liaison des mathématiques du CRSNG : <http://nmlc.math.ca/>.

Bien que nous convenions tous du principe de la séparation de l'évaluation des propositions des décisions sur les montants des subventions à accorder, de nombreuses décisions touchant le processus détaillé à cet égard peuvent avoir des effets imprévus. Par exemple, le groupe d'évaluation n'aurait pas été au courant de la diminution des fonds généraux par rapport à 2010 pendant qu'ils évaluaient les propositions. Par rapport au plan à long terme, le comité de direction a alors décidé qu'il devait fournir, dans le plan, des recommandations concernant l'évaluation des demandes de subventions à la découverte. Nous comptons les préparer avant le concours 2012, même si le modèle fondé sur les enveloppes ne sera pas encore instauré. Autre conséquence pour le plan à long terme, il a été difficile d'accorder l'importance requise à la planification à long terme, selon un scénario décrit par le CRSNG comme du « financement stable », à la lumière des résultats de 2011.

Les prochaines étapes pour le comité de direction consistent à rédiger une première ébauche du plan à long terme, à collaborer avec le CRSNG et son comité de liaison sur les mathématiques/statistiques au sujet des recommandations pour le concours de 2012 et à entamer des pourparlers avec le CRSNG au sujet des paramètres de l'enveloppe et de la définition de « financement stable ». Bien que tous les membres du comité de direction soient chargés de la rédaction de diverses parties du plan, un sous-comité de rédaction formé de Nancy Reid, de Rachel Kuske et d'Edward Bierstone veillera à tout regrouper. De plus, nous avons retenu les services d'un rédacteur se spécialisant dans les sciences, qui se chargera des parties du document destinées au grand public. Nous comptons terminer la première ébauche au début du mois de novembre; nous comptons au début avoir tout terminé au début du mois de septembre. On peut obtenir un sommaire provisoire du document, y compris les en-têtes de chapitres et les sujets de chacun des chapitres, dans la présentation Powerpoint qui a été présentée aux réunions d'été des sociétés et qui est affichée sur le site : <http://longrangeplan.ca/>.

Voici quelques-unes des décisions importantes qui ont été prises : recommander de réservé un pourcentage fixe (18 %) de l'enveloppe aux activités liées aux instituts, recommander une meilleure coordination nationale des activités parmi les trois instituts de

sciences mathématiques suivant si les conditions d'ordre scientifique s'y prêtent, recommander que les trois instituts de sciences mathématiques financent un programme en sciences statistiques s'apparentant au National Program on Complex Data Structures, programme qui jouirait d'un financement de 500 000 \$ par année et recommander des lignes directrices pour l'évaluation des activités permanentes et les nouvelles activités des instituts et que la SRIB soit considérée comme une entité internationale spéciale qui fait partie de notre enveloppe et qui est profitable à l'ensemble de notre milieu.

Il reste toujours à définir la portée du plan, à créer des mécanismes de surveillance de sa mise en œuvre, à établir des lignes directrices détaillées pour les évaluations et à éviter à tout prix les différends à l'intérieur de notre enveloppe au sujet du fractionnement entre les mathématiques et les statistiques et la division du financement des institutions et des fonds des subventions à la découverte. Autre sujet de préoccupation immédiat, le CRSNG n'envisagera de changer l'attribution de fonds aux groupes d'évaluation qu'après la présentation d'un rapport du Conseil des académies canadiennes : ce rapport est attendu à l'été 2012. C'est là la seule occasion s'offrant à nous d'accroître notre financement des subventions à la découverte par le CRSNG.

Un observateur attentif nous a demandé quelle était notre vision vis-à-vis du plan à long terme : « À quoi ressemblerait le succès? » Après avoir songé quelque temps à la réponse, nous avons décrit le succès comme comptant à tout le moins les éléments suivants : faire participer des scientifiques de tous les domaines de recherche scientifique en mathématiques et en statistiques; faire connaître nos forces en recherche, tant par sa portée que par sa diversité; susciter un engouement au CRSNG égal au nôtre pour notre recherche; accroître nos occasions d'obtenir du financement de recherche; s'assurer que notre financement de recherche actuel est bien adapté à la discipline et appliqué efficacement et se servir d'anecdotes pour démontrer en quoi notre force en recherche soutient les priorités actuelles du gouvernement et de la société.

FROM THE LONG RANGE PLAN STEERING COMMITTEE *continued*

the communities that the current evaluation system is broken. Several factors conspired to damage the competition results this year, and secrecy and rigidity at NSERC made things worse. As well the election hampered the flow of information. When the smoke cleared, it appeared that there were fewer returning funded applicants, and fewer early career researchers, relative to the recent past. Returning funded applicants bring their \$\$ to the budget; early career researchers attract money from the whole DG budget. If other groups have relatively more ECRs, some money effectively flows from mathematics and statistics to help with this pressure. The net result was that there was about \$3 million distributed in grants, whereas last year there was \$3.5 million. The situation is well-described at the Math NSERC Liaison Committee Blog: <http://nmlc.math.ca/>.

While we are all agreed on the principle of separating out evaluation of proposals from decision about the amount of the grant, there are many decisions on the detailed process for achieving this that can have unexpected effects. As one example, the evaluation group would not have been aware of the decrease in overall funding from 2010 while they were evaluating proposals. The net result for the LRP is that the steering committee has decided that it needs to make recommendations in the plan for the evaluation of Discovery Grants. We plan to have these recommendations prepared in time for the 2012 competition, even though the envelope model will not be in place then. Another consequence for the LRP is that it has been difficult to focus on long range planning, under a scenario described by NSERC as "stable funding", in light of the 2011 results.

The next steps for the steering committee are to prepare a first draft of the long range plan, to work with NSERC and their math/stats Liaison committee on recommendations for the 2012 competition, and to engage in discussion with NSERC on the parameters of the envelope, and on the definition of stable funding. While all steering committee members will be engaged in writing parts of the plan, a writing subcommittee of Nancy Reid, Rachel Kuske and Edward Bierstone will work to tie it all together. As well, we have engaged the services of a science writer, to help with the parts of the document intended for the public. We are aiming to complete the first draft by early November; we originally hoped to have this completed by the beginning of September. A draft outline, with chapter headings and topics for each chapter, is available on the powerpoint slides presented at the summer meetings of the societies, and posted to <http://longrangeplan.ca/>. Some important decisions that have been made are to recommend a fixed percentage (18%) of the envelope for institute-like activity, to recommend better national

coordination of activity across the three mathematical sciences institutes where that is scientifically sensible, to recommend that the three mathematical sciences institutes fund a program in statistical sciences along the lines of the National Program on Complex Data Structures, with funding on the order of \$500,000 per year, and to recommend evaluation guidelines for ongoing and new institute activity, and that BIRS should be considered a special international entity which is part of our envelope and benefits our entire community.

Challenges we continue to face include defining the scope of the plan, creating mechanisms for oversight of its implementation, the need for detailed evaluation guidelines, the imperative that we avoid arguments within our envelope, over the split between mathematics and statistics and the split between institutes funding and Discovery Grants funding. An immediate practical concern is that NSERC will consider a different allocation of funds to evaluation groups only after a report from the Canadian Council of Academies is submitted: this report is expected in summer 2012. This is our only foreseeable opportunity to increase our DG funding from NSERC.

A perceptive observer asked about our vision for the long range plan: "what would success look like?" After some thought, we described success as consisting of at least the following elements: engaging scientists from the full range of mathematical and statistical sciences research; conveying the strength we have in research, both in breadth and diversity; having NSERC as excited about our research as we are; expanding our opportunities for research funding; ensuring our existing research funding is well suited to the discipline and effectively implemented; and using stories to show how our research strength supports current priorities of government and society.

CALL FOR SESSIONS | APPEL DE SESSIONS Réunion d'été SMC 2012 CMS Summer Meeting

June 2 - 4, 2012

Regina Inn and Ramada Inn, Regina, Saskatchewan

Host: University of Regina

We welcome and invite proposals for sessions for this meeting in Regina, Saskatchewan, from June 2 to 4, 2012; in particular, we encourage submissions from the Western Provinces. Proposals should include a brief description of the focus and purpose of the session, the expected number of speakers, as well as the organizer's name, complete address, telephone number and e-mail address. All sessions will be advertised in the CMS Notes, on the web site and in the AMS Notices. Speakers will be requested to submit abstracts, which will be published on the web site and in the meeting program. Those wishing to organize a session should send a proposal to the Meeting Directors by the deadline below.

Deadline: September 30, 2011

Scientific Directors | Directeurs scientifiques

Doug Farenick (doug.farenick@uregina.ca) and Don Stanley (stanley@math.uregina.ca)

Sessions

The following sessions have been confirmed:

Les sessions suivantes ont été confirmées :

Applied Analysis | Analyse appliquée

Org: Peter Gibson (York), Michael Lamoureux (Calgary)

Cluster Algebras and Related Topics

Algèbres amassées et sujets reliés

Org: Ralf Schiffler (Connecticut), Hugh Thomas (UNB)

Combinatorics | Combinatoire

Org: Karen Meagher (Regina), Marni Mishna (SFU)

Complex Geometry and Related Fields

Géométrie complexe et domaines reliés

Org: Tatyana Foth (Western), Eric Shippers (Manitoba)

Free Probability Theory: New Developments and Applications | Théorie des probabilités libres: applications et développements récents

Org: Serban Belinschi (Saskatchewan),
Benoît Collins (Ottawa)

Geometric Topology | Topologie géométrique

Org: Steve Boyer (UQAM), Ryan Budney (Victoria),
Dale Rolfsen (UBC)

Harmonic Analysis and Operator Spaces

Analyse harmonique et espaces d'opérateurs

Org: Yemon Choi (Saskatchewan),
Ebrahim Samei (Saskatchewan)

2 – 4 juin 2012

Hôtels Regina Inn et Ramada Inn, Regina (Saskatchewan)

Hôte : Université Regina

Nous vous invitons à proposer des sessions pour la réunion qui se tiendra à Regina (Saskatchewan) du 2 au 4 juin 2012 ; particulièrement les soumission des universités des provinces de l'Ouest sont encouragées. Votre proposition doit inclure une brève description de l'orientation et des objectifs de la session, le nombre de conférenciers prévues, ainsi que le nom, l'adresse complète, le numéro de téléphone et l'adresse courriel. Toutes les sessions seront annoncées dans les Notes SMC, sur le site web et dans le AMS Notices. Les conférenciers devront présenter un résumé qui sera publié sur le site web et dans le programme de la réunion. Toute personne qui souhaiterait organiser une session est priée de faire parvenir une proposition aux directeurs de la Réunion avant la date indiquée ci-dessous.

Date limite : 30 septembre 2011

Homotopy Theory | Théorie de l'homotopie

Org: Kristine Bauer (Calgary), Marcy Robertson (Western)

Interactions Between Algebraic Geometry and Commutative Algebra | Intéractions entre la géométrie algébrique et l'algèbre commutative

Org: Susan Cooper (Central Michigan),
Sean Sather-Wagstaff (North Dakota State)

Perspectives in Mathematical Physics

Perspectives en physique mathématique

Org: Yvan Saint-Aubin (Montréal), Luc Vinet (Montréal)

Operator Algebras | Algèbres des opérateurs

Org: Martín Argerami (Regina), Juliana Erlíman (Regina),
Remus Floricel (Regina)

Representation Theory of Groups, Lie Algebras, and Hopf Algebras | Théorie de représentation des groupes, des algèbres de Lie et de Hopf

Org: Allen Herman (Regina), Fernando Szechtman (Regina)

Total Positivity | Positivité totale

Org: Shaun Fallat (Regina), Michael Gekhtman (Notre Dame)

Contributed Papers | Communications libres

Org: Edward Doolittle (First Nations University),
Fotini Labropulu (Regina)

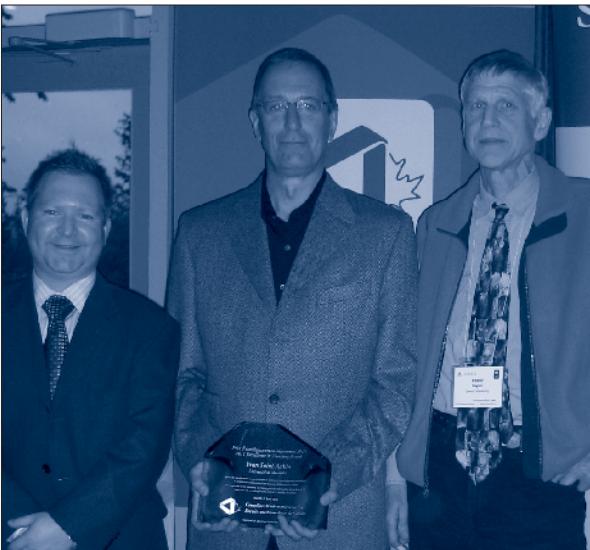
Prix d'excellence en enseignement 2011 Excellence in Teaching Award Yvan Saint-Aubin (Université de Montréal)

Yvan Saint-Aubin is a credit to mathematics education. He has distinguished himself by his outstanding teaching skills and attentiveness toward students as well as by playing a pivotal role in both the overall mathematical life of students and his department's efforts to revitalize the delivery of several courses and to refresh and modernize its programs.

He approaches his discipline and course content with tremendous depth, insisting on big thinking and linking course modules to one another and even to other courses. He is known for the clarity of his explanations and the efforts he makes to ensure every student understands the material. His students praise him for his humour and enthusiasm, as well as the fact that he tries to learn the name of every student in his classes.

Throughout his career, Yvan Saint-Aubin has championed an innovative vision of teaching in his department. He has redesigned several courses, including linear algebra, differential geometry and Fourier analysis, by drafting course notes and producing quality workbook. He has also created original courses, including a symbolic manipulations course that was one of the first of its kind, and, with Prof. Christiane Rousseau, a course in mathematics and technology for future high-school teachers that is now cited and emulated around the world. Their book Mathematics and Technology has received multiple honours and launched the Springer Undergraduate Texts in Mathematics and Technology (SUMAT) series.

Yvan Saint-Aubin earned his PhD in physics from the Université de Montréal in 1982. After postdoctoral work at MIT, he became processor at the Université de Montréal in 1984. He has served as deputy director of CRM (1995-1999), chair of his department (2001 to 2005) and vice-president of the CMS (2007-2009). Currently, he is chair of the CMS Finance Committee and is a sought-after public lecturer, speaking extensively in CEGEPS across Quebec. He received the Excellence in Teaching Award from the Université de Montréal in 1992.



Sean Chamberland, Yvan Saint-Aubin and Peter Taylor

Yvan Saint-Aubin est un exemple pour l'enseignement des mathématiques. Il s'est distingué par la qualité de sa prestation d'enseignement et son attention aux étudiants et par son rôle fondamental dans la revalorisation de l'enseignement de plusieurs cours dans son département, dans l'innovation et la modernisation des programmes et dans la vie mathématique des étudiants.

Il est également très profond dans son approche de la matière. Il insiste sur les grandes idées, fait des liens entre les différentes parties du cours, ainsi que des liens avec les autres cours. Il est

connu pour ses explications claires et les efforts qu'il consent pour s'assurer que chaque étudiant comprend bien ce qu'il enseigne.

Tout au long de sa carrière, Yvan Saint-Aubin a imposé une vision de l'enseignement dans son département. Il a remodelé plusieurs cours, notamment l'algèbre linéaire, la géométrie différentielle et l'analyse de Fourier, en écrivant des notes de cours et de très beaux recueils de problèmes. Il a également créé des cours tout à fait nouveaux, y compris un cours sur les manipulations symboliques qui a été un des premiers cours uniques en son genre, et avec la professeure Christiane Rousseau, un cours de mathématiques et de technologie à l'intention de futurs enseignants du secondaire, cours qui est maintenant cité et copié à travers le monde. Leur ouvrage intitulé Mathématiques et Technologie, a reçu de nombreux honneurs et lancé la série d'ouvrages Springer Undergraduate Texts in Mathematics and Technology (SUMAT).

Yvan Saint-Aubin a obtenu son doctorat en physique de l'Université de Montréal en 1982. Après son travail postdoctoral à MIT, il est devenu professeur à l'Université de Montréal, en 1984. Il a été directeur adjoint de CRM (de 1995 à 1999), directeur de son département (de 2001 à 2005) et vice-président de la SMC (de 2007 à 2009). À l'heure actuelle, il est président du Comité des finances de la SMC et est un conférencier public recherché. Il donne de nombreuses présentations dans des cégeps à travers le Québec. Il a reçu un prix d'excellence en enseignement de l'Université de Montréal en 1992.

Prix Jeffery-Williams 2011 Jeffery-Williams Prize Kai Behrend (University of British Columbia)

Kai Behrend is a leading expert in the theory of algebraic stacks and the geometry of moduli spaces of stable maps. His work on Gromov-Witten theory, Donaldson-Thomas theory, and the virtual fundamental class has had a large and lasting impact on algebraic geometry. In particular, his 1996 Duke paper (with Manin) and his two 1997 Inventiones papers (one with Fantechi) are among the most heavily cited papers in the subject. Nearly every paper in Gromov-Witten theory, which is a mathematical incarnation of string theory, relies on his work in some way.

His recent Annals paper on micro-local geometry and Donaldson-Thomas theory has revolutionized the subject. Donaldson-Thomas invariants are fundamental invariants of Calabi-Yau threefolds. His Annals paper allows the use of topological techniques to compute the invariants and has changed the way that people think about these invariants. Dr Behrend's use of micro-local geometry to study the virtual fundamental class was ingenious and completely unprecedented in mathematics and physics. It led to his discovery of the now-called "Behrend function", a fundamental integer valued function on any complex variety or scheme which provides subtle information about the singularities.

After studying in Hamburg and Oregon, Dr. Behrend did graduate work under G. Harder in Bonn and A. Ogus in Berkeley, receiving his PhD from the University of California in 1991. After post-doctoral work at the Massachusetts Institute of Technology and the Max-Planck Institute for Mathematics he accepted a position at the University of British Columbia in 1995, where he is now Professor of Mathematics. He has also held visiting positions at the Max-Planck-Institut für Mathematik, Bonn, and at the Research Institute for Mathematical Sciences in Kyoto, Japan.



Kai Behrend and Jacques Hurtubise

Kai Behrend est l'un des plus illustres experts mondiaux de la théorie des empilements algébriques et de la géométrie des espaces de modules d'applications stables. Son travail relativement à la théorie de Gromov-Witten, de la théorie de Donaldson-Thomas et de la catégorie fondamentale virtuelle a laissé une grande marque durable sur le domaine de la géométrie algébrique. En particulier, son article pour le journal de Duke de 1996 (co-rédigé avec Manin) et ses deux publications de 1997 dans le journal Inventiones (un avec Fantechi) figurent parmi les ouvrages les plus fréquemment

cités sur le sujet. Pratiquement tous les écrits sur la théorie de Gromov-Witten, qui est une incarnation mathématique de la théorie des cordes, sont fondés de manière quelconque sur les ouvrages de M. Behrend.

Sa récente publication dans le journal Annals sur la géométrie micro-locale et la théorie de Donaldson-Thomas a révolutionné le domaine. Les invariante de Donaldson-Thomas sont des invariante fondamentales des « trois plis » Calabi-Yau. Son article dans le journal Annals admet l'usage de techniques topologiques pour calculer les invariante et a changé la façon dont les gens perçoivent ces invariante. L'usage qu'a fait M. Behrend de la géométrie micro-locale pour étudier la classe virtuelle fondamentale était fort ingénieux et sans précédent dans le domaine des mathématiques et de la physique. Cela lui a permis de découvrir ce qu'on appelle maintenant la « fonction Behrend », une fonction à valeur d'entier relatif fondamentale dans toute variété complexe ou modèle, qui fournit des détails subtils au sujet des singularités.

Kai Behrend a obtenu sa maîtrise de la University of Oregon en 1984. Il a fait du travail de deuxième cycle sous la direction de G. Harder à Bonn et de M. Ogus à Berkeley, a reçu son diplôme de la University of Bonn en 1989 et un doctorat de la University of California à Berkeley en 1991. Il a été instructeur Moore à la Massachusetts Institute of Technology, et après avoir fait ses travaux postdoctoraux à cet établissement et à la Max-Planck Institute, il s'est joint à la University of British Columbia en 1995 à titre de professeur de mathématique. Il a également occupé divers postes comme professeur invité au Max-Planck-Institut für Mathematik, à Bonn et à la Research Institute for Mathematical Sciences, à Kyoto, au Japon.



PIMS Postdoctoral Fellowship Competition

The Pacific Institute for the Mathematical Sciences (PIMS) invites nominations of outstanding young researchers in the mathematical sciences for Postdoctoral Fellowships for the year 2012-2013. Please note that the deadline for receipt of applications has been changed to December 1. Candidates must be nominated by at least one scientist or by a Department (or Departments) affiliated with PIMS. The fellowships are intended to supplement support provided by the sponsor, and are tenable at any of its Canadian member universities: Simon Fraser University, the University of Alberta, the University of British Columbia, the University of Calgary, the University of Victoria, University of Regina and the University of Saskatchewan, as well as at the PIMS affiliates Universities of Lethbridge and Northern British Columbia.

For the 2012-2013 competition, held in January of 2012, the amount of the award will be \$20,000 and the sponsor(s) is (are) required to provide additional funds to finance a minimum total stipend of \$40,000.

Rankings of candidates are made by the PIMS PDF Review Panel based on the qualifications of the candidate, potential for participation in PIMS programs, and potential involvement with PIMS partners. PIMS Postdoctoral Fellows will be expected to participate in all PIMS activities related to the fellow's area of expertise and will be encouraged to spend time at more than one site. To ensure that PIMS Postdoctoral Fellows are able to participate fully in Institute activities, they may not teach more than two single-term courses per year.

Nominees must have a Ph.D. or equivalent (or expect to receive a Ph.D. by December 31, 2012) and be within three years of their Ph.D. at the time of the nomination (i.e., the candidate must have received her or his Ph.D. on or after January 1, 2009). The fellowship may be taken up at any time between September 1, 2012 and January 1, 2013. The fellowship is for one year and is renewable for at most one additional year.

Details

The PIMS PDF nomination/application process takes place entirely online, utilizing the MathJobs service provided by the American Mathematical Society. Having selected their nominees, sponsors direct them to apply online at mathjobs.org/jobs/PIMS. Nominees are required to upload **two letters of reference**, a **curriculum vitae** and a **statement of research interests**. Sponsors must upload their own **reference letters** (these are in addition to the two reference letters mentioned just above) and a **statement of financial support**. They will receive instructions as to how to proceed from their nominees via email from MathJobs. Detailed instructions regarding all aspects of the MathJobs application procedure may be found in the online MathJobs user guides. Please note that application is by nomination only; unsolicited applications will not be considered. Please note that **all** nominees **must** apply through MathJobs; **this includes nominees from PIMS Collaborative Research Groups**.

Complete applications must be uploaded to MathJobs by **December 1, 2011**.

(Note that this date is 2 weeks earlier than in previous years.)

For further information, visit: www.pims.math.ca/scientific/postdoctoral or contact: assistant.director@pims.math.ca.

The Departments of Economics, Applied Mathematics, and Statistical & Actuarial Sciences at The University of Western Ontario invite applications from both Canadian and international candidates for a Tier II Canada Research Chair in the area of **Financial Econometrics**, at the rank of probationary (tenure-track) Assistant or tenured Associate Professor, as qualifications and experience warrant, with a starting date of January 1, 2013 or later. The successful candidate will be jointly appointed to the Department of Economics and to the Department of Applied Mathematics or the Department of Statistical & Actuarial Sciences. In accordance with the regulations set for Tier II Canada Research Chairs, the candidate will hold a PhD (normally obtained within the last ten years), and will be an outstanding emerging scholar who has demonstrated innovation with the potential to achieve international recognition within five to ten years. The candidate must propose an original research program that will attract external funding and excellent graduate students. The candidate will work with the Office of Research Services to develop a proposal to be submitted with the Chair nomination to the CRC Secretariat in 2012. Please refer to the CRC website for detailed information about the Program: www.chairs-chaires.gc.ca.

Western's Department of Economics (www.economics.uwo.ca) has a long standing reputation as a leading research department in Canada. Current research strengths are: Labour Economics, Macroeconomics, Micro Theory and Econometrics. Quantitative Finance is an area of research focus for the Departments of Applied Mathematics (www.apmaths.uwo.ca) and Statistical & Actuarial Sciences (www.stats.uwo.ca), which offer Financial Modeling programs at the undergraduate, master, and doctoral levels. The three Departments, together with the Faculty of Business and the Faculty of Law, share research and teaching links and are planning to offer a Masters in Financial Economics program starting in September 2012.

We seek a financial econometrics scholar whose areas of specialization might include: estimation and inferences of financial models, volatility estimation, term structure of interest rates, risk management, testing financial economic theory, capital asset pricing and arbitrage pricing, derivative pricing, portfolio allocation, risk-adjusted returns, simulating financial systems, and hedging strategies. The candidate will play an important role in the Masters of Financial Economics program and the Financial Modeling graduate programs including course development, research project supervision and/or administration. The ideal candidate will establish a competitive, internationally recognized, research program, and bring leadership qualities that will enhance established strengths in the departments and increase interdisciplinary links between them.

Review of applications will commence on October 1, 2011 and will continue until the position is filled. A complete application will include: a covering letter and curriculum vitae; a current working paper and up to three refereed publications; a teaching dossier; the names, addresses, email addresses, and phone numbers of three referees; and a description of a 5-7 year research program. The application should be sent to:

**Dr. Andrew Nelson, Associate Dean - Research
Office of the Dean, Faculty of Social Sciences
The University of Western Ontario
London, Ontario N6A 5C2 Canada
Email: anelson@uwo.ca**

Positions are subject to budget approval. Applicants should have fluent written and oral communication skills in English. All qualified candidates are encouraged to apply; however, Canadians and permanent residents will be given priority. The University of Western Ontario is committed to employment equity and welcomes applications from all qualified women and men, including visible minorities, Aboriginal people and persons with disabilities.

Prix Krieger-Nelson 2011 Krieger-Nelson Prize Rachel Kuske (University of British Columbia)

Professor Rachel Kuske is one of Canada's leading applied mathematicians. She has made important contributions to the study of ordinary, stochastic, and partial differential equation models for a wide range of applications including neuroscience, mathematical biology, cellular buckling, mathematical finance, and hydraulic-fracture mechanics.

A recurrent theme in her work has been to develop and apply innovative asymptotic and multi-scale methods for the study of transition, or bifurcation behaviour, of dynamical systems in the presence of noise or time delays. Such systems are ubiquitous in mathematical modeling of problems in neuroscience, machine-tool vibrations, and epidemic models. The mathematical framework of Professor Kuske and collaborators has led to the development of new and widely applicable analytical tools to investigate stochastic resonance phenomena and delayed bifurcation effects in these contexts.

Concerning the theory of deterministic localized pattern formation, Kuske, together with Chris Budd and Giles Hunt, provided the first comprehensive multi-scale asymptotic theory to predict and characterize oscillatory, but localized, buckling states for an elastic strut under compressive loading. Such large amplitude states, which exist far from the buckling load, were previously observed in many physical experiments without a theoretical explanation. Her pioneering and well-cited work in this area has been at the forefront of the emergence of an exciting new sub-field in localized pattern formation. This is related to the characterization of so-called snaking bifurcation diagrams associated with spatially localized oscillatory states in various normal form partial differential equations arising in continuum mechanics, including the well-known Swift-Hohenberg equation.

Professor Kuske received her PhD in 1992 from Northwestern University, working on waves in random media with Bernard J. Matkowsky in the Department of Engineering Science and Applied Mathematics. Before coming to Canada, she was a postdoctoral student at Stanford and the University of Utrecht and held faculty appointments at Tufts University and University of Minnesota. In 1992 she joined the mathematics faculty at the University of British Columbia, where she holds a Canada Research Chair in Applied Mathematics.

She has given several plenary lectures, most notably a plenary lecture at the international SIAM Snowbird Dynamical Systems Conference in 2009. Professor Kuske's recent service to the mathematics community includes being Associate Director of



Rachel Kuske and Jacques Hurtubise

Program Diversity at the American Institute of Mathematics, co-chair of the bi-annual SIAM Applied Dynamical Systems meeting, and founder and co-chair for the Mentor Network of the Association for Women in Mathematics. She is on the editorial boards for the SIAM Journal of Applied Math, SIAM Review, the European Journal of Applied Math, and the IMA Journal of Applied Math.

Professeure Rachel Kuske est l'une des plus grandes mathématiciennes en mathématiques appliquées du Canada. Elle a fait une importante contribution à l'étude des modèles d'équations ordinaires,

stochastiques et d'équations aux dérivées partielles qui serviront à un large éventail d'applications, notamment à la science neurologique, à la biologie mathématique, à la science de l'écrasement sous pression, à la finance mathématique et à la mécanique hydraulique/de la fissure.

Un des thèmes qui revient continuellement dans sa recherche est celui de la mise au point et de l'application de nouvelles méthodes asymptotiques et à multi-échelle qui serviront à l'étude de la transition ou du comportement de bifurcation de systèmes dynamiques en présence de bruit ou de délais temporels. De tels systèmes sont omniprésents dans la modélisation mathématique de problèmes en science neurologique, dans l'étude des vibrations des outillages et les modèles épidémiques. Le cadre mathématique qu'elle et ses collègues ont mis au point a permis de créer de nouveaux outils d'analyse à grande application qui serviront à étudier le phénomène de la résonance stochastique et les effets de bifurcation à rebours dans ces contextes.

En ce qui concerne la théorie de la formation déterministique et localisée de modèles, Mme Kuske, de concert avec Chris Budd et Giles Hunt, ont présenté la toute première théorie asymptotique à multi-échelle complète qui servira à prédire et à caractériser les états d'écrasement oscillatoires, mais localisés d'une jambe élastique à laquelle on applique une force de compression. On avait observé auparavant de tels états d'amplitude à grande échelle, qui existent loin de la charge d'écrasement, dans le cadre de nombreuses expériences physiques, mais sans pouvoir offrir aucune explication théorique. Son travail de pionnière qui est bien cité dans ce domaine est à l'avant-garde d'un nouveau sous-domaine naissant et fort passionnant en matière de formation de modèles localisés. Le tout est lié à la caractérisation de ce qu'on appelle des diagrammes de bifurcation lézardée associées aux états oscillatoires localisés dans l'espace dans diverses équations différentielles partielles de forme normale

du domaine de la mécanique des milieux continus, y compris l'équation bien connue de Swift-Hohenburg.

Rachel Kuske a obtenu son doctorat en 1992 de la Northwestern University. Elle s'intéressait aux ondes dans des médias aléatoires en collaboration avec Bernard J. Matkowsky de la faculté des sciences du génie et des mathématiques appliquées. Avant de s'installer au Canada, elle a été étudiante postdoctorale à Stanford et à la University of Utrecht et a été membre du corps professoral à la Tufts University et à la University of Minnesota. En 2002, elle s'est jointe à la Faculté des mathématiques de la University of British Columbia, où elle est titulaire d'une chaire de recherche du Canada en mathématique appliquée.

Elle a donné plusieurs conférences plénières, en particulier

un exposé en séance plénière à la Conférence internationale SIAM Snowbird Dynamical Systems en 2009. Parmi les services rendus récemment par la professeure Kuske au milieu des mathématiques, citons son poste de directrice adjointe de la Diversité des programmes à la American Institute of Mathematics, de coprésidente de la réunion biannuelle SIAM Applied Dynamical Systems et de fondatrice et coprésidente du Mentor Network de la Association for Women in Mathematics. Elle fait partie des comités de rédaction du SIAM Journal of Applied Math, du SIAM Review, du European Journal of Applied Math et du IMA Journal of Applied Math.

CALL FOR PROPOSALS 2011 Endowment Grants Competition

APPEL DE PROJETS Concours de bourses du fonds de dotation 2011

The Canadian Mathematical Society is pleased to announce the 2011 Endowment Grants Competition. The CMS Endowment Grants fund projects that contribute to the broader good of the mathematical community. Projects funded by the Endowment Grants must be consistent with the interests of the CMS: to promote the advancement, discovery, learning and application of mathematics.

An applicant may be involved in only one proposal per competition as a principal applicant. Proposals must come from CMS members, or, if joint, at least one principal applicant must be a CMS member.

The deadline for applications is September 30, 2011. Successful applicants will be informed in December 2011 and grants will be awarded in January 2012.

Further details about the endowment grants and the application process are available on the CMS website: www.cms.math.ca/Grants/EGC

The Endowment Grants Committee (EGC) administers the distribution of the grants and adjudicates proposals for projects. The EGC welcomes questions or suggestions you may have on the program. Please contact the Committee by e-mail at chair-egc@cms.math.ca.

La Société mathématique du Canada (SMC) est heureuse d'annoncer la tenue du Concours de bourses du fonds de dotation 2011. Les bourses du fonds de dotation de la SMC finance des activités contribuant à l'essor global de la communauté mathématique. Les projets financés à partir des bourses du fonds de dotation doivent correspondre aux intérêts de la SMC : soit promouvoir et favoriser la découverte et l'apprentissage des mathématiques, et les applications qui en découlent.

Un demandeur ne peut présenter qu'un projet par concours en tant que demandeur principal. Les projets doivent venir de membres de la SMC. S'il s'agit d'un projet conjoint, au moins un des demandeurs principaux doit être membre de la SMC.

La date limite pour présenter sa demande est le 30 septembre 2011. Les projets retenus seront annoncés en décembre 2011, et les bourses distribuées en janvier 2012.

Pour vous procurer un formulaire ou pour de plus amples renseignements sur l'appel de projets, passez sur le site de la SMC au : www.smc.math.ca/Grants/EGC/

Le Comité d'attribution des bourses du fonds de dotation (CABFD) gère la répartition des bourses et évalue les projets. Pour toute question ou tout commentaire sur les bourses du fonds de dotation, veuillez communiquer par courriel avec le comité à pres-egc@smc.math.ca.

CALENDAR OF EVENTS / CALENDRIER DES ÉVÉNEMENTS

SEPTEMBER	2011	SEPTEMBRE	NOVEMBER	2011	NOVEMBRE
1 – 3	Algebraic Representation Theory Conference (Uppsala, Sweden) www.math.uu.se/conference/		7 – 11	Klein project (Amer. Inst.of Math, Palo Alto, CA) http://aimath.org/ARCC/workshops/kleinproject.html	
7 – 9	IMA Hot Topics Workshop: Instantaneous Frequencies and Trends for Nonstationary Nonlinear Data (Minneapolis, Minnesota) www.ima.umn.edu/2011-2012/SW9.7-9.11/		7 – 11	Waves in Science and Engineering 2011 (Mexico City, Mx) www.wise.ipn.mx/	
10 – 11	AMS Eastern Section Meeting, Cornell University (Ithaca, N.Y.) www.ams.org/meetings/calendar/2011_sep10-11_ithaca.html		19 – 21	International Conference on Analysis and its Applications (Aligarh, India) www.amu.ac.in/conference/icaa2011	
17 – 21	Years and Counting: AWM's celebration of Women in Mathematics (Brown University, Providence, RI) http://icerm.brown.edu/events/awm-anniversary-2011				
18 – 23	Resolution of Singularities and Related Topics – 80th Birthday of Heisuke Hironaka (Las Casas del Tratado, Tordesillas, Spain) www5.uva.es/hironaka/				
18 – 24	8th International Conference on Function Spaces, Differential Operators, Nonlinear Analysis (Tabarz/Thuringa, Germany) http://fsdona2011.uni-jena.de/		10 – 12	CMS Winter Meeting Ryerson University and York University, Toronto, ON www.cms.math.ca	
19 – 23	IMA Workshop: High Dimensional Phenomena (Minneapolis, Minnesota) www.ima.umn.edu/2011-2012/W9.19-23.11/		17 – 18	International Symposium on Biomathematics and Ecology (Portland, OR) www.biomath.ilstu.edu/beer	
28 – 30	Balance, Boundaries and Mixing in the Climate Problem (CRM, Montreal, QC) www.crm.umontreal.ca/Mix11/index_e.php		17 – 18	International Conference on Math Sciences and Applications (New Delhi, India) http://ijmsa.yolasite.com/conference-announcement.php	
OCTOBER	2011	OCTOBRE			
10 – 14	Weighted singular integral operators and non-homogenous harmonic analysis, AIM Workshop (Amer. Inst.of Math, Palo Alto, CA) http://aimath.org/ARCC/workshops/singularintops.html				
17 – 21	Applications of Kinetic Theory and Computation (ICERM, Brown University, Providence, RI) http://icerm.brown.edu/sp-f11/workshop-2.php				
24 – 26	Algebra, Geometry, and Mathematical Physics (Mulhouse, France) www.agmp.eu/mul11				
24 – 27	SIAM Conference on Geometric and Physical Modelling (Orlando, FL) www.siam.org/meetings/gdspm11/				
24 – 28	Heritage of Galois' work (IHP, Paris, France) www.galois.ihp.fr/				
26 – 29	Integers Conference 2011 (University of West Georgia, GA) www.westga.edu/~math/IntegersConference2011/				
31 – Nov 4	Geometry of large networks (Amer. Inst.of Math, Palo Alto, CA) http://aimath.org/ARCC/workshops/largenetworks.html				
NOVEMBER	2011	NOVEMBRE			
5 – 9	Stability, hyperbolicity, and zero localization (Amer. Inst.of Math, Palo Alto, CA) http://aimath.org/ARCC/workshops/hyperbolicpoly.html				
DECEMBER	2011	DECEMBRE			
10 – 12	CMS Winter Meeting Ryerson University and York University, Toronto, ON www.cms.math.ca				
17 – 18	International Symposium on Biomathematics and Ecology (Portland, OR) www.biomath.ilstu.edu/beer				
17 – 18	International Conference on Math Sciences and Applications (New Delhi, India) http://ijmsa.yolasite.com/conference-announcement.php				
JANUARY	2012	JANVIER			
4 – 7	AMS Joint Mathematics meetings (Boston, MA) www.ams.org/meetings/national/jmm/2138_intro.html				
23 – 27	Set Theory and C*-algebras (Amer. Inst.of Math, Palo Alto, CA) http://aimath.org/ARCC/workshops/settheorycstar.html				
MARCH	2012	MARS			
12 – 16	Classifying fusion categories (Amer. Inst.of Math, Palo Alto, CA) http://aimath.org/ARCC/workshops/fusioncat.html				
MAY	2012	MAI			
20 – 27	European Conference on Elliptic and Parabolic Problems (Gaeta, Italy) www.math.uzh.ch/gaeta2012				
July	2012	Juillet			
16 – 20	HPM 2012 History and Pedagogy of Mathematics - The HPM Satellite Meeting of ICME-12 (Daejeon, Korea) www.hpm2012.org				

The Natural Sciences and Engineering Research Council (NSERC) and the Canadian Mathematical Society (CMS) support scholarships at \$9,000 each. Canadian students registered in a mathematics or computer science program are eligible.

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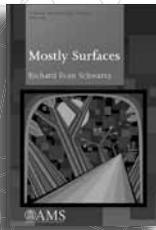
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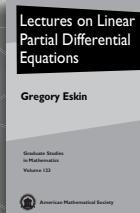


Mostly Surfaces ♦

Richard Evan Schwartz, Brown University, Providence, RI

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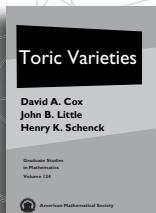


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Gregory Eskin, University of California, Los Angeles, CA

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David A. Cox, Amherst College, MA, John B. Little, College of the Holy Cross, Worcester, MA, and Henry K. Schenck, University of Illinois at Urbana-Champaign, IL

This masterfully written book will become a standard text on toric varieties, serving both students and researchers. The book's leisurely pace and wealth of background material makes it perfect for graduate courses on toric varieties or for self-study. Researchers will discover gems throughout the book and will find it to be a valuable resource.

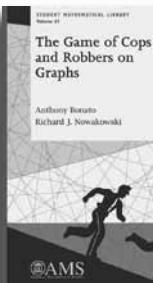
—Sheldon Katz

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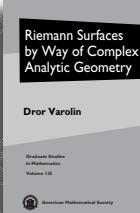


The Game of Cops and Robbers on Graphs ♦

Anthony Bonato, Ryerson University, Toronto, ON, Canada, and Richard J. Nowakowski, Dalhousie University, Halifax, NS, Canada

This book is the first and only one of its kind on the topic of Cops and Robbers games, and more generally, on the field of vertex pursuit games on graphs. The book is written in a lively and highly readable fashion, which should appeal to both senior undergraduates and experts in the field (and everyone in between). One of the main goals of the book is to bring together the key results in the field; as such, it presents structural, probabilistic, and algorithmic results on Cops and Robbers games. Several recent and new results are discussed, along with a comprehensive set of references. The book is suitable for self-study or as a textbook, owing in part to the over 200 exercises. The reader will gain insight into all the main directions of research in the field and will be exposed to a number of open problems.

Student Mathematical Library, Volume 61; 2011; approximately 267 pages; Softcover; ISBN: 978-0-8218-5347-4; List US\$45; AMS members US\$36; Order code STML/61



Riemann Surfaces by Way of Complex Analytic Geometry ♦

Dror Varolin, Stony Brook University, NY

This book is the first to give a textbook exposition of Riemann surface theory from the viewpoint of positive Hermitian line bundles and Hörmander $\bar{\partial}$ estimates. It is more analytical and PDE oriented than prior texts in the field, and is an excellent introduction to the methods used currently in complex geometry, as exemplified in J. P. Demailly's online but otherwise unpublished book "Complex analytic and differential geometry." I used it for a one-quarter course on Riemann surfaces and found it to be clearly written and self-contained. It not only fills a significant gap in the large textbook literature on Riemann surfaces but is also rather indispensable for those who would like to teach the subject from a differential geometric and PDE viewpoint.

—Steven Zelditch

Graduate Studies in Mathematics, Volume 125; 2011; 236 pages; Hardcover; ISBN: 978-0-8218-5369-6; List US\$63; AMS members US\$50.40; Order code GSM/125



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