



CMS NOTES de la SMC

FROM THE PRESIDENT'S DESK

Tom Salisbury
(York)



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Treasurer

Much has happened over the summer, including the very successful CMS Summer Meeting in Calgary, and progress regarding NSERC funding of the mathematics research institutes. But I'd like to start this report by thanking **Eddy Campbell** (Memorial) whose term as President of the Society ended June 30.

Eddy's fairness, good sense, and enthusiasm have served the CMS well for a long time, but especially over the last two years as President. Among his many successes, I'll single out his response to the budgetary difficulties the CMS recently found itself in. While implementing cost savings, Eddy also realized that the real solution was to build an effective fundraising capacity within the CMS, and he led us promptly and effectively towards that goal. As he steps down, it is gratifying to note that these efforts have started to bear fruit, in large part due to Eddy's vision and energy. It has been a great personal pleasure working with Eddy this past year, and I'd like to express the Society's thanks to him for the superb job he has done.

NSERC and the Institutes

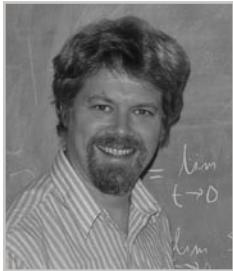
As of this writing (July), there has been progress on the issue of NSERC funding for the mathematics research institutes. As those of you who completed a survey NSERC conducted will know, the Centre de recherches mathématiques (CRM), the Fields Institute, and the Pacific Institute for the Mathematical Sciences (PIMS) have NSERC grants expiring March 31, 2008. The most recent institute funding competitions took place under the umbrella of NSERC's global reallocations process. That mechanism no longer exists, and NSERC has been in discussions with the Institutes for some time about a replacement, that could also be used to evaluate proposals for new institutes. NSERC's website now has details of this program - the *Major Resources Support* (MRS) program - a replacement for the existing *Major Facilities Access* (MFA) program.

Arthur leaves us in good hands, as we welcome **David Rodgers** as our new Treasurer. David is by training a chemist, but has served the Society ably for years in the area of electronic services and publishing. In his new capacity as Treasurer, we will draw on that experience as well as his extensive background in private business. I thank David for his generosity in continuing his service to the CMS, and I look forward to working with him.

To provide community input into this discussion, a **liaison committee** was struck, consisting of the Institute directors and other stakeholders, along with representatives of mathematical sciences societies, department chairs, and the associated NSERC Grant Selection committees (GSCs). Community consultations took place

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A FAMOUS TIME-WASTER

Are you familiar with that famous time-waster, the Collatz problem? Pick a positive integer, any positive integer. Now, if it's even, divide it by two; if it's odd, multiply by three and add one. Now repeat this process, and keep on going until the numbers start to cycle, or until your colleagues remind you that you were meant to be in a meeting ten minutes ago. Ready? Let's start with 7. Next we get 22, 11, 34, 17, 52, 26, 13, 40, 20, 10, 5, 16, 4, 2, 1, 4... (OK, you can stop now!)

The question is, do we always end up in the same cycle, or are there other ways that one of these sequences can end? Nobody knows, although much research has been done on the subject. It is known that if there is a sequence that doesn't reach the "standard ending" it must have pretty large numbers in it (no term less than ten quadrillion). Graphs of the number of steps needed to reach 1 show intriguing fractal textures (for these, and other facts, see the Wolfram MathWorld "Collatz Problem" page <http://mathworld.wolfram.com/CollatzProblem.html>). But what's really going on?

Most intriguingly, John H. Conway proved in 1972 that a slight generalization of this problem is formally undecidable. All that is needed is that, instead of choosing one of two linear functions to create the next term based on the current number's parity, we choose based on a larger set of residue classes. It's actually not too hard to see why this ought to work.

Most of us are familiar with the "Turing machine", a hypothetical computer with an infinite set of one-bit registers that can simulate any other computer. It may be shown that this is equivalent to an "abacus" or "register machine" that has a finite number of registers each capable of holding an arbitrary natural number. The instruction set of an abacus is very simple. A register may be increased; or you may attempt to decrease it, branching to a new instruction if it is already zero. And that's it! A clever simulation argument due to Minsky shows that any abacus is equivalent to one with only two registers.

Those two registers, in turn, may be represented by the number of 2's and 3's respectively in the prime factorization of a single natural number. But the residue mod 6 tells us if either of these is equal to 0, and linear functions like those in the original Collatz problem can increase or decrease those powers. So a generalized Collatz-type problem gives us the parts we need to build an abacus!

So the question arises naturally: is it possible that even the original Collatz problem can also be interpreted as a universal computer? Of course, right now we have no idea how (if at all) a problem might be coded up for it! But it is an intriguing thought that a pencil-and-paper game using Grade 3 arithmetic might lead us to formal undecidability, one of the biggest ideas of modern mathematics.

UNE FAMEUSE PERTE DE TEMPS

Connaissez-vous la conjecture de Collatz, ce fameux problème qui est garanti de vous faire gaspiller votre temps. Choisissez un entier positif, n'importe lequel. S'il s'agit d'un nombre pair, divisez-le par deux; s'il est impair, multipliez-le par trois et ajoutez-lui le nombre 1. Maintenant, recommencez le processus et continuez jusqu'à ce que les suites commencent à se répéter, ou jusqu'à ce que l'un de vos collègues vous rappelle à l'ordre en mentionnant que vous étiez attendu à une réunion il y a plus de dix minutes. Bon, vous êtes prêt? Commençons avec 7 qui donne 22, 11, 34, 17, 52, 26, 13, 40, 20, 10, 5, 16, 4, 2, 1, 4... (Oui, vous pouvez arrêter maintenant!)

La question est de savoir si nous obtenons toujours la même suite, ou s'il y a d'autres façons dont les suites peuvent se terminer. Personne ne le sait, malgré que l'on ait beaucoup étudié la question. Tout ce que nous savons, c'est que, s'il existe une suite qui n'atteint pas la « fin usuelle », elle doit être composée de nombres pas mal énormes (de l'ordre de pas moins de dix mille milliards). Les graphiques de la quantité

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ÉDITORIAL suite

d'étapes nécessaires pour atteindre le nombre 1 montrent d'intrigantes formes fractales (pour examiner celles-ci et d'autres faits intéressants, voir la page <http://mathworld.wolfram.com/CollatzProblem.html> « Collatz Problem » dans *MathWorld* de Wolfram). Mais que se passe-t-il en réalité?

Fait fascinant, John H. Conway a démontré en 1972 qu'une légère généralisation de ce problème est indécidable. Pour le vérifier, il suffit, plutôt que de choisir entre deux fonctions linéaires pour obtenir le prochain chiffre en se fondant sur la parité du nombre actuel, soit son résidu modulo 2, de choisir en se fondant sur une classe plus grande de résidus. Il n'est pas vraiment difficile de comprendre pourquoi cela peut fonctionner.

En effet, la plupart d'entre nous sommes familiers avec la « machine de Turing », un ordinateur hypothétique ayant un ensemble infini de registres d'un bit qui peut simuler tout autre ordinateur. L'on pourrait démontrer que cette machine est l'équivalent d'un abaque ou d'une caisse enregistreuse qui possède un nombre infini de registres, chacun étant capable de conserver un nombre naturel arbitraire. Le jeu d'instructions d'un abaque est très simple. L'on peut accroître un registre, ou encore tenter de le réduire en bifurquant vers une nouvelle instruction, si celle-ci indique déjà zéro. Et c'est tout! Une

argumentation de simulation astucieuse proposée par Minsky montre que n'importe lequel abaque est l'équivalent d'un abaque ayant seulement deux registres.

Ces deux registres, à leur tour, peuvent être représentés par le nombre de facteurs « 2 » et de « 3 » que l'on retrouve respectivement dans la mise en facteur premier d'un seul entier naturel. Mais, le modulo associé 6 nous dit si l'un ou l'autre est égal à 0 et des fonctions linéaires comme celles de la conjecture de Collatz originale peuvent alors accroître ou réduire ces puissances. Un problème généralisé de type Collatz peut donc nous fournir les éléments dont nous avons besoin pour fabriquer un abaque.

À la suite de cette progression naturelle, l'on peut se poser la question suivante : est-il possible d'interpréter même le problème original de Collatz comme étant un ordinateur universel? Bien entendu, pour l'instant, nous n'avons aucune idée de la façon (s'il y en a une) de coder le problème pour le soumettre à cet ordinateur. Mais, c'est néanmoins intrigant, cette notion qu'un jeu qui n'exige qu'une feuille de papier, un crayon et des notions d'arithmétique de 3e année soit capable de nous mener à une indécidabilité formelle, l'une des plus grandes idées des mathématiques modernes.

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Wanted: (i) CMS members impressed by site content to write letters of reference; (ii) a post in mathematics or mathematics education in Canada or the UK, secondary to university level, asap.

CALL FOR COMMITTEE NOMINATIONS

The Canadian Mathematical Society serves the community as admirably as it does because of a substantive committee structure supported by over 140 volunteers.

Finding replacements as the terms of office expire is an important and ongoing task of the CMS Nominating Committee. Before the end of 2006, the Committee must fill positions on the Advancement of Mathematics, Education, Endowment Grants, Electronic Services, Finance, Publications and Research Committees.

The Nominating Committee strives to find colleagues, particularly younger colleagues, who are interested in serving on a CMS committee. If you have colleagues who you think would be good candidates for one of the above committees (or for any CMS committee), please forward their names (together with an indication of where they might best serve) to chair-nomc@cms.math.ca before September 30, 2006.

Edgar Goodaire Chair
CMS Nominating Committee

APPEL DE CANDIDATURES POUR LES COMITÉS

La Société mathématique du Canada sert la communauté de façon admirable, et ce, parce qu'elle peut compter sur un important réseau de comités auxquels participent plus de 140 bénévoles.

Le Comité des mises en candidature a l'importante tâche de trouver des remplaçants pour les membres de comité dont le mandat est échu. Or, d'ici la fin de 2006, il doit combler des vacances dans les comités suivants : Avancement des mathématiques, Éducation, Attribution des bourses du fonds de dotation, Services électroniques, Finances, Publications et Recherche.

Le Comité des mises en candidature cherche des membres, tout particulièrement jeunes, qui seraient intéressés à siéger à un comité de la SMC. Si vous connaissez des personnes, parmi vos collègues, qui feraient d'excellents candidats pour l'un des comités susmentionnés (ou tout autre comité de la SMC), veuillez soumettre leur nom (accompagné de quelques mots d'indication sur les domaines où ils pourraient le mieux servir la Société) à chair-nomc@cms.math.ca avant le 30 septembre 2006.

Edgar Goodaire
Président du Comité des mises en candidature

MESSAGE FROM THE PRESIDENT *continued*

at various meetings over the last year, for example, the CMS meetings and at meetings with mathematics department chairs. Two basic issues were the terms of reference for the new MRS program, and determining who would make decisions about Institute funding - the mathematics GSCs or an interdisciplinary MRS committee. One rationale for the former (the "envelope" model) was that Institute funding had been won through the mathematics community's reallocations prioritizations, so should stay within our discipline in spite of the funding pressures expected for the MRS program. And such pressures do exist, not just from proposals for new institutes, but also from the host of CFI projects now coming to the end of their initial funding. Arguments against the envelope were the added complexity its administration would bring, and the diminished upside potential for the Institutes within the envelope (assuming adequate funding for the MRS program does actually materialize). The liaison committee was chaired by **Richard Kane**, and I'd like to thank Richard for the vast amount of time he invested in this process, and for the diplomacy with which this task was conducted. The dialogue between NSERC and the committee was very productive, leading to much better defined versions of the two options, and to far more appropriate rules and objectives for the MRS program's Institute component than would have been the case otherwise. In the end, NSERC's survey of GSC 336 and 337 drew a strong response. Based in part on that survey, NSERC has (as of this writing) abandoned the envelope model, and the Institutes are now preparing for

their first MRS competition. Among the hopeful signs for the future is the attention and effort NSERC devoted to this whole process, and their acknowledgement throughout it of the excellence of Canada's mathematics research institutes and of their importance for the discipline.

Fundraising

The CMS's new fundraising capability has had some initial success, leading to increased support from two long-time CMS sponsors, the **Imperial Oil Foundation**, and **Sun Life Financial**. I would like to thank both organizations for their generous and on-going commitment to the CMS, and for the recognition of the value of our educational activities that this support implies. Our mathematics competitions and math camps programs make an important contribution to Canadian society, and the help of our donors in making them possible is greatly appreciated.

Calgary meeting

The CMS summer meeting in Calgary was a great success, for which all the organizers deserve our gratitude, especially **Claude Laflamme** (meeting director) and **Tony Ware** (chair, local arrangements committee). The content of the 12 special sessions was excellent, as were the meeting facilities. I was particularly impressed by the quality of the plenary sessions, a striking number of whose speakers took seriously the responsibility to explain to non-experts WHY their topic was interesting. The CMS also thanks the meeting sponsors - the University of Calgary, CRM, Fields, MITACS, and PIMS.

Bill Pulleyblank (IBM) delivered a fascinating public lecture, and plenary

talks were given by **Steve Awodey** (Carnegie-Mellon), **John Conway** (Princeton), **Nicole El Karoui** (Ecole Polytechnique, Paris), **Nigel Kalton** (Missouri), **Alexander Kechris** (Cal Tech), **László Lovász** (Microsoft), and **Dave Marker** (Illinois at Chicago). CMS prize lectures were delivered by **Jim Geelen** (Waterloo), who won the **Coxeter-James prize**; **Penny Haxell** (Waterloo), who won the **Krieger-Nelson prize**; and **Frédéric Gourdeau** (Laval), who won the **CMS Excellence in Teaching award**. The education session was jointly sponsored by the Canadian Mathematics Education Study Group (CMESG), which also met in Calgary. The meeting (and Conway's talk in particular) celebrated the 90th birthday of **Richard Guy**.

Future meetings

We are looking forward to the first joint meeting of the CMS with the **Sociedad Matemática Mexicana** (SMM), to be held in Guanajuato, Mexico, September 21-23, 2006. The scientific committee is co-chaired by **Alejandro Adem** (UBC) and **J.C. Gomez Larrañaga** (CIMAT). Shortly thereafter, December 9-11, 2006, the **University of Toronto** will host the Winter CMS meeting, with **Ian Graham** as meeting director, and with **Erich Ellers** chairing the local arrangements committee. Planning has already started for several future meetings, including the **2008 Canadian Mathematics Education Forum**, to be co-chaired by **France Caron** (Montréal), **Malgorzata Dubiel** (SFU), and **Peter Taylor** (Queen's), with the help of PIMS. There are indeed more good things to come!

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All proceeds go to a Dalhousie Mathematics and Statistics library fund.

MESSAGE DU PRÉSIDENT

Tom Salisbury
(Université York)

Beaucoup de choses se sont produites au cours de l'été. La réunion d'été de la SMC, à Calgary, a été des plus réussies et des progrès ont été réalisés sur la question du financement que le CRSNG accorde aux instituts de recherche en mathématiques. Mais d'abord, j'aimerais commencer ce rapport en remerciant **Eddy Campbell** (Université Memorial) dont le mandat à la présidence de la Société s'est terminé le 30 juin.

L'impartialité, le bon sens et l'enthousiasme d'Eddy ont bien servi la SMC au fil des ans, et encore plus au cours des deux dernières années alors qu'il a occupé les fonctions de président. Parmi ses nombreux succès, j'aimerais souligner les mesures qu'il a prises pour sortir la SMC de sa récente impasse financière. Tout en sabrant dans les dépenses, Eddy a compris que la véritable solution au problème consistait à doter la SMC d'une meilleure capacité de financement et il a rapidement et efficacement canalisé les efforts vers cet objectif. Il est donc agréable de voir, alors qu'il passe le flambeau, que ces efforts commencent à porter fruit grâce en grande partie à son énergie et à sa perspicacité. Sur le plan personnel, j'ai eu un grand plaisir à travailler avec Eddy au cours de la dernière année et, au nom de la SMC, je le remercie pour son travail exceptionnel.

Trésorier

Un autre mandat remarquable vient de se terminer et c'est celui de notre trésorier, **Arthur Sherk** (Université de Toronto). Arthur veille aux finances de la SMC depuis 13 ans, et ce, avec intégrité, soin et dévouement. Durant toutes ces années, ses décisions, qu'elles aient été annonciatrices de bonnes ou de mauvaises nouvelles, ont toujours été rendues avec justice et bonne humeur. Grâce aux nouveaux revenus que nous attendons des mesures de financement mises en place et à la prudence avec laquelle Arthur a géré nos dépenses, la santé financière immédiate de la Société semble désormais assurée. Je suis sûr que tous les anciens présidents qui ont travaillé avec lui se joindront à moi pour remercier Arthur de sa contribution exceptionnelle à la SMC, laquelle sera reconnue de façon officielle à l'occasion de notre réunion d'hiver 2006.

Arthur laisse notre trésorerie en bonnes mains, car c'est **David Rodgers** qui prend sa relève. Chimiste de formation, David sert la Société de manière fort compétente depuis plusieurs années dans le domaine des services électroniques et de l'édition. À titre de trésorier, il nous fera profiter de sa vaste expérience des affaires dans le secteur privé. Je le remercie d'avoir accepté de continuer à servir la SMC et j'anticipe avec plaisir de travailler avec lui.

Le CRSNG et les instituts

Au moment où je rédigeais ce rapport (juillet), il y a eu de nouveaux développements dans le dossier du financement des instituts de recherche en mathématiques par le Conseil de recherches en sciences naturelles et en génie du Canada (CRSNG). Comme le savent ceux d'entre vous qui ont complété le sondage que le CRSNG a réalisé, les subventions que le Centre de recherches mathématiques (CRM), l'Institut Field et l'Institut du Pacifique en sciences mathématiques (PIMS) reçoivent de cet organisme se terminent le 31 mars 2008. Or, les derniers concours de subventions du CRSNG avaient été organisés dans le cadre du processus de réaffectation globale des fonds. Celui-ci n'existe plus et le CRSNG discute depuis un certain temps déjà avec les instituts sur la mise en place d'un mécanisme de remplacement qui servirait également à l'évaluation des projets pour la création de nouveaux instituts. Vous trouverez sur le site Web du CRSNG de l'information à ce sujet. Le nouveau mécanisme s'appelle *Programme d'appui aux ressources majeures* (ARM) et il remplace le *Programme de subventions d'accès aux installations majeures* (AIM).

Pour obtenir l'apport de la communauté dans cette discussion, un **comité de liaison** a été mis sur pied. Il est composé des directeurs d'instituts et d'autres intervenants, ainsi que des représentants des sociétés de sciences et des directeurs de département de mathématiques et des comités de sélection des subventions (CSS) qui leur sont associés. Des consultations du milieu ont été réalisées lors de diverses assemblées (réunions de la SMC et rencontres avec les directeurs de département de mathématiques) qui ont eu lieu durant la dernière année.

Deux questions fondamentales ont orienté les discussions pour définir le mandat du nouveau programme d'ARM et déterminer qui prendrait les décisions sur le financement des instituts (est-ce que cela devait être les CSS ou plutôt un comité interdisciplinaire du programme d'ARM?). L'un des motifs invoqués pour le maintien de la première option (le modèle de l'enveloppe) était que les subventions étaient obtenues à la suite des priorités de réaffectations fixées par le milieu des mathématiques. Par conséquent, les décisions de financement devaient logiquement continuer à être prises par les gens du milieu, et ce, malgré les pressions exercées pour l'obtention des subventions du programme d'ARM. Et ces pressions existent, non seulement en raison des projets pour de nouveaux instituts, mais aussi parce que la subvention de plusieurs projets de la Fondation canadienne pour l'innovation (FCI) arrive aussi à terme. Ceux qui s'opposent au modèle de l'enveloppe disent que son administration ajoute de la complexité et réduit les possibilités de fonds supplémentaires que les Instituts pourraient espérer recevoir (en présumant que l'on arrivera à obtenir un financement adéquat du programme d'ARM). Le Comité de liaison a été présidé par **Richard Kane** que je veux remercier pour l'énorme quantité de temps qu'il a consacré à ce processus et pour la diplomatie avec laquelle il a effectué sa tâche. Le dialogue entre le CRSNG et le Comité a été très productif et a donné lieu à des versions beaucoup plus définies et claires des deux options, ainsi qu'à des règles plus adéquates et objectives pour ce qui touche le mandat du programme d'ARM en matière de financement des instituts. Au bout du compte, le sondage que le CRSNG a réalisé sur les CSS 336 et 337 a suscité une forte réponse. En se fondant en partie sur les résultats de ce sondage, le CRSNG a abandonné le modèle de l'enveloppe et les instituts se préparent désormais à prendre part au premier concours de subventions d'ARM. Cela dit, l'attention et les efforts que le CRSNG consacre à ce processus sont de bon augure, de même que sa reconnaissance de l'excellence des instituts canadiens de recherche en mathématiques et de leur importance pour la discipline.

MESSAGE DU PRÉSIDENT *suite*

Financement

Notre nouvelle capacité de trouver et d'obtenir du financement porte déjà des fruits puisque deux de nos commanditaires de longue date, la **Fondation de l'Impériale** et la **Financière Sun Life**, ont décidé d'accroître le soutien qu'il nous accorde. J'en profite donc pour les remercier de leur engagement généreux et soutenu. Ces sociétés reconnaissent la valeur des activités éducatives que la SMC peut organiser grâce à leur aide financière. Nos concours et nos programmes de camps de mathématiques sont un apport important pour la société canadienne et nous apprécions grandement les fonds que nous accordent nos donateurs et bienfaiteurs pour que nous puissions les organiser.

Réunion de Calgary

La réunion d'été de la SMC qui a eu lieu à Calgary a obtenu un franc succès pour lequel tous les organisateurs, et notamment **Claude Laflamme** (directeur de réunion) et **Tony Ware** (président, comité de la logistique local), méritent nos félicitations. Le contenu des 12 séances spéciales a été excellent, de même que les installations. J'ai été particulièrement impressionné par la qualité des séances plénières, où de nombreux conférenciers se sont bien acquittés de la responsabilité qu'ils avaient d'expliquer à des non-spécialistes POURQUOI le sujet pouvait les intéresser. Le SMC tient aussi à remercier les commanditaires de la rencontre, l'Université de Calgary, le Centre de recherches mathématiques, l'Institut Fields de recherche en sciences mathématiques, l'Institut du Pacifique en sciences mathématiques (PIMS) et MITACS.

Bill Pulleyblank (IBM) a présenté une conférence populaire fascinante, tandis que **Steve Awodey** (Carnegie-Mellon), **John Conway** (Princeton), **Nicole El Karoui** (École polytechnique, Paris), **Nigel Kalton** (Missouri), **Alexander Kechris** (Cal Tech), **László Lovász** (Microsoft) et **Dave Marker** (Illinois at Chicago) ont prononcé les conférences plénières. Les conférences des prix de la SMC ont été données par **Jim Geelen** (Waterloo), titulaire du Prix **Coxeter-James**; **Penny Haxell** (Waterloo), récipiendaire du Prix **Krieger-Nelson**; et **Frédéric Gourdeau** (Laval), lauréat du Prix **d'excellence en enseignement de la SMC**. La séance sur l'éducation a été cocommuniquée par la SMC et le Groupe canadien d'étude en didactique des mathématiques (GCEDM) qui avait également une réunion à Calgary. Cette réunion (et surtout l'allocution de Conway) a célébré le 90^e anniversaire de **Richard Guy**.

Réunions à venir

Nous attendons avec impatience la tenue de la première réunion conjointe de la SMC et de la **Sociedad Matemática Mexicana** (SMM) qui doit avoir lieu à Guanajuato (Mexique), du 21 au 23 septembre 2006. Le comité scientifique de la rencontre est coprésidé par **Alejandro Adem** (UBC) et **J.C. Gomez Larrañaga** (CIMAT). L'**Université de Toronto** sera l'hôte de la réunion d'hiver de la SMC qui aura lieu du 9 au 11 décembre 2006. **Ian Graham** dirigera la réunion et **Erich Ellers** présidera le comité de la logistique local. Nous avons déjà amorcé la planification des futures réunions, dont celle du Forum canadien sur l'enseignement des mathématiques de 2008 qui sera coprésidé par **France Caron** (Montréal), **Małgorzata Dubiel** (SFU) et **Peter Taylor** (Queen's) avec l'aide du PIMS. Les mois à venir promettent donc d'être des plus intéressants!

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Department of Mathematics and Statistics
Concordia University
1455 de Maisonneuve Blvd. Montreal, Quebec H3G 1M8
E-mail: chair@mathstat.concordia.ca

Subject to budgetary approval, we anticipate filling these positions, normally at the rank of Assistant Professor, for **July 1, 2007**. Candidates for both positions should have a PhD. Review of applications will begin immediately and will continue until the positions are filled. All applications should reach departments no later than **November 1, 2006**.

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Brauer Type Embedding Problems

by Arne Ledet

Fields Institute Monographs 21

AMS 2005 viii + 171 pages

ALTHOUGH THERE IS a well-known publishing firm called Random House, it appears to be quite difficult to build a house randomly. For example, one would not begin with the tenth floor and then continue on with the twelfth floor, followed by the seventeenth and twenty-fifth floors. Perhaps this is possible but certainly not advisable. Instead one usually begins with a carefully constructed foundation, after which comes the first floor, the second floor, and so on. This is also a good way in which to build Galois extensions with given Galois groups using Brauer type embedding Galois problems.

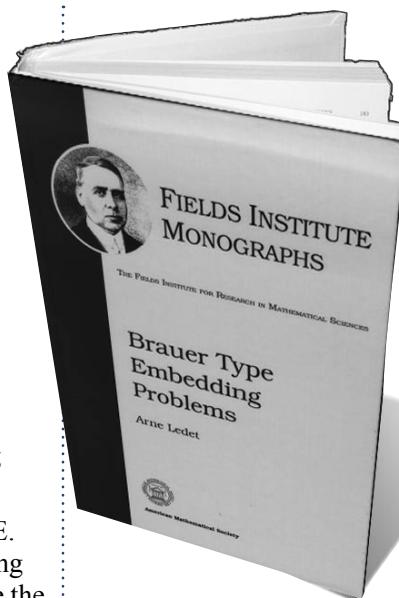
Galois groups were first considered by J.-L. Lagrange, E. Galois, N. H. Abel and others, as a tool for understanding the permutation of the roots of polynomials which preserve the relations between them. Their investigations were motivated by the following classical problem: Is there a formula for finding the roots of a fifth (or higher) degree polynomial equation in terms of the coefficients of the polynomial, analogous to the well-known formulas for solving the roots of a quadratic, cubic, and biquadratic polynomial? Galois theory provides a very elegant answer to this question.

Although originally these techniques were aimed at the specific problem of solving polynomials over rational numbers in radicals, today the technique of Galois extensions has penetrated the mainstream of current mathematics. What used to be considered a difficult subject is now taught as a basic undergraduate course. Indeed if one wishes to learn modern mathematics, one should study Galois theory.

Galois theory, having reached maturity, is now approachable, utilized and discussed. Remarkably this theory has not lost its youthful attractiveness, charm, depth, and mystery. In particular some classical open problems related to Galois theory, number theory, and algebraic geometry are as challenging to us, and as alluring to us, as much as they ever were before.

Today Galois theory is a part of field theory. The rational numbers \mathbb{Q} , the complex numbers \mathbb{C} , the real numbers \mathbb{R} , the rational functions with rational coefficients, the Laurent formal power series $\sum_{n=r}^{\infty} a_n z^n$, where r is an integer and $a_n \in \mathbb{C}$ are all fields. A field K is a set where we can both multiply and divide by non-zero elements, as well as add elements. Everything is commutative and the basic rules, such as associativity and distributivity, are satisfied.

If we have an inclusion of fields $F \subset K$ we say that K/F is a field extension. If we forget how to multiply general elements in K and we only remember how to multiply by elements in F , we see that we can view K as a vector space over F . This simple but powerful idea leads to a linear algebra approach developed by E. Artin in his charming book ([Ar]). (I still experience goose bumps and the rise of tremendous excitement when I recall reading this gem of a book during biology class in high school accompanied by the monotonous voice of



the teacher explaining to us how a child is born.) First of all we restrict ourselves to finite dimensional vector spaces K over F with dimension $[K : F]$. We consider the set $\text{Aut}_F(K)$ of all automorphisms σ of K which leave each element in F fixed. This means that σ is a bijection which takes sums to sums, products to products, and $\sigma(f) = f$ for each $f \in F$.

As H. Weyl wrote in [We, page 723], the images $\sigma(k)$, $k \in K$, perform exactly the same way as the elements in K , like a parade. Now one can show that the number $|\text{Aut}_F(K)|$ will never exceed $[K : F]$. We say that the field extension K/F is Galois if and only if $\text{Aut}_F(K) = [K : F]$. If this is the case $|\text{Aut}_F(K)|$ is called $\text{Gal}(K/F)$ —the Galois group of K over F . Thus \mathbb{C}/\mathbb{R} is a Galois extension and its Galois group $\text{Gal}(\mathbb{C}/\mathbb{R})$ is $\{1, \sigma\}$ where 1 is the identity map and σ is the complex conjugation.

For the Galois extension K/F there is a beautiful Galois one-to-one correspondence between the intermediate subfields between F and K and between the subgroups of the Galois group $\text{Gal}(K/F)$. One can generalize and elegantly formulate this correspondence also as a suitable equivalence of categories. This is related to Grothendieck's approach to fundamental groups. (See [GM, pages 72, 73].)

A key problem in Galois theory, which is still open, is whether each finite group G is a Galois group of some extension K/\mathbb{Q} . However in 1954 Šafarevič succeeded in showing that each solvable group G is indeed a Galois group of some extension K/\mathbb{Q} . For an excellent, modern exposition of Šafarevič's theorem see [NSW, Chapter IX, §5].

Arne Ledet's book is a remarkably clear and lucid book which treats the following Brauer Galois embedding problem. Let K/F be a Galois extension with $G = \text{Gal}(K/F)$ and assume that μ_m - the group of all m th roots of 1, is in F . (We assume that $|\mu_m| = m$.) Let H be a group and let $\theta : H \rightarrow G$ be a surjective group homomorphism. Then does there exist a Galois field extension M/F such that $\text{Gal}(M/F) = H$, $K \subset M$ and such that the restriction homomorphism $\text{Gal}(M/F) \rightarrow \text{Gal}(K/F)$ coincides with the prescribed homomorphism θ ? Usually when this problem has a positive answer and we can actually construct a field M we are very happy.

Arne Ledet is one of the experts in this area and in fact his book grew out of his Ph.D. thesis work. This book contains a number of original results produced by Arne Ledet.

Solutions to this problem are especially useful when one considers a group T of order a power of prime p . Indeed in

this case one can hope to build an extension E/F with a Galois group T by first constructing a suitable cyclic extension of degree p , then by embedding it into a Galois extension of degree p^2 , and so on, just like building a house in the usual, systematic, and non-random way.

One of the simplest examples of a Brauer embedding problem is the problem of embedding a quadratic extension $F(\sqrt{a})/F$, $\text{char } F \neq 2$, $[F(\sqrt{a}) : F] = 2$ into an extension M/F with $\text{Gal}(M/F) \cong C_4$ -a cyclic group of order 4. It is a nice exercise to show that this problem is solvable if and only if a is a sum of two squares. The group extensions $1 \rightarrow \mu_m \rightarrow H \rightarrow G \rightarrow 1$ are classified by the second cohomology group $H^2(G, \mu_m)$. A closely related tool for deciding whether a given Brauer embedding problem is solvable is $H^2(G, K^*)$ where $K^* = K \setminus \{0\}$ is a multiplicative group of K . This group in turn is related to the Brauer group of classes of central simple algebras over F . Thus there is indeed an important relation with Brauer groups, which was the original motivation of Brauer when he considered Brauer embedding problems in 1932. Ledet's book explores the rich connections between Galois theory, cyclic algebras, group cohomology, equivalences of quadratic forms, and orthogonal representations. Ledet has succeeded in a masterful presentation of these topics. The reader is only required to have a very basic knowledge of algebra. The author explains everything: Galois theory, group cohomology, central simple algebras, Brauer groups, and quadratic forms. These topics are treated with as much depth as is needed to cover the main subject of this book. Ledet loves carefully worked out examples, and so will the reader. A lot of the further examples and interesting additions are in the form of carefully chosen exercises. The author has the special gift of being able to explain subtle material with clarity and wit. He occasionally lightens the text with brief, informal footnotes such as the one on page 20 where he clarifies the sentence, "It is then natural to ask..." with the additional words, "...for some people anyway." It is a challenging exercise to find a misprint no matter how small such a misprint might be. (Hint: look very carefully at page 62.) As Ledet himself pointed out, there are other ways of looking at embedding problems. There are both geometrical and topological methods. For an excellent treatment of these methods in Galois theory see [MaMa].

For some recent developments in the use of Galois theory in moduli spaces of covers of curves, *dessins d'enfants*, Hurwitz monodromy, and modular towers, fundamental groups of curves, and other fascinating topics, see [FrIh] and [Sch]. A great book which is closely related to Ledet's book is the book [JLY]. (Also see the insightful review of this book [Re].) For basic and interesting further expositions of Galois theory see [Co], [Sw], and of course [Ar].

But if you wish to learn about Brauer type embedding problems, and if you want to see a crystal-clear and beautiful picture with a number of delightful examples, with a friendly and witty guide, you cannot do better than to read this fine book by Arne Ledet.

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PROBLEM OF THE MONTH

***The following problem was submitted by
Dr Stan Wagon of Macalester University.***

1. “Space-Filling? Or Not?”

For a set X in Euclidean space, define $L(X)$ to be the set of points one gets in any infinite line formed by connecting two points in X . Let T be the 4 vertices of a regular tetrahedron.
True or False: $L(L(T))$ is all of R^3 .

Answers will be provided in the next month's Notes.

Send your own favorite problems to: notes-editors@cms.math.ca

It's About Time

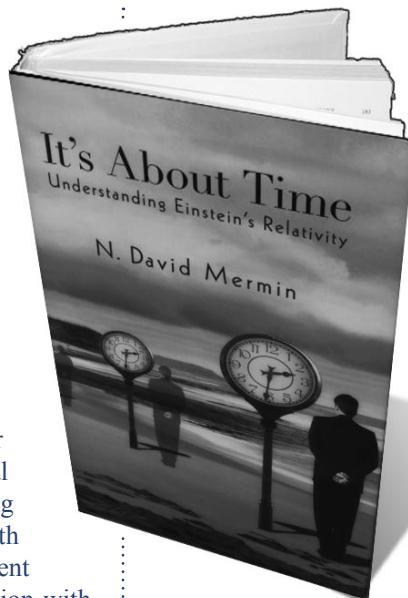
by N. David Mermin
Princeton 2005 xv + 192 pages

MERMIN STATES IN his preface that relativity is about time. Forty years ago as a young assistant professor of physics at Cornell University, he thought it was about time that relativity be included in the high school curriculum, especially since it could serve as an application of high school algebra and plane geometry. As a help, he offered a course to high school teachers, and as an outgrowth, he published a book Space and Time in Special Relativity in 1968. Intermittently over the past thirty-five years he offered courses on special relativity to non-science students at Cornell, initially using the above book as a text but eventually replacing it with lecture notes. These notes received continual refinement that resulted from the author's experience and interaction with generations of keen students. Now near retirement, Mermin believed it was time for these notes to be transformed into a book. The publication of this book also coincided with the centenary of Einstein's paper on special relativity.

The present book is aimed at anyone who wants to learn and understand special relativity. The only background required is elementary high school algebra and plane geometry. The book is to be studied, in the sense that one has to read and sometimes pause to think through the arguments presented.

A key to understanding relativity is to be able to visualize a given situation in different frames of reference. For most people this is not a natural ability. At the very beginning, Mermin uses familiar collision problems to accustom a reader to this mode of thinking, and at the same time illustrates how the principle of relativity is used. Likewise, he first considers the addition of small (compared with the speed of light) velocities, again familiar to all, before discussing the addition of arbitrary velocities with an innovative thought experiment. The relativistic velocity addition law thus obtained is at once in an elegant and interesting form, which is then recast into the more conventional and practical expression.

While other books on relativity also make use of space-time diagrams, Mermin has developed a unique approach to these diagrams to extract physical information (such as the invariant intervals between events) with the use of plane geometry only. "Popular" topics like the slowing down of moving clocks and the pole-in-barn paradox are discussed with great care. Of course there is also a chapter on $E = Mc^2$. Many readers of this journal will be delighted to see that Mermin called this equation the second most famous equation of all time—behind the Pythagorean theorem.



While it is still too optimistic to hope that special relativity will be included in the high school curriculum as an application of elementary mathematics, the availability of this excellent book definitely will help any one who desires to learn, appreciate, and understand Einstein's special theory of relativity. This book deserves to be in all public libraries.

UNIVERSITE LAVAL, Québec, QC Département de mathématiques et de statistique <http://www.mat.ulaval.ca/>

The Department of Mathematics and Statistics at Université Laval (Québec City) invites applications for a tenure-track professor position, effective September 1, 2007.

This invitation extends to outstanding candidates with PhDs in any area of algebra. The capacity of the candidate to initiate collaborative research within the "Centre interuniversitaire en calcul mathématique algébrique" (CICMA)¹ will be considered a plus. Candidates should have a strong record in research and a commitment to excellence in teaching, including in the context of service courses.²

All qualified candidates are encouraged to apply, however, according to Canadian immigration requirements, Canadians and permanent residents will be given priority. The salary and rank will be commensurate with qualifications and experience. According to its equal opportunity program, at Université Laval, half the vacant positions are reserved for the appointment of women.

Applications should include full curriculum vitae, some reprints of a few recent publications and a summary no longer than two pages, describing the present and future research program. Applicants should also ask three referees to send letters of reference to the address below. The name and address (including phone and fax numbers and e-mail address) of the referees should be listed in the application.

Applications should be sent to the following address, before November 30, 2006.

Roger Pierre, directeur
Département de mathématiques et de statistique
Université Laval
Québec QC Canada G1K 7P4
rpierre@mat.ulaval.ca www.mat.ulaval.ca

¹ <http://www.crm.umontreal.ca/labs/cicma/fr/>

² Université Laval is a French speaking university, thus the non-francophone candidates should be willing to acquire fluency in French in a short period.

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NEW AND NOTEWORTHY

Additive Combinatorics

Terence Tao and Van H. Vu

Cambridge Studies in Advanced Mathematics
\$88.95*: Hardback: 0-521-85386-9: 536pp

Multiplicative Number Theory I

Classical Theory

Hugh L. Montgomery and
R. C. Vaughan

Cambridge Studies in Advanced Mathematics
\$93.95*: Hardback: 0-521-84903-9: 650pp

Random Fragmentation and Coagulation Processes

Jean Bertoin

Cambridge Studies in Advanced Mathematics
\$76.95*: Hardback: 0-521-86728-2: 256pp

Fundamentals of Hyperbolic Manifolds

Selected Expositions

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D. B. A. Epstein

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\$82.95*: Paperback: 0-521-61558-5: 348pp

Spaces of Kleinian Groups

Edited by Yair Minsky, Makoto Sakuma,
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Elliptic Functions

V. Armitage

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\$50.95*: Paperback: 0-521-78563-4

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Leon Harkleroad

Outlooks

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\$27.95*: Paperback: 0-521-00935-9

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Coffee Time in Memphis

Béla Bollobás

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\$40.95*: Paperback: 0-521-69395-0

Hilbert's Tenth Problem

Diophantine Classes and Extensions to
Global Fields

Alexandra Shlapentokh

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P. M. Cohn

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Yury J. Ionin and Mohan S. Shrikhande

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David Brannan

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Multiple Scattering

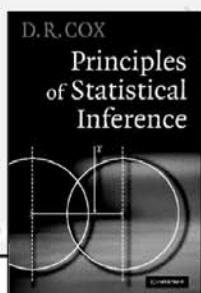
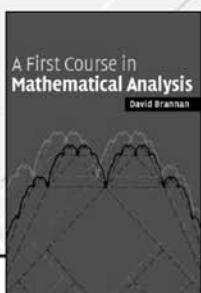
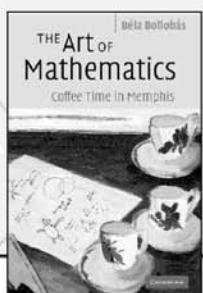
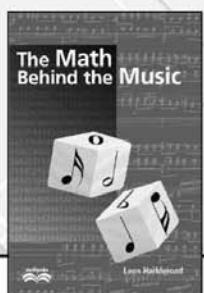
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with N Obstacles

Paul Martin

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Lie Algebras of Finite and Affine Type

by Roger Carter

Cambridge Studies in Advanced Mathematics 96
Cambridge 2005, xvii + 632pp, US \$80.00 (hb).

Lie algebras were introduced by Sophus Lie early in the second half of the nineteenth century. Finite dimensional simple Lie algebras over the complex field were investigated independently by Elie Cartan and W. Killing in the last decade of that century. The structure and representation theory of Lie algebras were studied at a later stage by Hermann Weyl. In 1967 V. G. Kac and R. V. Moody independently introduced the Lie algebras now known as Kac-Moody algebras. All these types of algebras have many varied applications, in both mathematics and mathematical physics.

The general study of Lie algebras involves concepts called Cartan subalgebras, Killing forms, root systems, the Weyl group, Cartan matrices and the Dynkin diagram. Kac-Moody algebras are those associated with what is known as a generalized Cartan matrix (GCM). The terms finite type, affine type and indefinite type are defined by varying conditions on the GCM.

This book provides a detailed mathematical treatment of the subject, including both the Cartan-Killing-Weyl theory of finite dimensional simple algebras and the more modern theory of Kac-Moody algebras. The only prerequisite is a good knowledge of linear algebra. The first half of the book deals with the classification of the finite dimensional simple Lie algebras and their representation theory. The second half deals with the theory of Kac-Moody algebras: a brief account of Borcherds algebras is also included. An appendix gives a summary of the basic properties of each Lie algebra of finite and affine type.

Topics in Kinetic Theory

Edited by Thierry Passot, Catherine Sulem,
Pierre-Louis Sulem

Fields Institute Communications 46, AMS 2005, vii + 312pp.

This volume is made up of the lectures given at the short course and workshop on kinetic theory organized in the framework of the thematic program on partial differential equations at the Fields Institute in Toronto during September 2004. The contributions cover a variety of topics related to kinetic theory in neutral gases and magnetized plasmas, with extensions to other systems such as quantum plasmas and granular flows. Results concerning the following are discussed: The Boltzmann equations and other kinetic equations for neutral gas, derivations of compressible and incompressible fluid dynamical systems, collisionless magnetized plasmas, well-posedness of the Vlasov-Maxwell system, asymptotic regimes where the scales of variation of electromagnetic field are clearly separated from those associated with gyromotion of the particles.

Sums of Squares of Integers

By Carlos J. Moreno and Samuel S. Wagstaff, Jr.
Discrete Mathematics and its Applications
Chapman & Hall/CRC 2006, xi + 354 pp.

This book deals with topics in combinatorial number theory as they relate to counting representations of integers as sums of a certain number of squares.

These representations are studied by combining Liouville's elementary methods with the analytic methods of modular functions. The chapter headings are: 1. Introduction, 2. Elementary Methods, 3. Bernoulli Numbers, 4. Examples of Modular Forms, 5. Hecke's theory of Modular Forms, 6. Representation of Numbers as Sums of Squares, 7. Arithmetic Progressions, and 8. Applications.

The book concludes with three little-known applications having no apparent connection to sums of squares or to number theory. It is shown that the number of ways to write a positive integer as the sum of three positive squares determines the eigenfrequencies for microwave radiation in a cubed-shaped resonant cavity. The structure of crystals is used to explain why the number of facets on a round brilliant-cut diamond might be related to the total number of ways of writing the integers 1, 2, 3, 4 and 5 as the sum of three squares. Finally it is shown how to compromise one variation of the RSA signature scheme, which is widely used in internet commerce, by constructing a bogus valid signature for a message not actually signed by the alleged signer. The attacker does this by writing a certain number as the sum of two squares in two different ways.

The book provides a good introduction to theory of modular forms; a study of the chapter on Hecke's theory of modular forms prepares the reader to understand more advanced treatments such as Goro Shimura's book on arithmetic theory of automorphic forms.

Max Plus at Work

by Bernd Heidergott, Geert Jan Olsder
and Jacob van der Woude
Princeton 2006, xi + 213 pp. US \$50.00

The subtitle is: Modeling and Analysis of Synchronized Systems: A Course on Max-Plus Algebra and its Applications.

On $\mathbb{R} \cup \{-\infty\}$, the binary operations "plus", defined as the maximum, and "times", defined as ordinary addition, yield a commutative and idempotent semiring. The underlying algebra is an example of max-plus algebra. Traffic systems, computer communication systems, production lines, and flows in networks are all based on discrete event systems which are well suited to describe the ordering and timing of events. These can be analysed by means of max-plus algebra. For example, trains pull into a railroad station and must wait for each other before leaving again for passengers to change trains; the

timetable must accurately reflect their comings and goings. Using four trains in the model, this example is used in the opening chapter to motivate the use of max-plus algebra.

Part I of the book explores the introduction of the max-plus algebra and of system descriptions based upon it. Numerical procedures to calculate characteristic quantities of the systems are emphasized. Part II deals with the real application, the design of timetables for railway networks. The Dutch railway system is used to elucidate the concepts. Part III examines various extensions, such as stochastic systems and min-max-plus systems.

Each chapter has exercises, notes and a reference section. The book can be used for senior undergraduate courses in mathematics.

William Playfair's Commercial and Political Atlas and Statistical Breviary

*edited and introduced by Howard Wainer and Ian Spence
Cambridge 2005, viii + 160 pp*

William Playfair (1759-1823) was a Scottish practical engineer. His *Commercial and Political Atlas and Statistical Breviary* are among the most important works in the entire history of statistical graphics and data visualization, wherein one can find the origin of the modern graphical forms – the pie chart, line graph and bar chart. These works have been difficult to find and read simply because they are old and rare.

The book is a full-color reproduction of the two classic works, with new explanatory material. The introduction, written by the editors, relates many fascinating, and often surprising, details of the life led by William Playfair. It also comments on the contents of the two works, discussing the technology behind their printing and highlighting some of Playfair's conceptual breakthroughs, as well as some of the difficulties, idiosyncrasies, and infelicities.

Writing a brief history on quantitative graphics in statistics, J. R. Beniger and D. L. Robyn (*The American Statistician*, 1978) observed that, beginning with maps of Northern Mesopotamia, there was a 3000-year-old tradition of representing physical space (world) by space (the map). Although sufficiently inspired by mapmakers to use the word “atlas” in the title of his treatise, Playfair ended their monopoly on the use of spatial displays. His genius was to realize that nonspatial quantities such as expenditures and historical time could be represented by physical space and that such representation offered advantages denied to tabular presentation.

In the *Statistical Breviary*, Playfair presented statistical data for European countries at the beginning of the 19th century. He used charts since he believed that “making an appeal to the eye when proportion and magnitude are concerned, is the best and readiest method of conveying a distinct idea”.

Collocation Methods for Volterra Integral and Related Functional Equations

*by Hermann Brunner
Cambridge Monographs on Applied and Computational Mathematics 15
Cambridge 2004, xiv + 597pp*

A collocation solution u to a functional equation (for example an ordinary differential equation or a Volterra integral equation) on an interval I is an element from some finite-dimensional function space (the collocation space) which satisfies the equation on an appropriate finite subset of I (the set of collocation points) whose cardinality essentially matches the dimension of the collocation space. If initial (or boundary) conditions are present then u will usually be required to fulfil these conditions too.

The principal aims of this monograph are (i) to serve as an introduction and a guide to the basic principles and the analysis of collocation methods for a broad range of functional equations, including initial-value problems for ordinary and delay differential equations, and Volterra integral and integro-differential equations, (ii) to describe the current ‘state of the art’ of the field, (iii) to make the reader aware of the many (often very challenging) problems that remain open and which represent a rich source for future research, and (iv) to show, by means of the annotated list of references and the Notes at the end of each chapter, that Volterra equations are not simply an ‘isolated’ small class of functional equations but that they play an (increasingly) important – and often unexpected! – role in time-dependent PDEs, boundary integral equations, and in many areas of analysis and applications.

The book is intended for researchers in numerical and applied analysis, for ‘users’ of collocation methods in the physical sciences and engineering, and as an introduction to collocation methods for senior undergraduate and graduate students. The prerequisites are, for the most part, senior-level courses in linear algebra, the theory of ODE, and numerical analysis (especially numerical quadrature and numerical solutions of ODEs).

Since the exercise section of each chapter contains a rich list of open problems the book may also serve as a source of topics for M.Sc. and Ph.D. theses.

**For a list of workshops to be held
at the Research Institute for
Mathematical Sciences
of Kyoto University visit**

www.kurims.kyoto-u.ac.jp/~kyoto/program18-en.htm

CMS 2006 COXETER-JAMES PRIZE

DR. JIM GEELEN (UNIVERSITY OF WATERLOO)

The Coxeter-James Prize recognizes young mathematicians who have made outstanding contributions to mathematical research.

Dr. Jim Geelen is already a world leader in the areas of combinatorial optimization and matroid theory. The referees describe him as an “outstanding talent” and a “very creative and original researcher” with a “huge international reputation”.

The following are among the highlights of his 30-odd papers. With Gerards and Kapoor, he characterized the matroids representable over the finite field $GF(4)$, which had been considered an impossibly hard problem. Their paper is described as a “huge breakthrough”. With Whittle, he has proved that among the set of excluded minors preventing representability of a matroid over a given finite field, there is only a finite number of matroids of a given branch-width. This is remarkably strong evidence in support of the Rota Conjecture.

Dr. Geelen has made important contributions to extending results of the Graph Minors Project from graphs to matroids. This is currently the main focus of matroid theory. A major step in this direction is his result with Gerards and Whittle that binary matroids with large branch-width contain big grids as minors. One of his contributions to combinatorial optimization is a deterministic algorithm for the maximum matching problem, simple to use but theoretically deep.

Dr. Geelen received a Bachelor of Science degree in 1992 from Curtin University in Australia, and a Ph.D. in 1996 from the University of Waterloo under the supervision of Professor William H. Cunningham. After postdoctoral fellowships in the Netherlands, Germany, and Japan, he returned to the University of Waterloo in 1997 and is now an Associate Professor and Canada Research Chair.

He won the Doctoral Prize of the CMS in 1996 and the Fulkerson Prize of the American Mathematical Society and the Mathematical Programming Society in 2003. He received a Premier’s Research Excellence Award from the Province of Ontario in 2000 and a Sloan Fellowship in 2002.



Edwin Perkins, Jim Geelen, Eddy Campbell

PRIX COXETER-JAMES 2006 DE LA SMC

JIM GEELEN (UNIVERSITÉ DE WATERLOO)

Le prix Coxeter-James rend hommage aux jeunes mathématiciens qui se sont distingués par l’excellence de leur contribution à la recherche mathématique.

Jim Geelen est déjà une sommité mondiale dans les domaines de l’optimisation combinatoire et de la théorie des matroïdes. Les membres du comité de sélection ont souligné son “talent exceptionnel” et l’ont décrit comme un “chercheur très créatif et original de grande réputation internationale”.

Voici quelques hauts faits de la trentaine d’articles qu’il a déjà publiés. Avec Gerards et Kapoor, il a caractérisé les matroïdes représentables sur le corps fini $GF(4)$, ce qui était considéré jusque-

là comme un problème quasi impossible à résoudre. Son article a été qualifié de “percée monumentale”. En collaboration avec Whittle, il a prouvé que, parmi l’ensemble des mineurs exclus empêchant la représentabilité d’un matroïde sur un corps fini donné, il y a seulement un nombre fini de matroïdes avec une largeur de branche donnée. Ceci prêche très fortement en faveur de la validité de la conjecture de Rota.

Jim Geelen a grandement contribué à étendre des graphes aux matroïdes les résultats du projet des mineurs de graphes. À l’heure actuelle, c’est l’orientation centrale de la théorie des matroïdes. Les résultats qu’il a obtenus avec Gerards et Whittle sont d’ailleurs une étape importante du processus selon lequel les matroïdes binaires contiennent de larges grilles comme mineurs. L’une de ses contributions à l’optimisation combinatoire est un algorithme déterministe pour le problème de paireage maximum, simple à utiliser mais très profond.

Jim Geelen a obtenu un baccalauréat en sciences en 1992 de l’Université Curtin en Australie et un doctorat de l’Université de Waterloo en 1996 sous la direction du professeur William H. Cunningham. Après des stages de recherche postdoctorale aux Pays-Bas, en Allemagne et au Japon, il est retourné à l’Université de Waterloo en 1997 où il est désormais professeur agrégé et titulaire d’une Chaire de recherche du Canada.

Il a reçu le Prix de doctorat de la SMC en 1996 et le prix Fulkerson de l’American Mathematical Society et de la Mathematical Programming Society en 2003. Il a en outre obtenu une Bourse du premier ministre pour l’excellence en recherche (de l’Ontario) en 2000 ainsi que la bourse de recherche Sloan en 2002.

CMS EXCELLENCE IN TEACHING AWARD

DR. FRÉDÉRIC GOURDEAU (UNIVERSITY OF LAVAL)

Thomson Nelson, a leading Canadian publisher, and Thomson Brooks/Cole, a Thomson Higher Education brand and premier provider of educational materials for mathematics and science - both part of The Thomson Corporation - have partnered with the CMS to support the Excellence in Teaching Award for post-secondary undergraduate teaching in mathematics. The award recognizes sustained and distinguished contributions in teaching at the post-secondary undergraduate level at a Canadian institution.

Frédéric Gourdeau won Laval University's Grand Prize for Distinction in Teaching in 2004-2005. He has been consistently recognized by his Faculty for the excellence attested to by his teaching evaluations. His department's undergraduate student society awards a teaching prize each year, which Gourdeau has won on four separate occasions.

His students speak of him as an inspirational and dynamic teacher, one who succeeds in conveying deep ideas in a manner that is accessible to a broad range of students, and which awakens them to the beauty of the subject. He engages and motivates his students, in part through his own clear love of the material. He demonstrates great care for his students, and is always accessible to help them, supervise projects, or organize supplementary class meetings. He teaches frequently in Laval's undergraduate program for mathematics teacher candidates, and has established a leadership role in this program through his pedagogical innovations and his development of new courses. Students taking these courses speak in glowing terms of how he brings the subject alive for them in a way they have not seen before, and how he sparks and stimulates their interest in this subject. Some feel he is simply the best teacher they have ever encountered. Coming from students with a strong interest in teaching but less mathematical background than mathematics majors, this is high praise indeed.

Related to his outstanding achievements as a teacher, are his numerous pedagogical activities. These include serving as president of the Canadian Mathematics Education Study Group (CMESG), co-chairing the 2005 Canadian Mathematics Education Forum, and co-founding l'Association québécoise des jeux mathématiques, which runs yearly competitions for students. He participates in various activities of ICMI - the International Commission on Mathematics Instruction, and has presented and written about his own work on



Harley Weston, Frédéric Gourdeau, Eddy Campbell

PRIX D'EXCELLENCE EN ENSEIGNEMENT DE LA SMC

FRÉDÉRIC GOURDEAU (UNIVERSITÉ LAVAL)

La société Nelson, important éditeur canadien, la société Brooks/Cole, principal fournisseur de matériel pédagogique en mathématiques et en sciences - toutes deux du groupe Thomson - supporte le Prix d'excellence en enseignement de la SMC pour l'enseignement collégial et de premier cycle universitaire en mathématiques. Ce nouveau prix récompense des contributions exceptionnelles et soutenues en enseignement au collégial et au premier cycle universitaire dans un établissement canadien.

Frédéric Gourdeau a remporté le grand prix Distinction en enseignement dans le cadre du concours des prix d'Excellence en enseignement 2004-2005 de l'Université Laval. L'excellence

de son enseignement est constamment reconnue par sa Faculté à la suite des évaluations annuelles de l'enseignement par les étudiants. L'association des étudiantes et étudiants de son département décerne annuellement un prix à un enseignant, prix que le professeur Gourdeau s'est mérité en quatre occasions.

Ses étudiants le décrivent comme un enseignant inspirant et dynamique, qui réussit à expliquer des notions difficiles de manière à ce qu'elle soient accessibles à tous, et qui les amène à voir la beauté du sujet étudié. Il motive ses étudiants et les amène à s'engager à fond, en partie grâce à son amour manifeste du sujet. Il porte un grand intérêt à ses étudiants, est toujours disponible pour les aider, pour superviser des projets ou organiser des rencontres en dehors de la classe. Il enseigne fréquemment aux étudiants du programme de baccalauréat en enseignement secondaire en mathématiques et y joue un rôle de leadership de premier plan par ses innovations pédagogiques et la mise sur pied de nouveaux cours. Les étudiants de ces cours décrivent avec enthousiasme comment il donne vie aux mathématiques comme nul autre auparavant, et comment il suscite et stimule leur intérêt pour ce sujet. Certains estiment qu'il est simplement le meilleur enseignant qu'ils ont rencontré. Il s'agit là de propos forts élogieux, d'autant plus qu'ils proviennent d'étudiants qui ont un intérêt marqué pour l'enseignement tout en ayant un bagage mathématique moins important que celui des étudiants se spécialisant en mathématiques.

De nombreuses activités à caractère pédagogique sont reliées à ses réussites exceptionnelles en enseignement. Il est notamment président du Groupe Canadien d'Étude en Didactique des Mathématiques (GCEDM), a été co-président du Forum Canadien sur l'Enseignement des Mathématiques 2005, et a fondé l'Association québécoise des jeux mathématiques qui organise annuellement un concours de jeux mathématiques et logiques. Il participe à divers travaux de la CIEM - la Commission

incorporating dynamic geometry into the classroom using Cabri. He participates actively in pedagogical discussions, both within his department and beyond. For his department he has developed numerous formal course notes, he coaches the Putnam mathematics competition team, and he engages in a host of other teaching-related activities and outreach.

Frédéric Gourdeau is a Full Professor in the Department of Mathematics and Statistics of Laval University. His research is in the area of functional analysis. He obtained his undergraduate degree in mathematics in 1984 from Laval University, and his doctorate in mathematics in 1989 from Cambridge University in England, under the supervision of G.R. Allan. He worked in the field of international cooperation from 1991 to 1995, as a regional coordinator for Canadian Crossroads International. In 1995 he obtained a position at Laval University, where he has remained ever since.

2006 KRIEGER-NELSON PRIZE

DR. PENNY HAXELL (UNIVERSITY OF WATERLOO)

The Krieger-Nelson Prize recognizes outstanding research by a female mathematician.



Edwin Perkins, Penny Haxell, Eddy Campbell

Dr. Penny E. Haxell works in Combinatorics and Graph Theory, focussing on extremal problems. She has obtained highly interesting results using combinatorial, probabilistic and, more recently, topological tools in a very fascinating manner. In all her work she exhibits impressive capability, originality and technical ability, and her pioneering work is well known internationally.

Her work in 1995 with Kohayakawa and Luczak, led to a profound study of Szemerédi's lemma in a sparse setting, and their methods are still being developed fruitfully by others.

Shortly thereafter, she gave an ingenious proof of a conjecture of Aharoni. This led to a collaboration that culminated in a beautiful and celebrated paper applying topological ideas to give a simple sufficient condition for a system of distinct representatives in a hypergraph family. The work has already found manifold applications.

internationale sur l'enseignement des mathématiques, et a prononcé des conférences et publié des écrits relativement à son utilisation de la géométrie dynamique en utilisant Cabri. Il participe activement à des discussions à caractère pédagogique, autant au sein de son département qu'à l'extérieur. Il a écrit des notes de cours pour plusieurs cours, il est responsable de l'équipe qui représente son université à la compétition mathématique Putnam, et il est engagé dans plusieurs autres activités reliées à l'enseignement et à la vulgarisation mathématique.

Frédéric Gourdeau est professeur titulaire au Département de mathématiques et de statistique de l'Université Laval. Ses travaux de recherche sont dans le domaine de l'analyse fonctionnelle. Il a obtenu un baccalauréat en mathématiques en 1984 à l'Université Laval et un Ph. D. en mathématiques, sous la direction de G.R. Allan, à l'université de Cambridge, au Royaume-Uni, en 1989. Fait inusité pour un professeur de mathématiques, il ouvre en coopération internationale de 1991 à 1995 : il est alors coordonnateur régional pour Carrefour Canadien International. En 1995, il obtient un poste à l'Université Laval, où il est depuis lors.

PRIX KRIEGER-NELSON 2006

PENNY HAXELL (UNIVERSITY OF WATERLOO)

Le prix Krieger-Nelson rend hommage aux mathématiciennes qui se sont distinguées par l'excellence de leur contribution à la recherche mathématique.

Penny E. Haxell s'intéresse à la combinatoire et à la théorie des graphes, et se concentre en particulier sur les problèmes extrêmaux. Elle a obtenu des résultats très intéressants en utilisant d'une manière fascinante des instruments combinatoires, probabilistes et, plus récemment, des instruments topologiques. L'ensemble de ses travaux se démarque par la puissance impressionnante de leur auteure, son originalité et ses aptitudes techniques. Son travail de pionnière est reconnu mondialement.

Les travaux qu'elle a réalisés en 1995 avec Kohayakawa et Luczak ont mené à une étude approfondie du Lemme de Szemerédi dans un arrangement clairesemé, dont les méthodes sont encore reprises et perfectionnées par d'autres.

Peu après, elle a formulé une preuve ingénieuse d'une conjecture d'Aharoni. Ces travaux ont mené à une collaboration dont le point culminant a été un très bel et retentissant article appliquant des méthodes topologiques pour donner une condition suffisante simple pour un système de graphes représentatifs distincts dans une famille d'hypergraphes. Ces travaux ont déjà débouché sur de multiples applications.

Le théorème Haxell-Rödl, publié en 2001, affirme qu'un plongement partiel optimal d'un graphe dans un autre peut être converti en plongement réel qui est plus ou moins aussi bon. Il peut faciliter la preuve d'un résultat de stabilité, ou de structuration, sans recourir à l'utilisation d'un théorème extrémal existant, permettant peut-être de récupérer le théorème extrémal lui-même. Cette toute nouvelle orientation

The Haxell-Rödl Theorem, published in 2001, asserts that an optimal fractional packing of one graph into another can be converted into an actual packing that is more or less as good. It can facilitate the proof of a stability, or structural, result without the need for a pre-existing extremal theorem, from which it may then be possible to recover the extremal theorem itself. This line of research is very new, with great potential and prospects.

One of her latest papers gives a proof that the strong chromatic number of a graph is at most three times the maximum degree. This is a direction of research in which Alon's ten-year-old result was the previous best but, whereas Alon's approach was probabilistic, Haxell's is a lovely demonstration of traditional graph theory.

Dr. Haxell received a B. Math. Honours from the University of Waterloo in 1988 and was awarded the University of Waterloo Alumni Association Gold Medal for highest academic achievement in the Faculty of Mathematics. She received her Ph.D., supervised by Bela Bollobas, from the University of Cambridge in 1993. She has been a member of the Department of Combinatorics and Optimization, University of Waterloo, since 1993, rising to rank of Full Professor in 2004. In 2002, she was a Visiting Professor at Bell Laboratories, Lucent Technologies, New Jersey.

She received an NSERC Women's Award from 1993 to 1998, and an Ontario Premier's Research Excellence Award from 2001 to 2006. Dr. Haxell is a managing editor of the Journal of Combinatorial Theory (Series B), widely regarded as the best in the subject. She has been active in the organization of international conferences and seminars. From 1997 to 2001, she served on the Board of Directors of the Canadian Mathematical Society.

de recherche présente un grand potentiel et semble très prometteuse.

Dans l'un de ses derniers articles, elle prouve que le nombre chromatique fort du graphe correspond à au plus trois fois le degré maximal. Dans ce créneau, les résultats obtenus par Alon il y a dix ans étaient ce qui se faisait de mieux. Par contre, Alon avait adopté une démarche probabiliste, tandis qu'Haxell propose une démonstration attrayante de la théorie des graphes traditionnelle.

Mme Haxell a obtenu son baccalauréat avec spécialisation en mathématiques de l'Université de Waterloo en 1988 et a reçu la médaille d'or de l'association des anciens de cette université pour la moyenne la plus élevée de la Faculté de mathématiques. Elle a obtenu son doctorat de l'Université de Cambridge, sous la direction de Bela Bollobas, en 1993. Elle est membre du Département de combinatoire et d'optimisation de Waterloo depuis 1993, où elle est devenue professeure titulaire en 2004. En 2002, elle a été professeure invitée aux laboratoires Bell (Lucent Technologies), au New Jersey.

Elle a été professeure-boursière du CRSNG de 1993 à 1998 et a obtenu la Bourse du premier ministre de l'Ontario pour l'excellence en recherche de 2001 à 2006. Mme Haxell est rédactrice gérante du Journal of Combinatorial Theory (Series B), reconnu comme la meilleure revue du domaine. Elle participe aussi activement à l'organisation de congrès et de séminaires internationaux. De 1997 à 2001, elle a siégé au Conseil d'administration de la Société mathématique du Canada.



香港城市大學
City University
of Hong Kong

City University of Hong Kong is one of eight higher education institutions directly funded by the Government of the Hong Kong Special Administrative Region through the University Grants Committee (Hong Kong). It aims to become one of the leading universities in the Asia-Pacific region through excellence in professional education and applied research. In two studies, City University of Hong Kong ranks among the top 200 universities in the world, and among the top ten universities in the Greater China region. The mission of the University is to nurture and develop the talents of students and to create applicable knowledge in order to support social and economic advancement. The student population is approximately 23,000 enrolled in over 100 programmes at the associate degree, undergraduate and postgraduate levels. The medium of instruction is English.

The University invites applications for the following posts. Candidates with applied research achievements will receive very positive consideration. Relevant experience in business and industry will be a definite asset.

Associate Professor/Assistant Professor [Ref. A/465/49] Department of Mathematics

Duties : Teach undergraduate and postgraduate courses, especially in Applied Mathematics and Statistics; supervise research students; conduct research in areas of Applied Mathematics; and perform other duties as assigned by Head.

Requirements : A PhD in Mathematics/Applied Mathematics/Statistics with an excellent research record.

Salary and Conditions of Service

Salary offered will be highly competitive and commensurate with qualifications and experience. Appointment will be on a fixed-term contract with contract-end gratuity. Fringe benefits include annual leave, medical and dental schemes, and housing benefits where applicable.

Application and Information

Information concerning the posts and the University is available at <http://www.cityu.edu.hk> or from the Human Resources Office, City University of Hong Kong, Tat Chee Avenue, Kowloon, Hong Kong [Fax : (852) 2788 1154 or (852) 2788 9334/E-mail : hrojob@cityu.edu.hk]. Please send an application letter enclosing a current curriculum vitae to the Human Resources Office by **30 September 2006**. Please quote the reference of the post in the application and on the envelope. The University reserves the right to consider late applications and nominations, and to fill or not to fill the positions.

SASKATCHEWAN MATHEMATICS FORUM

At the Canadian Mathematics Education Forum at the Fields Institute in May, 2005, a group of participants from Saskatchewan met after the *Sharing Successes* presentations. A topic of discussion was why we needed to come to Toronto to find out what was happening in Saskatchewan. One of the participants suggested that a Saskatchewan version of the Forum be organized as a way to build on the CMS Math Forum initiative and to help keep Saskatchewan teachers, mathematics educators and mathematicians in touch with each other. On May 5 and 6, 2006, the *Sask Math Forum* was held at the University of Saskatchewan in Saskatoon.

The theme of the Forum was *Creating a Culture of Success*; the structure was modelled on the CMS Forum. The opening blessing and address were given by Elder Dr. Cecil King, Professor Emeritus from Queens University and currently elder in residence at the Indigenous Teacher Education Program at the University of Saskatchewan. The participants then organized themselves into five working groups for sessions before and after lunch. The working groups were

- Creating a culture of success . . . for All Learners
- Creating a culture of success . . . for Assessment
- Creating a culture of Success . . . for First Nations and Métis Learners
- Creating a Culture of Success . . . for Teachers
- Creating a Culture of Success . . . for Early Learners.

The day ended with eight presentations by teachers and university faculty under the title *Happenings in our Province*.

On Saturday morning, the working groups met again and after coffee, a panel discussed *Envisioning a Future*. The panel was composed of a teacher, a consultant, a mathematician, a mathematics educator and a First Nations leader. The working groups then reported to the large group. Some closing remarks were made by Dr. Florence Glanfield from the University of Saskatchewan; she had been one of the organizers of the CMS Forum. The Sask Math Forum was closed by a blessing from Dr. King.

There were between 60 and 65 participants — teachers, administrators, mathematics educators and mathematicians. It was an exciting day and a half; the discussions were lively and resulted in plans for future work and collaboration. The success of the Forum is to a large part due to the Saskatchewan Math Teachers' Society, its president Karen Campbell and her organizing committee that took the germ of an idea from the discussion in Toronto and turned it into a successful event.

Harley Weston, University of Regina

FIELDS INSTITUTE MATHEMATICS EDUCATION FORUM

In February of this year, the Fields Institute Mathematical Education Forum focussed on educational research in Ontario and heard from Cathy Bruce of Trent University, Lynda Colgan of Queen's University, Joyce Mgombelo of Brock University, Luis Radford of Laurentian University and Gila

Hanna and Doug McDougall of OISE/University of Toronto. Gila Hanna spoke on Explanation and Proof. She noted that the last two decades have seen an increased awareness that proof and other forms of reasoning must be central to mathematical instruction and can play a vital role in learning. Her work is based on the view that educational researchers and curriculum developers can work effectively if they understand what role reasoning and proof play in mathematics itself; she has studied the history and philosophy of mathematics to establish a theoretical framework that will inform the direction of research and the collection and interpretation of empirical data. The following joint article is based in part on her talk.

Explanation and Proof

In the main, philosophers of mathematics have focussed on the justificatory aspects of proof without taking account of its explanatory power. That proofs can be more or less satisfying is a familiar observation of mathematicians; Pierre Deligne, a Fields Medalist, commented on one of his own proofs, "Je serais reconnaissant à toute personne ayant compris cette démonstration de me l'expliquer". ("I would be grateful if anyone who has understood this demonstration would explain it to me.") However, this has recently changed. In 2001, Paolo Mancosu posed the following philosophical questions:

1. Are there explanations in mathematics?
2. What form do they take?
3. Is mathematical explanation a novelty?
4. What are the philosophical accounts of mathematical explanation?
5. What is the relationship between mathematical explanation and scientific explanation theories?

Mathematical explanation is not part of traditional foundational work and is difficult to treat with mathematical or logical tools. We are not dealing with certainty, so there is a vagueness attached to the topic. Explanation is an acknowledged goal of science but not of mathematics. So there are a number of challenges to clarify terms, determine factors to help explain differences of context, purpose or emphasis, as well as to understand mathematical practice and the motivation to look for explanation.

Explanation is not synonymous with proof. Some proofs explain, others do not. On the other hand, some explanations fall short of a proof, lending understanding but leaving details to be tidied up. The distinction between explanation and proof is not just psychological and we need to study what makes a proof more explanatory. Part of it is situating the discourse in an area familiar to the reader, by making use of analogies to models in other areas, such as geometry or physics. Part of it is the utilization and laying bare the natural structure of the situation so as to reduce the sense of arbitrariness and increase the sense of inevitability. It should be pointed out that explanatory power seems to have many levels and dimensions, and that results can be understood in a variety of ways. Atiyah, using the example of the many proofs of the quadratic reciprocity law by Gauss, suggested that a good theorem should have several proofs, "the more the better". Euler seems to have followed the same principle in obtaining a closed expression

for the sum of the square reciprocals. Different points of view lend different insights. There is much work to do in producing a taxonomy of types of explanation.

How does this relate to the classroom? Pupils are inclined to see proof as artificial when the result seems obvious or there is no reason for them to see alternative states of the world. In fact, before it makes sense to explain some piece of mathematics to students, two other factors need to be there. There must be curiosity on the part of the student that leads them to wonder about why something is true. And this curiosity can only arise with students who are aware of details, and have the imagination to see different possibilities. Then there would be a thirst for explanation and a tendency to regard proofs as being primarily about explanation.

Asking “why?” is an indication that the questioner perceives that there may be connecting links among the various propositions of mathematics. Following Yu. Manin, we can think of a mathscape, where axioms, definitions and theorems are the localities and proofs are the paths that connect them, with the rules of logic as vehicles to travel in. As in a real landscape, there may be many routes between localities, some more “scenic” than others. Changing the metaphor, we can also regard proofs as the machinery that makes results happen.

Let us look at a few examples. Suppose that pupils are asked to write down the numbers 1, 2, 3, etc., in a list and beside each its positive divisors, and the number of its positive divisors. For example, beside 10 one would write the divisors 1, 2, 5, 10 and note that there are four divisors. On examining the list, one might note that the number of divisors is usually even, but that there are certain numbers, 1, 4, 9, 16, for example, that have an odd number of divisors. Furthermore, this seems to happen only for squares. To get this far, the pupil would have to be sensitive to the distinction between odd and even numbers as well as between squares and non-squares. But then the question of why there might be a connection between squares and numbers having an odd number of divisors would arise naturally.

There may be different ways of proving this; for example, one can construct a pretty technical argument based on the prime power decomposition. But one that reveals the mechanism starts with the observation that for each divisor of a number, there is a codivisor (the number divided by the divisor), so that divisors come in pairs. If there is an odd number of divisors, then some divisor must be paired with itself as a codivisor, which means that the number must be square.

Another approach in finding an explanation is to look outside the immediate context of the proposition for a model that is persuasive. Consider for example the result that the three medians of a triangle are concurrent. This can be put into the context of a physical model in which unit weights are hung at the vertices and we locate the centre of gravity. We postulate that (1) the centre of gravity is unique, (2) the principle of the lever holds (viz., the centre of gravity of two masses lies on the straight line joining them and the distances from the masses are inversely proportional to them) and (3) the centre of gravity

of a system of weights remains unchanged if we replace any two masses by a single mass equal to the sum of the two at the centre of gravity of the two masses. Using these three, we can replace two of the masses at the vertices by a double mass at the midpoint of the side connecting them, and then locate the centre of gravity at a point splitting the median in the ratio 1:2. Since the centre of gravity is unique, it must be in the same location if we argue from the other medians, and so there is a common point that splits each median in the ratio 1:2. Thus, we have used a physical system that the students may find more natural and easy to grasp, and then we now read our physical conclusion back into the geometry.

A striking example of this sort of idealized thought experiment in explaining a result is the explanation of Pick’s Theorem: Let P be a simple (non-crossing) polygon in the plane lattice whose vertices are all lattice points. Then its area is given by

$$A = i + (b/2) - 1$$

where i denotes the number of lattice points in the interior of P and b the number of lattice points (including the vertices) on the boundary. There are numerous proofs of this going back to Pick’s own work in 1899. Each investigator was undoubtedly aware of existing proofs, but wanted to find one that was more explanatory, more elegant or more general.

Here is how Blatter looked at it in 1997. Imagine each lattice point as a generator of a unit amount of heat, and look at the heat contained in the polygon. It is assumed that each lattice point projects heat uniformly in every direction. The heat in the interior of P comes only from the lattice points inside P and from the points on the boundary. We will suppose that one unit of heat warms one unit of area.

Each interior point thus warms one unit of area. Each point on the boundary that is not a vertex warms one-half unit of area. Each point on the boundary that is a vertex warms one half unit minus the turning angle at that vertex measured in units of 2π . Since the sum of all turning angles in the polygon is one full turn, we get that the heat contribution of all the points on the boundary is $(b/2) - 1$. Thus the area within the polygon heated by the lattice points is $i + (b/2) - 1$.

This argument fudges the relationship between the heat and the area, but it does seem to account in a significant way for the -1 term that occurs in Pick’s formula. The advantage of such an argument is that it encourages students to “think in pictures”, to look for an intuitive grasp of the situation. After all, this is what happens to real mathematicians, who often have a feeling where a proof is to be found before they actually sit down and work out the details.

The problem with a lot of the teaching of proof in the classroom is that proofs come out of the blue for a student, before students have the mental infrastructure to appreciate it. If teachers take care to help the student create this, they can keep alive the activity of proving, find interesting and exciting ways of proving results and never lose sight of the fact that proofs are the essence of mathematics.

Ed Barbeau & Gila Hanna, University of Toronto

NEWS FROM DEPARTMENTS

CONCORDIA UNIVERSITY, MONTREAL, QUEBEC

Promotions: Xiaowen Zhou (Associate Professor, June 1st, 2006)

Appointments: Cody Hyndman (Assistant Professor, Mathematical Finance, Stochastic Analysis, July 1st, 2006); Alina Stancu (Assistant Professor, Geometric Analysis, July 1, 2006).

Resignations: Qihe Tang (Assistant Professor, December 31, 2005)

Deaths: Mary Brian (Retired Associate Professor, May 2006)

Awards/Distinctions: John Harnad (2006 CAP-CRM Prize in Theoretical & Mathematical Physics, June 2006).

Visitors (name, country, area, dates): Iana Anguelova (Bulgaria, Pure and Applied Mathematics, September 2006 - May 2007); Mikhail Babich (Russia, Mathematical Physics, September - December 2006); Leonid Chekhov (Russia, Mathematical Physics, September-December 2006); Victor Enolskii (Russia, Mathematical Physics, September-December 2006); Jose Marin-Antuna (Cuba, Theoretical Physics, May-August 2006); Reinaldo Rodriguez (Cuba, Mathematical Physics, July-August 2006).

Other News: The Concordia Mathematics & Statistics Department executed a major move this year, consolidating its units on both campuses into one building on Concordia University's downtown Sir George William campus.

DALHOUSIE UNIVERSITY, HALIFAX, NS

Retirements: Kit Bowen (Assistant Professor, Statistics, July 1, 2006); John Clements (Professor, Applied Mathematics, July 1, 2006); C.C.A. Sastri (Professor, Statistical Mechanics, July 1, 2006).

Other News: Karl Dilcher took over as Chair from July 1, 2006. Christopher Field has been awarded the Gold Medal of the Statistical Society of Canada.

UNIVERSITY OF GUELPH, GUELPH, ONTARIO

Promotions: H. Eberl (Associate Professor, July 1, 2006); G. Umphrey (Associate Professor, July 1, 2006); J. Horrocks (Associate Professor, July 1, 2006).

Appointments: M. Garvie (Assistant Professor, July 1 2006, Numerical Analysis, BioMathematics); R. Deardon (Assistant Professor, July 1 2006, Statistics); Z. Feng (Assistant Professor, July 1 2006, Statistics).

Retirements: Joe Cunsolo (Professor, September 2006); John Holt (Professor, January 2006); John Hubert (Professor, January 2006).

Awards/Distinctions: J. Cunsolo (John Bell Award - the highest teaching honour bestowed by the University of Guelph, June 2005); H. Eberl (Canada Research Chair Tier II in Applied Mathematics, July 2006); C. Bauch, M.-G. Cojocaru (PI), D. Kribs, H. S. Sendov, A. Willms (CFI New Opportunities Fund - 3rd largest in Applied Mathematics to date (approx. 900,000 CAD) for a High Performance Computing Facility).

Visitors: P. Lio (University of Cambridge UK, Applied Mathematics-BioMathematics, April 2006).

Other News: Research Groups reflecting the current research configuration of the department (alphabetically): BioMathematics and BioStatistics Working Group (Winter 2005); Operations Research Working Group (Summer 2006); Quantum Information and Operators Working Group (Summer 2005).

UNIVERSITY OF MANITOBA, WINNIPEG, MANITOBA

Promotions: Yong Zhang (Associate Professor, July 1st).

Appointments: Gábor Lukács (Assistant Professor, July 1st).

Death: Nathan S. Mendelsohn (Distinguished Professor Emeritus, July 4, 2006).

Awards/Distinctions: D. Trim, Dr. and Mrs. H. H. Saunderson (Award for Excellence in Teaching, 2006); T. Berry (2005 Merit award for service); and S. Kalajdzievska (2006 Students' Teacher Recognition).

Visitors: Since April 1, 2006 N. Romanovski (Russia, Group Theory, April 2 - 29); G. Willis, (USA, Abstract Harmonic Analysis, May 11- 16); G. Dales (UK, Abstract Harmonic Analysis, May 8 - 18); M. Hendriksen (USA, Topology, Apr. 30 - May 20) F. Levin (UK, Group Theory, May 8 - 19); M. A. Al-Zanaidi (Kuwait, Differential Equations, June).

UNIVERSITY OF SASKATCHEWAN, SASKATOON, SK

Appointments: Rajesh Pereira (Assistant Professor, July 1, 2006 - June 30, 2007)

Retirements: Gareth Griffith (Professor, December 2006); Wayne Skrapek (Associate Professor, December 2005); Patrick Browne (Professor, June 2006); Murray Marshall (Professor, June 2006).

Visitors: Mohamed El Bachraoui (Morocco, June, July, 2006); Andreas Fischer (Germany, April - December, 2006); Igor Klep (Slovenia, June, July, August, 2006); Mohamad Vali (Iran, October 2005 - August 2006); Hamid Usefi (Ontario, July - December 2006); Andrew Douglas (Ontario, January - June 2007).

Other News: Raj Srinivasan appointed Head (July 1, 2006-June 30, 2011).

WILFRID LAURIER UNIVERSITY, WATERLOO, ON

Appointments: Manuele Santoprete (Assistant Professor, Applied Mathematics July 1, 2006); Roman Makarov (Assistant Professor, Financial Mathematics, July 1, 2006).

Retirements: Stephen J. Stack (Associate Professor, June 30, 2006, after 37 years service, many of them as Department Chair).

Other News: David C. Vaughan completed two terms as Department Chair. Sydney Bulman-Fleming has been elected Chair for the period 2006-09.

UNIVERSITY OF WATERLOO, WATERLOO, ON

Appointments: David McKinnon (granted tenure and promoted to Associate Professor, Algebraic Geometry, July 1, 2006); Albert Chau (PhD Columbia 2001, Differential Geometry, July 1, 2005); Barbara Csima (PhD Chicago 2003, Logic, hired under the UFA program July 1, 2005); Ruxandra Moraru (PhD McGill 2001, Algebraic and Differential Geometry, July 1, 2005).

Retirements: Dragomir Djokovic (Professor, Algebra, September 1, 2006).

Awards/Distinctions: Ken Davidson (named fellow of the Fields Institute, 2006) and Cameron Stewart (named University Professor, February 2004).

Visitors (name, country, area, dates): Sanjiv Gupta (Saudi Arabia, Harmonic Analysis, June 1, 2006-May 31, 2007); Adam Logan (UK (Liverpool) and Canada (CRM), Computational Number Theory, April 1, 2006-July 31, 2007); and Serban Belinschi (PDF, Non-commutative Probability, September 1, 2005-August 31, 2008).

NEWS FROM THE FIELDS INSTITUTE

Forthcoming events at the Fields Institute are listed in the Calendar of Events in this issue of the CMS Notes. For an up-to-date listing with more details, see www.fields.utoronto.ca/programs/

Juris Steprans (York University) is the Institute's new Deputy Director, succeeding Tom Salisbury (also of York). The Institute bids Juris a hearty welcome, and looks forward to his active participation in its affairs in this important role.

At the Annual General Meeting in June, several members of the Board of Directors were appointed/reappointed: John Challis (Vice-President of Research, University of Toronto), Tom Coleman (Dean of the Faculty of Mathematics, University of Waterloo), Feridun Hamdullahpur (Vice-President (Research and International), Carleton University), Janet Halliwell (Executive Vice-President, SSHRC), Juris Steprans, and Hari Venkatacharya (President and CEO, Clineo).

Also at the AGM, six new Fields Institute Fellows were announced: Hermann Brunner (Memorial University), Kenneth R. Davidson (Waterloo), George Gadanidis (UWO), David Rudd (Sigma Analysis and Management), Nicole Tomczak-Jaegermann (Alberta), and Noriko Yui (Queen's).

The thematic program this past (Winter/Spring) term has been *Holomorphic Dynamics, Laminations, and Hyperbolic Geometry*, organized by Bruce Kleiner (Michigan), Mikhail Lyubich (Toronto and Stony Brook), Yair Minsky (Yale), and Mike Shub and Michael Yampolsky (Toronto). There were 3 workshops, and two series of lectures by distinguished mathematicians – in January, Gregory Margulis (Yale) spoke in the Distinguished Lecture Series on his work on irrational quadratic forms and the space of lattices in n-dimensional Euclidean space, while Yair Minsky, also from Yale, delivered the Coxeter Lectures on *Curve complexes, surfaces and 3-manifolds* in March. These lectures (as well as talks in the workshops, and the Fall lecture series by Oded Schramm and Lai-Sang Young) are available at www.fields.utoronto.ca/audio.

The thematic program this fall is *Cryptography*, organized by Ian F. Blake (Toronto), Alfred Menezes (Waterloo), Michele Mosca (Waterloo and Perimeter Institute), Kumar Murty (Toronto), Andreas Stein (Wyoming), Renate Scheidler (Calgary), Ramarathnam Venkatesan (Microsoft), and Hugh Williams (Chair – Calgary). Gerhard Frey (Institut für Experimentelle Mathematik, Universität Duisburg-Essen) will deliver the Coxeter Lectures September 25-27 on *Duality Theorems in Arithmetic Geometry*

and *Applications*, and Shafira Goldwasser will speak in another Coxeter Lecture Series in November. The specific topics of the program are quantum computing and quantum cryptography, algebraic curves and cryptography, computational challenges arising in algorithmic number theory and cryptography, unconditionally secure cryptography, cryptographic protocols, and applied aspects of cryptography. Details on graduate courses, workshops and other activities in *Cryptography* can be found at www.fields.utoronto.ca/programs/scientific/06-07/crypto/.

Also during this fall, the winner of the 2006 CRM-Fields-PIMS Prize, Nicole Tomczak-Jaegermann (Alberta), will deliver her prize lecture on a date to be announced.

The Winter / Spring 2007 thematic program is *Geometric Applications of Homotopy Theory*, organized by Rick Jardine (Chair – UWO), Gunnar Carlsson (Stanford) and Dan Christensen (UWO). This program will develop new applications of homotopy theory in algebraic geometry, number theory and mathematical physics, and will include subprograms on *Higher Categories and Their Applications* (January-February; workshop January 9–13), *Homotopy Theory of Schemes* (March-April; workshop March 26–30), *Stacks in Geometry and Topology* (May-June; workshop May 14–18). There will also be a conference *Motives and Algebraic Cycles, A Conference Dedicated to the Mathematical Heritage of Spencer J. Bloch*, March 19–23. The Distinguished Lecture Series will be given in May by Michael Hopkins (Harvard), and Andrei Suslin (Northwestern) will give a Coxeter Lecture Series at a date to be announced.

During the Fall of 2007, the thematic program will be *Operator Algebras*, organized by George Elliott (Toronto, chief organizer), Dietmar Bisch (Vanderbilt), Joachim Cuntz (Münster), Kenneth Davidson (Waterloo), Thierry Giordano (Ottawa), and Roland Speicher (Queen's). Three workshops are being scheduled: Von Neumann Algebras, Structure of C*-Algebras, and Operator Spaces and Quantum Groups. There will also be three graduate courses – Introduction to Operator Algebras, Structure of C*-Algebras, and Free Probability. Distinguished Lecture Series will be delivered by Uffe Haagerup (Odense) and Alain Connes (IHES). Application forms for office space or funding will be available in early 2007.

In the Winter/Spring term, 2008, the thematic program will be *New Trends in Harmonic Analysis*, organized by Izabella Laba (UBC, chief organizer), Michael Lacey (Georgia

Tech), Alex Iosevich (Missouri – Columbia) and Eric Sawyer (McMaster). Jill Pipher (Brown) will be the Coxeter Lecturer, and Terence Tao will deliver the Distinguished Lecture Series.

Several new publications have appeared in the Fields Institute series recently. Those in our Communications series are *Topics in Kinetic Theory* (Thierry Passot, Catherine Sulem and Pierre-Louis Sulem), *Geometry and Topology of Manifolds* (Hans U. Boden, Ian Hambleton, Andrew J. Nicas and B. Doug Park), and *Nonlinear Dynamics and Evolution Equations* (Hermann Brunner, Xiao-Qiang Zhao and Xingfu Zou). *Bifurcation Theory and Spatio-Temporal Pattern Formation* (Wayne Nagata and N.Sri Namachchivaya) is in press. For details about these volumes, please see www.ams.org/cgi-bin/bookstore/bookpromo/ficseries. In our Monograph series, *Modular Calabi-Yau Threefolds* by Christian Meyer, and *Coxeter Groups and Hopf Algebras* by Marcelo Aguiar and Swapneel Mahajan appeared recently. See www.ams.org/cgi-bin/bookstore/bookpromo/fimseries.

In addition we have just published, jointly with the AMS, *The Coxeter Legacy: Reflections and Projections* (editors: Chandler Davis and Erich W. Ellers). This collection of articles by outstanding researchers and expositors is intended to capture the essence of the Coxeter legacy, and is a mixture of surveys, up-to-date information, history, storytelling, and personal memories, accompanied by a rich variety of interesting illustrations. Through this volume – and the conference from which it derives – the Institute pays a final tribute to the Canadian mathematics icon who was intimately involved with the Institute's development during its first 10 years.

Some upcoming deadlines:

Lecture Series nominations – September 15

CRM-Fields-PIMS Prize – October 1

Conferences and Workshops – October 15

PDF applications for the Operator Algebra and Harmonic Analysis thematic programs – December 7

For more details, follow "Proposals & Applications" on the Fields homepage www.fields.utoronto.ca

Carl Riehm, Fields Institute

**Host: University of Toronto
Sheraton Centre, Toronto, Ontario
December 9 – 11**

On behalf of the University of Toronto, the Department of Mathematics invites the mathematical community to the Winter 2006 Meeting of the Canadian Mathematical Society.

Following the usual format of the CMS Meeting, the program will include a wide variety of sessions, a contributed paper session, plenary and prize lectures, and a public lecture.

All activities and scientific talks will be held at the Sheraton Centre Toronto, located at the intersection of Queen and York Street.

For the most up-to-date information concerning the program, detailed schedules, registration forms and abstract submission forms, please visit the meeting website at www.cms.math.ca/Events/.

Business Meetings

The CMS will be holding the following business meetings:

Executive Committee Meeting: Thursday, December 7

Development Group Luncheon: Friday, December 8

Board of Directors Meeting: Friday, December 8

Social Events

The CMS will be holding the following social events:

Welcoming Reception: Friday, December 8

Participants' Social: Saturday, December 9

Banquet: Sunday, December 10

Complimentary coffee and juice will be available during the scheduled breaks.

CONFÉRENCE POPULAIRE / PUBLIC LECTURE
V. Kumar Murty (University of Toronto)

PLENARY SPEAKERS / CONFÉRENCIERS PLÉNIERS
Leone Burton (University of Birmingham)

Dmitry Dolgopyat (University of Maryland)

Dimitri Shlyakhtenko (UCLA)

Karen Smith (University of Michigan)

Susan Tolman
(University of Illinois at Urbana-Champaign)

Shmuel Weinberger (University of Chicago)

**Hôte : Université de Toronto
Hôtel Sheraton Centre, Toronto (Ontario)
9 – 11 décembre 2006**

Au nom de l'Université de Toronto, le Département de mathématiques souhaite inviter la communauté mathématique à la Réunion d'hiver 2006 de la Société mathématique du Canada.

Conformément au format habituel, la Réunion comprendra une grande diversité de sessions, une séance de communications libres, des conférences principales, des conférences de lauréats ainsi qu'une conférence populaire. Toutes les activités, y compris celles du programme scientifique, se dérouleront à l'Hôtel Sheraton Centre Toronto, qui se trouve à l'intersection des rues Queen et York.

Vous trouverez l'information la plus récente sur les programmes, y compris les horaires détaillés, les formulaires d'inscription et les formulaires électroniques pour l'envoi des résumés sur le site web de la Réunion (www.smc.math.ca/Events/f).

Séances de travail

La SMC tiendra les séances de travail suivantes :

Comité exécutif : jeudi 7 décembre

Lunch du groupe de développement : vendredi 8 décembre

Réunion du Conseil d'administration : vendredi 8 décembre

Activités sociales

La SMC tiendra les activités sociales suivantes :

Réception d'accueil : le vendredi 8 décembre

Rencontre des participants : le samedi 9 décembre

Banquet : le dimanche 10 décembre

Du café et des jus seront servis durant les pauses prévues à l'horaire.

PRIX / PRIZES AND AWARDS

PRIX JEFFERY-WILLIAMS PRIZE

Andrew Granville (Université de Montréal)

DOCTORAL PRIZE / PRIX DE DOCTORAT

Michael Newman (University of Waterloo)

PRIX ADRIEN POULIOT AWARD

Peter Taylor (Queen's University)

PRIX DAVID BORWEIN POUR CARRIÈRE ÉMÉRITE

DAVID BORWEIN DISTINGUISHED CAREER AWARD

To be announced

PRIX POUR SERVICE MÉRITOIRE / DISTINGUISHED SERVICE AWARD

To be announced

G. DE B. ROBINSON AWARD

Malcolm Harper (Champlain College)

Exhibits

Exhibits will be open from 9:30 am to 4:00 pm on Saturday and Sunday in the registration area.

The **Joint Exhibit** features books and other products from publishers and other companies and organizations not represented at the meeting. Order forms will be available at the exhibit for your convenience. The CMS will forward any orders to the corresponding company after the meeting. Books and other materials that will be displayed at this Joint Exhibit will be donated to the host university.

We invite participants to visit the **CMS Membership Booth and Book Display**, located in the registration area. A representative will be available from 9:30 am to 4:00 pm to answer questions about membership, publications, and other programs.

An **Information Table** will be set up in the registration area to display information of interest to participants. Please send a copy of your announcement to the CMS Meetings Coordinator, 577 King Edward, Ottawa, Ontario, Canada K1N 6N5, facsimile (613) 565-1539, e-mail meetings@cms.math.ca.

All announcements require prior approval. Once approved, the participant may display up to 100 copies of the announcement. The participant is responsible for providing all copies for display and for removing any remaining copies before 3:00 pm on the last day of the meeting. After that time, all remaining material will be discarded.

Announcements may not be posted in the registration or meeting area. Personal distribution of announcements and announcements of events competing in time or place with the meeting program are not permitted.

This table is not meant for material promoting products or services for sale. Those wishing to promote products for sale should contact the Meetings Coordinator for information on the Joint Exhibit.

Submission of Abstracts

For abstracts of talks to be published on-line and in the meeting programme, they have to be submitted by October 15, 2006, using the on-line form at cms.math.ca/forms/abs-w06. The organizers appreciate the cooperation of all speakers in observing this important deadline.

Registration

The registration form is also available at www.cms.math.ca/Events/ by email office@cms.math.ca and by mail from our Executive Office (address on inside cover).

Registration fees are given in Canadian dollars. Payment may be made by cheque (Canadian or US dollars), or by VISA or MasterCard. To qualify for the reduced rate, payment must be received in Ottawa by November 5; for the registration to be processed before the meeting, payment must be received by November 26. Receipts will be provided at the meeting.

Expositions

Le salon des exposants sera ouvert de 9 h 30 à 16 h le samedi et le dimanche, dans l'aire d'inscription.

Exposition conjointe : On y présentera des produits de maisons d'édition et d'autres entreprises et organismes non représentés à la Réunion. On trouvera des bons de commande sur place, que la Société transmettra aux entreprises concernées après la Réunion. Les livres et autres produits qui seront présentés à cette exposition seront offerts à l'université hôte.

Nous vous invitons à visiter **le comptoir d'adhésion et l'exposition de livres de la SMC** dans l'aire d'inscription. Un représentant sera sur place de 9 h 30 à 16 h pour fournir des renseignements sur l'adhésion, les publications et les autres activités de la Société.

Un **kiosque de renseignements** sera également aménagé dans l'aire d'inscription. Prière de faire parvenir une copie de votre annonce à la coordinatrice des Réunions de la SMC au 577, avenue King-Edward, Ottawa (Ontario), Canada K1N 6N5, fax : 613-565-1539, courriel : reunions@smc.math.ca.

Toute annonce doit être approuvée au préalable. Les participants pourront apporter jusqu'à 100 copies de leur annonce approuvée. Il leur incombe de fournir eux-mêmes les copies et de récupérer celles qui seront restées sur la table avant 15 h le dernier jour de la Réunion; autrement, elles seront détruites.

Il est interdit d'afficher des annonces dans l'aire d'inscription ou dans les salles de réunion, ou de distribuer des annonces aux passants. Les annonces d'événements entrant en conflit avec le programme de la Réunion ne seront pas acceptées.

Le kiosque n'est pas destiné à promouvoir des biens et services achetables. Ceux qui désirent faire la promotion de tels produits doivent communiquer avec la coordinatrice des expositions pour obtenir des renseignements sur l'exposition conjointe.

Envoi de résumés

Pour pouvoir publier votre résumé en ligne et dans le programme de la Réunion, nous devons le recevoir au plus tard le 15 octobre 2006 au moyen du formulaire électronique au cms.math.ca/forms/abs-s06. Les organisateurs remercient les conférenciers de bien vouloir respecter cette importante échéance.

Inscription

Vous pourrez vous procurer le formulaire d'inscription au www.smc.math.ca/Events/f, par courriel au bureau@cms.math.ca ou au de notre bureau administratif (adresse en couverture intérieure):

Les frais d'inscription sont indiqués en dollars canadiens. Vous pouvez payer par chèque (devises canadiennes ou américaines), VISA ou MasterCard. Le paiement doit nous parvenir à Ottawa au plus tard le 5 novembre pour que vous ayez droit aux tarifs réduits. Pour que votre inscription soit traitée avant la Réunion, votre paiement doit nous parvenir au plus tard le 26 novembre. Les reçus seront remis à la Réunion.

	Reduced rate	Regular rate
Prize Lecturer (incl. 2 free banquet tickets)	\$ 0	\$ 0
Plenary and Public Lecturer (incl. 1 free banquet ticket)	\$ 0	\$ 0
Member CMS/AMS/MAA	\$ 235.00	\$ 305.00
Non-Member (incl. free CMS Membership for 2006)	\$ 385.00	\$ 455.00
Session Organizer/Speaker	\$ 235.00	\$ 305.00
Postdoc	\$ 130.00	\$ 170.00
Teacher (K-12, CEGEP, College)	\$ 95.00	\$ 125.00
Retired	\$ 95.00	\$ 125.00
Student	\$ 75.00	\$ 95.00
Unemployed	\$ 95.00	\$ 125.00
One-day fee (available onsite only)	n/a	\$ 175.00
Banquet	\$ 60.00	\$ 60.00

CMS = Canadian Mathematical Society

AMS = American Mathematical Society

MAA = Mathematical Association of America

	Prix réduit	Prix régulier
Conférencier primé (2 billets pour le banquet incl.)	0 \$	0 \$
Conférencier princ./pop. (1 billet pour le banquet incl.)	0 \$	0 \$
Membre SMC/AMS/MAA	235,00 \$	305,00 \$
Non-membre (adhésion gratuite à la SMC pour 2006)	385,00 \$	455,00 \$
Organisateurs/conférenciers de session	235,00 \$	305,00 \$
Étudiants postdoctoraux	130,00 \$	170,00 \$
Enseignants (prim.-sec., cégep, collège)	95,00 \$	125,00 \$
Retraités	95,00 \$	125,00 \$
Étudiants	75,00 \$	95,00 \$
Sans-emploi	95,00 \$	125,00 \$
Frais d'une journée (disponible sur le Web seulement)	s/o	175,00 \$
Banquet	60,00 \$	60,00 \$

SMC = Société mathématique du Canada

AMS = American Mathematical Society

MAA = Mathematical Association of America

Advantages to Pre-Registration:

- reduced fees for early registration until November 5
- your name appears on the list of participants on the meeting web site
- your Meeting Package is waiting for you at the reception on Friday evening
- no waiting in line early Saturday morning to process your registration!
- banquet tickets are available now but may no longer be available on site

Refund Policy

Participants wishing to cancel their registration must notify the CMS Executive Office in writing by November 26 to receive a refund less a \$40 processing fee. Those whose contributed paper has not been accepted will upon request be fully refunded.

Accommodation

The hotels listed below are offering rooms at a reduced group rate during the conference as well as 3 days prior and 3 days after the conference. To be eligible for the reduced room rates, participants must make their reservations before the date indicated, quoting the group code. Reservations made after the deadline will be on a space available basis and the group rate may no longer apply.

Rates are per room per night and are quoted in Canadian dollars. Reservations must be guaranteed by a one-night deposit or a major credit card. It is recommended to clarify payment and cancellation policies when making the reservation, as these vary from hotel to hotel.

Additional information regarding accommodation choices will be posted to the meeting web site as it becomes available.

Avantages de la préinscription :

- Tarifs réduits pour les personnes qui s'inscrivent au plus tard le 5 novembre
- Votre nom figurera dans la liste des participants sur le site de la Réunion
- Votre trousse d'inscription sera déjà prête à votre arrivée le vendredi soir
- Vous n'aurez pas besoin de faire la file pour vous inscrire à la première heure samedi matin!
- Les billets pour le banquet sont en vente maintenant, mais il pourrait ne plus en rester sur place

Politique de remboursement

Les participants qui désirent annuler leur inscription doivent en aviser le bureau administratif de la SMC par écrit avant le 26 novembre pour se voir rembourser leurs frais d'inscription (moins 40 \$). Les participants dont les communications libres n'auront pas été acceptées seront remboursés intégralement sur demande.

Hébergement

Les hôtels indiqués ci-dessous offre des chambres à un tarif de groupe réduit durant la réunion, ainsi que trois jours avant et après celle-ci. Pour avoir droit au tarif réduit, les participants doivent réserver, en mentionnant le code de groupe, avant la date indiquée. Après cette date, les hôtels ne prendront vos réservations que s'il reste des chambres. En outre, ils peuvent demander le tarif normal.

Les tarifs sont par nuit, par personne, et sont indiqués en devises canadiennes. Toute réservation doit être garantie par le paiement d'une nuit ou par une carte de crédit reconnue. Au moment de faire votre réservation, n'oubliez pas de vérifier les modalités de paiement et d'annulation, car celles-ci varient d'un établissement à l'autre.

Nous publierons sur le site de la Réunion tout nouveau renseignement concernant l'hébergement dès que nous le recevrons.

Sheraton Centre Toronto

123 Queen Street West, Toronto, Ontario M5H 2M9
 Phone 416-361-1000 (main), 416-947-4955 (reservations)
 Fax 416-947-4854

Booking deadline: November 15, 2006

Group code: Canadian Mathematical Society

Please use the link provided on our web site for your room reservation

Rates: Single/Double- \$139.00, Club – \$199.00

\$30.00 per night for each additional person, maximum occupancy per room is 4 people. **Applicable taxes:** 6% GST (refundable to non-residents of Canada), 5% Provincial Room Tax, 3% Destination Marketing Fee (DMF is subject to 6%GST).

Children: Children under 18 may stay for free in their parent's room using existing bedding.

Parking: \$33.00 per day, includes in/out privileges, valet parking only.

Check-in: 3:00 pm / **Check-out:** 1:00 pm.

Marriott Downtown Eaton Centre

525 Bay Street, Toronto, Ontario M5G 2L2
 Phone: 416-597-9200 (main), 800-905-0667 (reservations)
 Fax: 416-597-9211

Booking deadline: November 15, 2006

Group code: MATO

Please use the link provided on our web site for your room reservation

Rates: Single/Double - \$99.00, \$20.00 per night for each additional person, maximum occupancy per room is 4 people. **Applicable taxes:** 6% GST (refundable to non-residents of Canada), 5% Provincial Room Tax, 3% Destination Marketing Fee. **Children:** Children under 12 stay for free in their parent's room.

Parking: Overnight guests: - Self-Parking: \$19.00 (reduced rate from check-in until 4pm next day) - Valet Parking: \$24.00 (from check-in until 4pm next day) Self-Parking and Valet Parking for our overnight guests include in and out privileges. Visitors: - Self Parking: \$2.50 per half hour or less; \$ 6.00 maximum (5:00 PM – 4:00 AM); \$13.00 maximum (7:00 AM – 7:00 PM), \$19.00 daily maximum - Valet Parking: \$6.00 per hour, \$24.00 daily maximum. Check-in: 3:00 pm / Check-out: 12:00 pm.

Child Care : The Sheraton Hotel and the Marriott Hotel do not offer in-house child care; the Front desk or the Concierge will assist in finding child care providers nearby. Advance research and arrangements are recommended.

Hôtel Sheraton Centre Toronto

123, rue Queen Ouest, Toronto (Ontario) M5H 2M9
 Téléphone (numéro principal) : 416-361-1000;
 (réservations) : 416-947-4955 Fax : 416-947-4854

Date limite de réservation : 15 novembre 2006

Code de groupe : Société mathématique du Canada ou Canadian Mathematical Society

Veuillez utiliser le lien sur notre site Web pour faire votre réservation.

Tarifs : Une ou deux personnes – 139 \$; club – 199 \$.

30 \$ la nuit par personne additionnelle, 4 personnes par chambre maximum. **Taxes applicables :** TPS, 6 % (remboursable aux non-résidents du Canada), Taxe provinciale d'hébergement, 5 %; Frais de marketing des destinations, 3 % (la TPS de 6 % s'applique à ces frais).

Enfants : Aucuns frais pour les enfants de moins de 18 ans qui partagent la chambre de leurs parents et utilisent la literie fournie.

Stationnement : 33 \$ par jour, avec droit d'entrée et de sortie. Service voiturier uniquement.

Arrivée : 15 h / Départ : 13 h

Hôtel Marriott Downtown Eaton Centre

525, rue Bay, Toronto (Ontario) M5G 2L2
 Téléphone (numéro principal) : 416-597-9200;
 (réservations) : 800-905-0667. Fax : 416-597-9211.

Date limite : 15 novembre 2006

Code de groupe : MATO

Veuillez utiliser le lien sur notre site Web pour faire votre réservation.

Tarifs : Une ou deux personnes – 99 \$. 20 \$ la nuit par personne additionnelle, 4 personnes par chambre maximum.

Taxes applicables : TPS, 6 % (remboursable aux non-résidents du Canada), Taxe provinciale d'hébergement, 5 %; Frais de marketing des destinations, 3 % (la TPS de 6 % s'applique à ces frais). **Enfants :** Aucuns frais pour les enfants de moins de 12 ans qui partagent la chambre de leurs parents.

Stationnement : Clients : Stationnement libre-service – 19 \$ (à partir de l'arrivée jusqu'à 16 h le lendemain). Service voiturier – 24 \$ (à partir de l'arrivée jusqu'à 16 h le lendemain). Dans les deux cas, les clients ont le droit d'entrer et de sortir à leur guise. Visiteurs : Stationnement libre-service – 2,50 \$ par demi-heure ou moins; de 17 h à 4 h, maximum de 6 \$; de 7 h à 19 h, maximum de 19 \$. Service voiturier – 6 \$ par heure; tarif quotidien maximum, 24 \$.

Arrivée : 15 h / Départ : 12 h

Services de garde : Ni l'Hôtel Sheraton, ni l'Hôtel Marriott n'offre un service de garde maison. Cependant, le personnel de la réception vous aidera à trouver un service de garde dans les environs. Nous vous recommandons cependant de faire vos démarches et vos réservations à l'avance.

Travel

A **taxi** fare from the airport to downtown costs approximately \$45.00-55.00. **Airport Shuttle Express:** one-way - \$16.00 (plus taxes).

Detailed information regarding the University of Toronto, the city of Toronto, and the Province of Ontario, including tourism information, local weather and climate, site and street maps, and itineraries for self-guided tours, are available at the following websites:

- University of Toronto (www.utoronto.ca)
- Tourism Toronto (www.torontotourism.com/visitor)
- Travel Ontario (www.ontariotravel.net)
- Canada Weather Forecast (www.weatheroffice.ec.gc.ca)

Graduate Student Support

Limited funds are available to partially fund the travel and accommodation costs for bona fide graduate students at a Canadian or other university. Preference is given to Canadian students. To apply for this funding, applicants should submit a letter written by their supervisor or departmental graduate advisor, providing the following: name of student, area of study and level, how the student will benefit from the meeting, whether or not the student be speaking, and what support is available from other sources.

This letter should be sent before October 15, 2006 to gradtravel-w06@cms.math.ca. Applicants will be notified early in November of the funding decision.

If successful, the student will receive a cheque for reimbursement of expenses after the meeting and upon completion and submission of the standard Travel Expense Claim Form, along with appropriate original receipts.

For more information, please contact the Meeting Committee at gradtravel-w06@cms.math.ca.

Sponsors

Support from the following is gratefully acknowledged. Additional information regarding support for this meeting will be posted to the meeting web site as it becomes available.

le Centre de Recherches Mathématiques

The Fields Institute

MITACS

Pacific Institute for the Mathematical Sciences

University of Toronto

Department of Mathematics

Department of Mathematical and Computational Sciences,
UTM

Department of Computer and Mathematical Sciences, UTSC
Faculty of Arts and Science

Office of the Vice-President, Research

Office of the Vice-Principal, Research, UTM

The Canadian Mathematical Society wishes to acknowledge the contributions of the **Meeting Committee**.

Déplacements

Le trajet en **taxis** de l'aéroport au centre-ville coûte environ de 45 à 55 \$. **Navette de l'aéroport** : sens unique – 16 \$ (plus taxes).

Vous trouverez des renseignements détaillés concernant l'Université de Toronto, la ville de Toronto et l'Ontario (renseignements touristiques, température et climat locaux, cartes de la ville et des attractions touristiques, circuits touristiques piétonniers, etc.) sur les sites web suivants :

- University of Toronto (www.utoronto.ca)
- Tourism Toronto (www.torontotourism.com/visitor)
- Travel Ontario (www.ontariotravel.net)
- Service météorologique du Canada (www.weatheroffice.ec.gc.ca)

Subventions pour étudiants diplômés

Les étudiants diplômés du Canada ou de l'étranger ont accès à un fonds limité pour financer une partie de leurs frais de déplacement et de séjour. La préférence est toutefois accordée aux étudiants canadiens. Toute demande de financement doit être accompagnée d'une lettre du superviseur de l'étudiant ou de la personne responsable des études supérieures de son département, dans laquelle il ou elle indiquera le nom de l'étudiant, son domaine et son niveau d'études, en quoi la Réunion sera profitable à l'étudiant, si l'étudiant présentera une communication et si l'étudiant a accès à d'autres sources de financement.

Cette lettre doit parvenir à la SMC avant le 15 octobre 2006 par courriel (gradtravel-s06@cms.math.ca). Les décisions seront annoncées au début de novembre.

Si une subvention est accordée à l'étudiant, ce dernier se verra rembourser ses dépenses après la Réunion sur présentation du formulaire de remboursement approprié accompagné des reçus originaux.

Pour de plus amples renseignements, veuillez communiquer avec le comité de coordination à l'adresse suivante : gradtravel-s06@cms.math.ca.

Commanditaires

Nous remercions les organismes ci-dessous de leur soutien financier. Nous publierons de plus amples renseignements sur le financement de la Réunion dès qu'ils nous parviendront.

Centre de recherches mathématiques

Institut Fields

MITACS

Pacific Institute for the Mathematical Sciences

Université de Toronto

Département de mathématiques

Département de sciences mathématiques
et d'informatique, Mississauga

Département d'informatique et de sciences
mathématiques, Scarborough
Faculté d'arts et de science

Bureau du vice-président, Recherche

Bureau du vice-recteur, Recherche, Mississauga

La Société mathématique du Canada tient à remercier les membres du **Comité de coordination** de leur apport.

By invitation of the Meeting Committee, there will be sessions in the following areas. The list of speakers is preliminary, and participants interested in delivering a talk in one of the sessions should contact one of the organizers of that session.

À l'invitation du comité de coordination, des sessions sont prévues dans les domaines ci-dessous. La liste de conférenciers est préliminaire, et l'on demande à toute personne intéressée à présenter une communication dans l'une des sessions de contacter l'un des organisateurs de la session en question.

Algebraic Combinatorics

Combinatoires algébriques

Org: Nantel Bergeron (York), Christophe Hohlweg (Fields Institute) and Michael Zabrocki (York)

Marcelo Aguiar (Texas A&M), François Bergeron (UQAM), Philippe Choquette (York), Sergey Fomin (Michigan-Ann Arbor), David Jackson (Waterloo), Aaron Lauve (UQAM), Rosa Orellana (Dartmouth), Muge Taskin (York), Hugh Thomas (UNB), Stephanie Van Willigenburg (UBC).

Calabi-Yau Varieties and Mirror Symmetry

Les variétés de Calabi-Yau et symétrie miroir

Org: James Lewis (Alberta) and Noriko Yui (Queen's)

Marie José Bertin (Paris IV), Patrick Brosnan (UBC), Xi Chen (Alberta), Adrian Clingher (Stanford), Igor Dolgachev (Michigan), Chuck Doran (Washington), Matt Kerr (Chicago), Nam-Hoon Lee (KIAS; Queen's), James Lewis (Alberta), Bong H. Lian (Brandeis), Ling Long (Iowa State), Steven Lu (UQAM), Gregory Pearlstein (Alberta), Andreas Rosenschon (Alberta), Abdullah Sebber (Ottawa), Andrey Todorov (UC- Santa Cruz), Johannes Walcher (IAS, Princeton), Shing-Tung Yau (Harvard), Jeng-Daw Yu (Queen's), Noriko Yui (Queen's).

Commutative Algebra and Algebraic Geometry

Algèbre commutative et géométrie algébrique

Org: Ragnar-Olaf Buchweitz (Toronto), Graham Leuschke (Syracuse) and Greg Smith (Queen's)

Luchezar L. Avramov (Nebraska-Lincoln), Neil Epstein (Michigan), Anthony V. Geramita (Queen's; Genoa), Colin Ingalls (UNB-Fredericton), Srikanth B. Iyengar (Nebraska-Lincoln), David A. Jorgensen (Texas-Arlington), Alexander Nenashev (York-Glendon College), Ravi Vakil (Stanford), Adam Van Tuyl (Lakehead), Alexander Yong (Fields Institute; Minnesota).

Complexity and Computability in Analysis, Geometry, and Dynamics

Complexité et calculabilité en analyse, géométrie et dynamique

Org: Alex Nabutovsky and Michael Yampolsky (Toronto) www.math.utoronto.ca/yampol/complexity.html.

Differentiable Dynamics and Smooth Ergodic Theory

Systèmes dynamiques différentiables et théorie ergodique lisse

Org: Giovanni Forni and Konstantin Khanin (Toronto)

Functional Analysis

Analyse fonctionnelle

Org: Robb Fry (Thompson Rivers) and S. Swaminathan (Dalhousie)

Razvan Anisca (Lakehead), Daniel Azagra (Universidad Complutense, Madrid), Manuel Cepedello-Boiso (Seville), Chandler Davis (Toronto), Alexander Litvak (Edmonton), Keith Taylor (Dalhousie).

Harmonic Analysis

Analyse harmonique

Org: Izabella Laba (UBC) and Malabika Pramanik (Caltech; UBC)

History of Mathematics

Histoire des mathématiques

Org: Tom Archibald (SFU)

Knot Homologies

Homologie de noeuds

Org: Dror Bar-Natan (Toronto)

Oliver Collin UQAM), Mikhail Khovanov (Columbia), Ciprian Manolescu (Columbia), Jake Rasmussen (Princeton), Lev Rozansky (North Carolina), Paul Seidel (Chicago), Adam Sikora (New York State).

Mathematical Aspects of Continuum Physics: Analysis, Computation, and Modeling

Aspects mathématiques de la physique du continu: analyse, analyse computationnelle et modélisation

Org: Rustum Choksi (SFU) and Mary Pugh (Toronto)

Irene Fonseca (Carnegie Mellon), Carlos Garcia-Cervera (California - Santa Barbara), Joy Ko (Brown), Robert McCann (Toronto), Govind Menon (Brown), Bob Pego (Carnegie Mellon), Silvia Serfaty (NYU), Eric vanden Eijnden (NYU), Thomas Wanner (George Mason).

Mathematical Biology

Biologie mathématique

Org: Gail Wolkowicz (McMaster)

Julien Arino (Manitoba), Chris Bauch (Guelph), Sue Ann Campbell (Waterloo), Yuming Chen (Wilfrid Laurier), Troy Day (Queen's), Herb Freedman (Alberta), Abba Gumel (Manitoba), Michael Li (Alberta), Xinzhil Liu (Waterloo), Connell McCluskey (Wilfrid Laurier), Stephanie Portet (Manitoba), Robert Smith (Ottawa), James Watmough (UNB), Jianhong Wu (York), Huaping Zhu (York), Xingfu Zou (Western).

Mathematics Education

L'éducation mathématique

Org: Walter Whiteley (York)

Nonlinear Schrodinger Equations

Équations de Schrödinger non linéaires

Org: James Colliander and Robert Jerrard (Toronto)

Poisson Geometry and Mathematical Physics

Géométrie de Poisson et physique mathématique

Org: Eckhard Meinrenken (Toronto)

Henrique Bursztyn (IMPA, Rio De Janeiro), Sam Evens (Notre Dame), Marco Gualtieri (MIT), Megumi Harada (McMaster), Tara Holm (Connecticut; Cornell), Lisa Jeffrey (Toronto), Yael Karshon (Toronto), Boris Khesin (Toronto), Greg Landweber (Oregon), Eugene Lerman (Illinois - Urbana-Champaign), Yi Lin (Toronto), Johan Martens (MPI Bonn; Toronto), Reyer Sjamaar (Cornell), Xiang Tang (UC Davis), Aiessa Wade (Penn State), Jonathan Weitsman (Santa Cruz), Graeme Wilkin (Brown).

Probabilistic Methods in Analysis and Algebra

Méthodes probabilistiques en analyse et en algèbre

Org: Matthias Neufang (Carleton) and Balint Virág (Toronto)

Representations of Algebras

Représentations des algèbres

Org: Ibrahim Assem, Thomas Brustle and Shiping Liu (Sherbrooke)

Raymundo Bautista (UNAM-Morelia), Frauke Bleher (Iowa), Walter Burgess (Ottawa), Flavio Ulhoa Coelho (USP, São Paulo), José Antonio de la Peña (UNAM), Edward Green (Virginia Tech), Mark Kleiner (Syracuse), Alex Martsinkovsky (Northeastern), Ralf Schiffler (Massachusetts-Amherst), Markus Schmidmeier (Florida Atlantic), Xueqing Chen Shiping (Wisconsin-Whitewater), Hugh Thomas (UNB-Fredericton), Gordana Todorov (Northeastern), Sonia Trepode (UNMDP, Argentina).

Contributed Papers Session

Communications libres

Org: Bill Weiss (Toronto)

BLOCK SCHEDULE/HORAIRE

THURSDAY/JEUDI DECEMBER 7	SATURDAY/SAMEDI DECEMBER 9	SUNDAY/DIMANCHE DECEMBER 10	MONDAY/LUNDI DECEMBER 11
	8:00 – 5:00 Registration/Inscription 9:30 – 4:00 Exhibits/Exposants	8:00 – 5:00 Registration/Inscription 9:30 – 4:00 Exhibits/Exposants	8:00 – 4:00 Registration/Inscription
6:00 PM – 10:00 PM Executive Committee Dinner Souper du Comité exécutif (Sheraton, Oxford Room)	8:30 – 9:00 Opening/Ouverture (Civic Ballroom)	8:30 – 10:00 Special Sessions	8:30 – 10:00 Special Sessions
	9:00 – 9:50 Karen Smith Plenary Lecture		
		9:50 – 10:15 Break/Pause	
FRIDAY/VENDREDI DECEMBER 8	10:15 – 12:15 Special Sessions	10:15 – 11:15 Special Sessions	10:15 – 11:15 Special Sessions
11:00 AM – 1:00 PM Development Group Luncheon Lunch du groupe de développement (Sheraton, Wentworth Room)		11:15 – 12:05 Susan Tolman Plenary Lecture	11:15 – 12:05 Dmitry Dolgopyat Plenary Lecture
		12:15 – 13:45 Lunch Break	
	13:45 – 14:35 Andrew Granville Jeffery Williams Prize Lecture	13:45 – 14:35 Doctoral Prize Lecture	13:45 – 14:35 Shmuel Weinberger Plenary Lecture
	14:45 – 15:35 Leone Burton Plenary Lecture	14:45 – 15:35 Dimitri Shlyakhtenko Plenary Lecture	14:45 – 15:45 Special Sessions
		15:35 – 16:00 Break/Pause	
1:30 – 6:30 Board of Directors Meeting Réunion du conseil d'administration de la SMC (Sheraton, Conference B&C)	16:00 – 18:00 Special Sessions	16:00 – 17:30 Special Sessions	16:00 – 18:00 Special Sessions
	18:00 – 18:30 Adrien-Pouliot Lecture		
	18:30 – 19:30 Participants' Social (Civic Ballroom)	18:00 – 19:00 Reception (cash bar) Réception (bar payant) (Civic Ballroom Foyer)	
7:00 – 9:00 Welcoming Reception Réception d'accueil (Sheraton, City Hall Room)	19:30 – 20:30 V. Kumar Murty Public Lecture	19:00 – 22:00 Banquet (Civic Ballroom)	

updated August 17, 2006

CMS WINTER 2006 MEETING REGISTRATION FORM

CMS ID	<input type="checkbox"/> DR. <input type="checkbox"/> PROF. <input type="checkbox"/> MS. <input type="checkbox"/> MRS. <input type="checkbox"/> MR.			DESIGNATION	ACCOMMODATION																																																	
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<table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 60%;"></th> <th style="width: 20%; text-align: center;">EARLY FEE</th> <th style="width: 20%; text-align: center;">REGULAR FEE</th> </tr> <tr> <td><input type="checkbox"/> Prize Lecturer (2 free banquet tickets)</td> <td style="text-align: center;">\$ 0</td> <td style="text-align: center;">\$ 0</td> </tr> <tr> <td><input type="checkbox"/> Plenary/Public Lecturer (1 free banquet ticket)</td> <td style="text-align: center;">\$ 0</td> <td style="text-align: center;">\$ 0</td> </tr> <tr> <td><input type="checkbox"/> Member CMS/AMS/MAA</td> <td style="text-align: center;">\$ 235</td> <td style="text-align: center;">\$ 305</td> </tr> <tr> <td><input type="checkbox"/> Non-Member (fee includes 2006 CMS Membership)</td> <td style="text-align: center;">\$ 385</td> <td style="text-align: center;">\$ 455</td> </tr> <tr> <td><input type="checkbox"/> Session Organizer/Speaker</td> <td style="text-align: center;">\$ 235</td> <td style="text-align: center;">\$ 305</td> </tr> <tr> <td><input type="checkbox"/> Postdoc</td> <td style="text-align: center;">\$ 130</td> <td style="text-align: center;">\$ 170</td> </tr> <tr> <td><input type="checkbox"/> Teacher (K-12, CEGEP, College)</td> <td style="text-align: center;">\$ 95</td> <td style="text-align: center;">\$ 125</td> </tr> <tr> <td><input type="checkbox"/> Retired</td> <td style="text-align: center;">\$ 95</td> <td style="text-align: center;">\$ 125</td> </tr> <tr> <td><input type="checkbox"/> Student</td> <td style="text-align: center;">\$ 75</td> <td style="text-align: center;">\$ 95</td> </tr> <tr> <td><input type="checkbox"/> Unemployed</td> <td style="text-align: center;">\$ 95</td> <td style="text-align: center;">\$ 125</td> </tr> <tr> <td><input type="checkbox"/> One-Day Fee (onsite only)</td> <td style="text-align: center;">n/a</td> <td style="text-align: center;">\$ 175</td> </tr> <tr> <td><input type="checkbox"/> Banquet</td> <td style="text-align: center; border-bottom: 1px solid black;">_____ X</td> <td style="text-align: center; border-bottom: 1px solid black;">\$ 60</td> </tr> <tr> <td>REGISTRATION \$</td> <td style="text-align: center;">+ BANQUET \$</td> <td style="text-align: center;">= TOTAL \$</td> </tr> </table>				EARLY FEE	REGULAR FEE	<input type="checkbox"/> Prize Lecturer (2 free banquet tickets)	\$ 0	\$ 0	<input type="checkbox"/> Plenary/Public Lecturer (1 free banquet ticket)	\$ 0	\$ 0	<input type="checkbox"/> Member CMS/AMS/MAA	\$ 235	\$ 305	<input type="checkbox"/> Non-Member (fee includes 2006 CMS Membership)	\$ 385	\$ 455	<input type="checkbox"/> Session Organizer/Speaker	\$ 235	\$ 305	<input type="checkbox"/> Postdoc	\$ 130	\$ 170	<input type="checkbox"/> Teacher (K-12, CEGEP, College)	\$ 95	\$ 125	<input type="checkbox"/> Retired	\$ 95	\$ 125	<input type="checkbox"/> Student	\$ 75	\$ 95	<input type="checkbox"/> Unemployed	\$ 95	\$ 125	<input type="checkbox"/> One-Day Fee (onsite only)	n/a	\$ 175	<input type="checkbox"/> Banquet	_____ X	\$ 60	REGISTRATION \$	+ BANQUET \$	= TOTAL \$	DEADLINES	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;">Early registration</td> <td style="width: 40%;">November 5</td> </tr> <tr> <td>Pre-registration</td> <td>November 26</td> </tr> <tr> <td>Cancellation (less \$40 admin fee)</td> <td>November 26</td> </tr> </table>		Early registration	November 5	Pre-registration	November 26	Cancellation (less \$40 admin fee)	November 26	CHEQUES PAYABLE TO THE CANADIAN MATHEMATICAL SOCIETY
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FAX: 613-565-1539 (FOR CREDIT CARD PAYMENTS ONLY)

RÉUNION D'HIVER 2006 DE LA SMC

FORMULAIRE D'INSCRIPTION

Nº SMC	<input type="checkbox"/> M ^{me} <input type="checkbox"/> M.	STATUT	HÉBERGEMENT
NOM		<input type="checkbox"/> Conf. principal/primé/populaire <input type="checkbox"/> Organisateur <input type="checkbox"/> Participant <input type="checkbox"/> Conférencier (précisez la session) _____	<input type="checkbox"/> Sheraton Hotel <input type="checkbox"/> Marriott Hotel <input type="checkbox"/> Autre <input type="checkbox"/> Pas nécessaire
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J'ACCEPTE QUE MON NOM FIGURE DANS LA LISTE DES PARTICIPANTS SUR LE SITE WEB DE LA SMC		<input type="checkbox"/> OUI <input type="checkbox"/> NON	DATE DE DÉPART
J'AIMERAIS PRÉSENTER UNE COMMUNICATION LIBRE		<input type="checkbox"/> OUI <input type="checkbox"/> NON	RENS. FACULTATIFS
Les droits d'inscription et les résumés doivent nous parvenir au plus tard le 15 octobre 2006. Aucun résumé ne sera évalué avant le règlement des droits d'inscription.			<input type="checkbox"/> HOMME <input type="checkbox"/> FEMME
J'ASSISTERAI AUX SESSIONS SUIVANTES		<input type="checkbox"/> Combinatoires algébriques <input type="checkbox"/> Les variétés de Calabi-Yau et symétrie miroir <input type="checkbox"/> Algèbre commutative et géométrie algébrique <input type="checkbox"/> Complexité et calculabilité en analyse, géométrie et dynamique <input type="checkbox"/> Systèmes dynamiques différentiables et théorie ergodique lisse <input type="checkbox"/> Analyse fonctionnelle <input type="checkbox"/> Analyse harmonique <input type="checkbox"/> Histoire des mathématiques	<input type="checkbox"/> Homologie de noeuds <input type="checkbox"/> Aspects mathématiques de la physique du continu <input type="checkbox"/> Biologie mathématique <input type="checkbox"/> L'éducation mathématique <input type="checkbox"/> Équations de Schrödinger non linéaires <input type="checkbox"/> Géométrie de Poisson et physique mathématique <input type="checkbox"/> Méthodes probabilistiques en analyse et algebra <input type="checkbox"/> Représentations des algebras <input type="checkbox"/> Communications libres
DROITS SI VOUS ENTREZ DANS PLUSIEURS CATÉGORIES, Veuillez COCHER LA MOINS CHÈRE.			
<input type="checkbox"/> Conférencier primé (2 billets banquet incl.) <input type="checkbox"/> Conférencier princ./pop. (1 billet banquet incl.) <input type="checkbox"/> Membre SMC/AMS/MAA <input type="checkbox"/> Non-membre (2006 adhésion à la SMC comprise) <input type="checkbox"/> Organisateur / Conférencier <input type="checkbox"/> Postdoc <input type="checkbox"/> Enseignant (mat.-12 ^e , cégep, collège) <input type="checkbox"/> Retraité <input type="checkbox"/> Étudiant <input type="checkbox"/> Sans-emploi <input type="checkbox"/> Droits d'une journée (inscription sur place seulement) <input type="checkbox"/> Banquet _____ X		Prix réduit Prix régulier	DATES Pré-inscription à prix réduit 6 novembre LIMITES Pré-inscription 26 novembre Annulation, moins 40 \$ de frais 26 novembre
LIBELLEZ VOTRE CHÈQUE AU NOM DE LA SOCIÉTÉ MATHÉMATIQUE DU CANADA			
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		TITULAIRE SEULEMENT	
INSCRIPTION _____ \$ + BANQUET _____ \$ = TOTAL _____ \$			

VEUILLEZ ENVOYER CE FORMULAIRE ET VOTRE PAIEMENT À: BUREAU DE LA SMC, 577, AVE KING-EDWARD, OTTAWA ON CANADA K1N 6N5
TÉLÉCOPIEUR : (613) 565-1539 (POUR LES PAIEMENTS PAR CARTE DE CRÉDIT SEULEMENT)

Call for Sessions – CMS-MITACS Joint Conference 2007

Appel de sessions – Congrès conjoint MITACS-SMC 2007

ADDITIONAL SELF-SUPPORTED SESSIONS play an important role in the success of our meetings. We welcome and invite proposals for self-supported sessions for this meeting (May 30 – June 3, 2007) at the Delta Hotel in Winnipeg. Proposals should include a brief description of the focus and purpose of the session, the expected number of the talks, as well as the organizer's name, complete address, telephone number, e-mail address, etc. These additional sessions will be incorporated with the other sessions in time blocks allocated by the Meeting Directors. All sessions will be advertised in the CMS Notes, on the web sites and, if possible, in the Notices of the AMS and in publications of other societies. Speakers in these additional sessions will be requested to submit abstracts which will be published on the web site and in the meeting programme. Those wishing to organize a session should send a proposal to the Meeting Directors by the deadline below.

LES SESSIONS COMPLÉMENTAIRES autonomes jouent un rôle important dans le succès de nos réunions. Nous vous invitons à proposer des sessions autonomes pour ce congrès qui se tiendra à l'hôtel Delta de Winnipeg, du 30 mai au 3 juin 2007. Votre proposition doit inclure une brève description de l'orientation et des objectifs de la session, le nombre de communications prévues et leur durée, ainsi que le nom, l'adresse complète, le numéro de téléphone, l'adresse courriel et les autres coordonnées de l'organisateur. Ces sessions complémentaires seront intégrées aux autres sessions du programme, dans des cases horaires prévues à cet effet par le directeur du Congrès. Toutes les sessions seront annoncées dans les Notes de la SMC, sur le site Web et, si possible, dans le Bulletin de l'AMS et les publications d'autres sociétés. Les conférenciers de ces sessions complémentaires devront présenter un résumé qui sera publié sur le site Web et dans le programme du Congrès. Toute personne qui souhaiterait organiser une session est priée de faire parvenir une proposition au directeur du Congrès avant la date limite indiquée ci-dessous.

The following CMS-MITACS invited (partially funded) sessions have been confirmed for this conference:

Les sessions suivantes (partiellement subventionnées) ont été confirmées :

Banach Algebras and Abstract Harmonic Analysis
Algèbre de Banach et analyse harmonique abstraite
Org: Yong Zhang (Manitoba)

Complex Function Theory
Théorie des fonctions complexes
Org: Ian Graham (Toronto),
Eric Schippers (Manitoba)

Geometrically-Constrained Resource Allocation
Allocation de ressources sous des contraintes géométriques
Org: Binay Bhattacharya (SFU)

Finite Combinatorics
Combinatoire finie
Org: Robert Craigen (Manitoba),
David Gunderson (Manitoba)

Mathematical Biology
Biologie mathématique
Org: Gerda de Vries (Alberta),
Frithjof Lutscher (Ottawa)

Mathematical Physics
Physique mathématique
Org: Richard Froes (UBC), Tom Osborn (Manitoba)

Model Theory and its Applications
Théorie des modèles et ses applications
Org: Bradd Hart (McMaster), Thomas Kucera (Manitoba), Rahim Moosa (Waterloo)

Network Algorithms
Algorithmes des réseaux
Org: Evangelos Kranakis (Carleton)

Nonlinear Methods in Computational Mathematics
Méthodes nonlinéaires en mathématiques computationnelles
Org: Kirill Kopotun (Manitoba)

Quantum Information Theory
Théorie de l'information quantique
Org: Richard Cleve (Waterloo)

Statistical Learning
Apprentissage statistique
Org: Yoshua Bengio (Montreal), Sam Roweis (Toronto)

Deadline:
September 30, 2006

Date limite :
30 septembre, 2006

Scientific Directors Directeurs du Congrès

Don Dawson
Lab for Research in Statistics
and Probability
Carleton University
1125 Colonel By Drive
Ottawa, ON K1S 5B6
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Fereidoun Ghahramani
Department of Mathematics
University of Manitoba
342 Machray Hall, 186 Dysart Rd
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fereidou@cc.umanitoba.ca

Call for Sessions – CMS Winter 2007 Meeting Appel de sessions – Réunion d'hiver 2007 de la SMC

ADDITIONAL SELF-SUPPORTED SESSIONS play an important role in the success of our meetings. We welcome and invite proposals for self-supported sessions for this meeting (December 8-10, 2007) at the Hilton Hotel in London, Ontario. Proposals should include a brief description of the focus and purpose of the session, the expected number of the talks, as well as the organizer's name, complete address, telephone number, e-mail address, etc. These additional sessions will be incorporated with the other sessions in time blocks allocated by the Meeting Director. All sessions will be advertised in the CMS Notes, on the web sites and, if possible, in the Notices of the AMS and in publications of other societies. Speakers in these additional sessions will be requested to submit abstracts which will be published on the web site and in the meeting programme. Those wishing to organize a session should send a proposal to the Meeting Director by the deadline below.

LES SESSIONS COMPLÉMENTAIRES autonomes jouent un rôle important dans le succès de nos réunions. Nous vous invitons à proposer des sessions autonomes pour ce congrès qui se tiendra à l'hôtel Hilton de London, Ontario, du 8 au 10 décembre 2007. Votre proposition doit inclure une brève description de l'orientation et des objectifs de la session, le nombre de communications prévues et leur durée, ainsi que le nom, l'adresse complète, le numéro de téléphone, l'adresse courriel et les autres coordonnées de l'organisateur. Ces sessions complémentaires seront intégrées aux autres sessions du programme, dans des cases horaires prévues à cet effet par le directeur de la Réunion. Toutes les sessions seront annoncées dans les Notes de la SMC, sur le site Web et, si possible, dans le Bulletin de l'AMS et les publications d'autres sociétés. Les conférenciers de ces sessions complémentaires 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 au directeur de la Réunion avant la date limite indiquée ci-dessous.

The following invited sessions have been confirmed for this conference: Les sessions suivantes ont été confirmées :

Algebraic Stacks

Piles algébriques

Org: Ajneet Dhillon (UWO)

Combinatorics and its Applications to Mathematical Physics

Combinatoires et ses applications en physique mathématique

Org: Michael Gekhtman (Notre Dame), Michael Shapiro (Michigan State)

Complex Analytic Geometry

Géométrie analytique complexe

Org: Tatyana Foth, Finnur Larusson, Rasul Shafikov (UWO)

Computer Algebra: «Algorithmic Challenges in Polynomial and Linear Algebra»

L'algèbre informatique: «Défis algorithmiques dans l'algèbre polynomiale et l'algèbre linéaire»

Org: Stephen Watt (UWO)

Iwasawa Theory

Théorie d'Iwasawa

Org: Manfred Kolster, Reza Sharifi (McMaster)

Mathematics Education

Éducation mathématique

Org: George Gadanidis (UWO)

Non-Commutative Geometry

Géométrie non commutative

Organizer: Masoud Khalkhali (UWO)

Meeting Director / Directeur de la Réunion

J. F. Jardine

Department of Mathematics

University of Western Ontario

Middlesex College

London, ON N6A 5B7

jardine@uwo.ca

Deadline: December 22, 2006
Date limite : 22 décembre, 2006

PRIMERA REUNIÓN CONJUNTA CMS/SMM

La Canadian Mathematical Society (CMS) y la Sociedad Matemática Mexicana (SMM) tienen el placer de anunciar su primera reunión conjunta. El Centro de Investigación en Matemáticas (CIMAT) será el anfitrión de la reunión que se llevará a cabo en Guanajuato, México, del 21 al 23 de septiembre de 2006. Debido a la naturaleza de la reunión, toda la otra información está en inglés.

FIRST JOINT CMS/SMM MEETING

The Canadian Mathematical Society (CMS) and the Sociedad Matemática Mexicana (SMM) are pleased to announce their first joint meeting. This meeting will be hosted by the Centro de Investigación en Matemáticas (CIMAT, www.cimat.mx), and will take place in Guanajuato, Mexico, from September 21 to 23, 2006.

PREMIÈRE RÉUNION CONJOINTE DE LA SMC/ SMM

La Société mathématique du Canada (SMC) et la Sociedad Matemática Mexicana (SMM) sont heureuses d'annoncer leur première réunion conjointe. L'événement se tiendra au Centro de Investigación en Matemáticas (CIMAT, www.cimat.mx), à Guanajuato, au Mexique, du 21 au 23 septembre 2006. En raison de la nature du congrès, toute information supplémentaire vous sera transmise en anglais.

CALL FOR PROPOSALS - 2006 ENDOWMENT GRANTS COMPETITION

The Canadian Mathematical Society is pleased to announce the 2006 Endowment Grants Competition to fund projects that contribute to the broader good of the mathematical community. The Endowment Fund is used to fund such projects and the Endowment Grants Committee (EGC) administers the distribution of the grants and adjudicates proposals for projects. Depending on the performance of the CMS Endowment Fund, the funds available for this year's competition may be less than past years.

Proposals must address the goal and statement of purpose of the Canadian Mathematical Society.

The goal of the Canadian Mathematical Society is to support the promotion and advancement of the discovery, learning, and application of mathematics. The CMS Statement of Purpose is:

1. To unify and support Canadian mathematicians through effective communication, broad membership, sponsorship of diverse activities, and partnerships with like professional societies.
2. To support mathematics research through the communication of current research to both the specialist and non-specialist, public recognition of research accomplishments and collaboration with the research institutes and granting agencies.
3. To support the advancement of mathematics education through joint projects with mathematics educators at all levels, promotion of educational advancements, and partnerships with provincial ministries of education and organizations supporting mathematics education.
4. To champion mathematics through initiatives that explain, promote and increase the general understanding of mathematics, provide extracurricular opportunities for students, and encourage partnerships with corporate, government and not-for-profit agencies.

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 EGC will consider funding proposals for a maximum of three years. However, multi-year proposals must be funded from the funds available to the EGC in the year of application. The EGC will consider funding proposals to a maximum of \$5,000 per year.

The EGC committee tends to favour proposals where CMS funds can be leveraged or where proposals have no other natural funding body to which to apply.

If it is anticipated that a proposal will generate something of lasting financial value, proposers must indicate that this is the case and declare their intent with respect to that value.

Application process. Application forms and templates as well as advice and directions are available at the CMS website www.cms.math.ca/Grants/EGC. Proposals must be received no later than September 30, 2006.

The Chair of the Endowment Grants Committee invites emails expressing interest in the grant as soon as possible

Dr. Karl Dilcher
Chair, Endowment Grants Committee
Canadian Mathematical Society
577 King Edward
Ottawa, ON K1N 6N5
chair-egc@cms.math.ca

APPEL DE PROPOSITIONS - CONCOURS DE BOURSES DU FONDS DE DOTATION 2006

La Société mathématique du Canada (SMC) est heureuse d'annoncer la tenue du Concours de bourses du fond de dotation 2006 pour le financement d'activités qui contribuent à l'essor global de la communauté mathématique. Le Comité d'attribution des bourses du fonds de dotation (CABFD) se charge d'évaluer les propositions et d'attribuer les bourses. Selon le rendement du Fonds de dotation de la SMC, le financement disponible pour le concours de cette année pourrait être inférieur à celui des années précédentes.

Les propositions doivent être conformes à l'objectif et à l'énoncé d'intention de la SMC.

La Société mathématique du Canada s'est donnée pour objectif de promouvoir et de favoriser la découverte et l'apprentissage des mathématiques, et les applications qui en découlent. Son énoncé d'intention est le suivant :

1. Regrouper et appuyer les mathématiciens canadiens en favorisant la communication et l'adhésion à grande échelle, en commanditant diverses activités et en établissant des partenariats avec des associations professionnelles semblables à la nôtre.
2. Encourager la recherche mathématique en diffusant les résultats de recherches en cours aux spécialistes et aux non-spécialistes, en faisant reconnaître publiquement les travaux de chercheurs et en collaborant avec les instituts de recherche et les organismes subventionnaires.
3. Favoriser l'apprentissage des mathématiques en réalisant des projets avec des professeurs de mathématiques de tous les niveaux, en faisant connaître les progrès dans l'enseignement et en établissant des partenariats avec les ministères de l'éducation provinciaux et les organismes voués à l'apprentissage des mathématiques.
4. Défendre les mathématiques en créant des initiatives visant à expliquer, à promouvoir et à mieux faire connaître la discipline, en organisant

des activités parascolaires et en encourageant les partenariats avec les sociétés privées, les gouvernements et les organismes à but non lucratif.

Un demandeur ne peut présenter qu'une proposition par concours en tant que demandeur principal. Les propositions 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.

Le CABFD évaluera les projets qui s'étalent sur un maximum de trois ans. Les projets s'échelonnant sur plusieurs années seront toutefois financés en fonction des fonds dont disposera le Comité l'année de la demande. Le Comité se limitera aux propositions dont le financement demandé n'excède pas 5 000 \$ par année.

De façon générale, le CABFD favorise les propositions où les fonds de la SMC peuvent être équilibrés ou les propositions qui ne disposent d'aucun organisme de financement naturel où postuler.

Si les demandeurs prévoient tirer une valeur financière durable du projet, ils doivent l'indiquer et expliquer leur intention envers cette valeur.

Processus de demande. Le formulaire de demande et gabarits, ainsi que conseils et instructions sont disponible au site de la SMC www.smc.math.ca/Grants/EGC/. Les applications doivent être reçues au plus tard le 30 septembre 2006.

Le président du comité invite les courriels décrivant votre intérêt au fond dès que possible.

Dr. Karl Dilcher
Président, Comité d'attribution des bourses du fonds de dotation
Société mathématique du Canada
577 King Edward Ottawa, ON K1N 6N5 chair-egc@cms.math.ca

In the Operations accounts (General, Education, Research, Publishing) there was an overall deficit of \$13,026. While any deficit is regrettable, this relatively small deficit indicates considerable recovery from larger financial difficulties encountered in the two previous years. Much of the credit for the improvement must go to the staff and to the committee chairs in exercising restraint. We are also seeing some improvement in revenue sources such as membership and contributions. Also, we are working on new marketing techniques for our periodicals that are designed to increase both revenue and efficiency of operation.

We continue to work on a proposed division of investments into genuine Endowment funds and a Contingency fund. The latter will be dedicated to guaranteeing that the Operations fund runs smoothly, by receiving Operations surpluses and covering deficits. It is also being used currently to cover the expenses of our new fund-raising activities. The best guarantee of future financial health of our Society is the success of these new fund-raising activities.

On a personal note, I finish thirteen years as Treasurer with this report. In that time I have been privileged to work with many society members, and it has been an honour to do so. My sincere thanks to all.

Le compte d'opérations (général, enseignement, recherche, édition) indique un déficit de 13 026 \$. S'il est vrai que tout déficit est regrettable, ce montant relativement petit indique que la Société s'est presque entièrement rétablie des difficultés financières qu'elle a connues au cours des deux dernières années. Une grande partie du mérite de cette amélioration revient au personnel et aux présidents de comité qui ont contrôlé les dépenses. Nous observons également une amélioration sur le plan des sources de revenus comme les adhésions et les dons. Par ailleurs, nous préparons de nouvelles techniques de marketing pour nos périodiques, lesquelles doivent accroître tant les recettes et que l'efficacité de ce poste budgétaire.

Nous continuons de travailler sur un projet visant à diviser nos investissements afin de créer de véritables fonds de dotation et un fonds de prévoyance. Ce dernier fonds aura pour but d'assurer un fonctionnement plus fluide du compte d'opérations, en recevant les surplus et en couvrant les déficits. Il sert aussi présentement à payer les dépenses de nos nouvelles activités de financement. Le succès de ces nouvelles activités est le gage de la viabilité financière future de la Société.

Sur le plan personnel, j'aimerais noter que la soumission de ce rapport met un point final à mes 13 années au poste de trésorier. Au cours de ces années, j'ai eu le privilège et l'honneur de travailler avec de nombreux membres de la Société. Je leur dis à tous un gros merci.

NSERC - CMS Math in Moscow Scholarships

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

The scholarships are to attend a semester at the small elite Moscow Independent University.

Math in Moscow Program

www.mccme.ru/mathinmoscow/

Application details

www.cms.math.ca/bulletins/Moscow_web/

For additional information please see your department or call the CMS at 613-562-5702.

Two scholarships will be awarded in the fall competition. Deadline **September 30, 2006** to attend the Winter 2007 semester



Bourse CMS/CRSNG Math à Moscou

Le Conseil de Recherches en Sciences Naturelles et en Génie du Canada (CRSNG) et la Société mathématique du Canada (SMC) offrent des bourses de 9,000 \$ chacune. Les étudiantes ou étudiants du Canada inscrit(e)s à un programme de mathématiques ou d'informatique sont éligibles.

Les bourses servent à financer un trimestre d'études à la petite université d'élite Moscow Independent University.

Programme Math à Moscou

www.mccme.ru/mathinmoscow/

Détails de soumission

www.cms.math.ca/bulletins/Moscou_web/

Pour plus de renseignements veuillez communiquer avec votre département ou la SMC au 613-562-5702.

Deux bourses seront attribuées au concours de l'automne. Date limite le **30 septembre 2006** pour le trimestre d'hiver 2007



THE CANADIAN OPEN MATHEMATICS CHALLENGE

Ian VanderBurgh - Chair, CMS Canadian Mathematics Challenge Committee and Director, Centre for Education in Mathematics and Computing, University of Waterloo

Problem

The best kept secret in Canadian mathematics is:

- (a) the product of Stephen Harper's age and shoe size
- (b) the relationship between the arithmetic mean and geometric mean of the weights of the Edmonton Oilers' defencemen
- (c) the Canadian Open Mathematics Challenge

Answer

Unfortunately, (c).

In November 2006, the Canadian Open Mathematics Challenge (COMC) will be written for the eleventh time. (I can hear people saying "The COMC? What's that?" Aha! The very reason for this article.)

The COMC is a CMS competition, produced in collaboration with the Centre for Education in Mathematics and Computing (CEMC). When the COMC was written for the first time in 1996, the two main reasons for its creation were to provide the CMS with a method of identifying students to write the Canadian Mathematical Olympiad (CMO) and to allow the CEMC to provide a "fall term" enrichment activity to secondary schools across the country.

Since its inception, the aims of the COMC have evolved somewhat. The CMS now relies heavily on the COMC for choosing students to attend several of its various camps (including the CMS National Camp). Both the CEMC and the CMS also currently view the COMC more proactively as a way of encouraging students to try a mathematics contest and to find enjoyment in mathematics enrichment. The COMC is geared towards students in their final two years of high school, but much of the paper is certainly accessible to more ambitious students in Grade 10 and even in Grade 9. A key phrase which well describes the COMC is "accessible yet challenging".

These diverse goals present quite a challenge to the indefatigable COMC Problems Committee, currently chaired by Dr. Larry Rice of the CEMC. Trying to set a paper that is accessible to a large number of students from a wide variety of backgrounds while providing some "separation" among the top 100 or so papers is really an impossible task. A large amount of credit must be given to the various incarnations of this Committee for their ability over the years to achieve these goals.

The 1996 COMC consisted of ten short answer problems (Part A) worth 5 marks each, and three long answer problems (Part B) worth 10 marks each. (Note that $(10 \times 5) + (3 \times 10) = 80$.) From 1997 onwards, the COMC has consisted of eight short answer problems (Part A) worth 5 marks each, and four long answer problems (Part B) worth 10 marks each. (Again, $(8 \times 5) + (4 \times 10) = 80$. An amazing coincidence! There's got to be a math contest question here somewhere...)

Some statistics for those who like these things: (Unfortunately, my crystal ball is hazy on the 2006 front!) These statistics nicely show the "warming trend" of the COMC – generally speaking the past few COMCs have been more accessible than the first few. These statistics also demonstrate the increased participation over the years in the COMC.

Year	# Who Registered	# Who Wrote	# of Schools	Mean Score (out of 80)	75th Percentile Score	# of Scores ≥ 70
1996	3014	2570	286	22.0	29	5
1997	3814	3255	367	28.5	37	22
1998	3705	3208	342	28.2	38	11
1999	4931	4288	392	27.6	36	11
2000	5190	4391	380	34.9	48	52
2001	4784	4104	351	42.0	54	150
2002	5965	5238	408	37.9	47	22
2003	6060	5121	408	34.9	43	15
2004	6521	5784	434	35.8	47	37
2005	7105	6286	465	40.8	49	57

When creating and administering a mathematics contest of this size, an important consideration is marking. Marking over 6000 written (not multiple choice!) contests is certainly a non-trivial task. Thankfully, over the years we have assembled a crack team of markers, who assemble in early December for two days of fulfilled marking. In December 2005, a group of 60.5 markers tackled this mountainous task with humour (lots of it) and aplomb. Without this motley collection of retired secondary school teachers and University faculty and grad students, the COMC would certainly not be possible in its current form.

Students can write the COMC as either an official or unofficial candidate. In 2004, the eligibility criteria for the COMC changed, becoming much simpler (both for the participants and for those processing the results). Among other things, these changes allowed international students to participate as official candidates (although there are no prizes for which international students are eligible).

Because of its diverse goals, the COMC tends to consist of a wide variety of problems, both in terms of topic and level of difficulty. The problems tend to range from relatively straightforward calculations to olympiad-level geometry and combinatorics problems. Calculators are not permitted on the COMC (as on the various olympiads); this requires a great deal of care in the selection of questions which can be handled by students' calculation abilities. Problems involving games of various kinds have tended to be quite popular

among the students writing (but not always among those marking). Alphonse and Beryl first put in an appearance on the 1998 COMC, and have been regular contributors ever since (sometimes leading to somewhat off colour humour).

Here is a sample of problems from past COMCs:

- 1996, Problem A1
The very first problem

The roots of the equation $x^2 + 4x - 5 = 0$ are also the roots of the equation $2x^3 + 9x^2 - 6x - 5 = 0$. What is the third root of the second equation?

- 2005, Problem A1
A big difference in difficulty from 1996

Determine the value of $10^2 - 9^2 + 8^2 - 7^2 + 6^2 - 5^2 + 4^2 - 3^2 + 2^2 - 1^2$.

- 1998, Problem B1

The most straightforward of the written problems from 1998

Triangle ABC has its sides determined in the following way: side AB by line $3x - 2y + 3 = 0$; side BC by line $x + y - 14 = 0$; and side AC by line $y = 3$. If the point P is chosen so that $PA = PB = PC$, determine the equation of the line containing A and P .

- 2004, Problem B1

Over the years, it has become clear that incorporating several different parts tends to give more students more chances for success

The points $A(-8, 6)$ and $B(-6, -8)$ lie on the circle $x^2 + y^2 = 100$.

- (a) Determine the equation of the line through A and B .
- (b) Determine the equation of the perpendicular bisector of AB .
- (c) The perpendicular bisector of AB cuts the circle at two points, P in the first quadrant and Q in the third quadrant. Determine the coordinates of P and Q .
- (d) What is the length of PQ ? Justify your answer.

- 2002, Problem B3

The third appearance of Alphonse and Beryl – and they have a friend!

There are some marbles in a bowl. Alphonse, Beryl and Colleen each take turns removing one or two marbles from the bowl, with Alphonse going first, then Beryl, then Colleen, then Alphonse again, and so on. The player who takes the last marble from the bowl is the loser, and the other two players are the winners.

- (a) If the game starts with 5 marbles in the bowl, can Beryl and Colleen work together and force Alphonse to lose?
- (b) The game is played again, this time starting with N marbles in the bowl. For what values of N can Beryl and Colleen work together and force Alphonse to lose?

- 2003, Problem B3(b)(ii)

Alphonse and Beryl leave us their Llama, Chuck, while on sabbatical

A barn has a foundation in the shape of a trapezoid, with three sides of length 6 m and one side of length 12 m. Chuck the Llama is attached by a chain to a point on the outside wall of the barn. Chuck is smarter than the average llama, and so realizes that he can always reach the area between the barn and where the chain is fully extended. If Chuck is attached at some point P along the wall between A and B with a chain of length 15 m, determine the location of P which restricts Chuck to the minimum area.

- 2004, Problem B3
Poor Chuck...

A map shows all Beryl's Llamaburger restaurant locations in North America. On this map, a line segment is drawn from each restaurant to the restaurant that is closest to it. Every restaurant has a unique closest neighbour. (Note that if A and B are two of the restaurants, then A may be the closest to B without B being closest to A .)

- (a) Prove that no three line segments on the map can form a triangle.
- (b) Prove that no restaurant can be connected to more than five other restaurants.

What about the future? In my opinion, the COMC is in a strong position right now. It is doing a good job of achieving its diverse goals. The participation rate is on the rise. (Can we get to a participation of 10 000 by its twentieth writing?) It would be wonderful for Canadian mathematics education to get more uniform representation on the COMC across the country, and also to encourage more international participation.

So please help us spread the word about the COMC. There are so many schools that do not know about it. Encourage your local schools to participate!

More information can be found through
www.cms.math.ca or through
www.cemc.uwaterloo.ca. The COMC is fun,
 accessible and challenging, and a great fallterm
 enrichment activity.

CANADA WINS FIVE SILVER MEDALS AND ONE BRONZE MEDAL AT THE 47TH MATHEMATICAL OLYMPIAD IN LJUBLJANA, SLOVENIA.

Competing against students from 89 other countries, Canadian high school students have done extremely well with all six students winning medals at the 47th International Mathematical Olympiad (IMO) Ljubljana, Slovenia, from July 6-18, 2006.

The six students who competed for Canada were: **Farzin Barekat**, Sutherland Secondary School, North Vancouver (British Columbia); **Viktoriya Krakovna**, Vaughan Road Academy Toronto (Ontario); **Yang (Richard) Peng**, Vaughan Road Academy, Toronto (Ontario); **Dong Uk (David) Rhee**, McNally High School, Edmonton (Alberta); **Peng Shi**, Sir John A. MacDonald Collegiate Institute, Toronto (Ontario); and **Yufei Zhao**, Don Mills Collegiate Institute, Toronto (Ontario).

The team was accompanied by the Team Leader Robert Morewood (Crofton House School, Vancouver) and the Deputy Team Leader Naoki Sato (Art of Problem Solving (AoPS) Incorporated).

At the Closing Ceremony on July 17, 2006, Silver Medals were awarded to Farzin Barekat, Viktoriya Krakovna, Dong Uk (David) Rhee, Peng Shi and Yufei Zhao; and a Bronze Medal to Yang (Richard) Peng.

Although students compete individually, country rankings are obtained by adding the teams' scores. The maximum score for each student is 42 and for a team of six students the maximum is 252. The Canadian team placed 15th out of 90 competing countries with a score of 123.

The top 10 teams and their scores are: China (214); Russia (174); Korea (170); Germany (157); USA (154); Romania (152); Japan (146); Iran (145); Moldova (140); and Taiwan (136).

Since 1981, Canadian students have received a total of 16 gold, 34 silver, and 58 bronze medals.

Sponsors of the 2006 Canadian IMO team include: the Canadian Mathematical Society; NSERC PromoScience; the Imperial Oil Foundation; Sun Life Financial; the Ontario Ministry of Education; Alberta Learning; the Nova Scotia Department of Education; the Newfoundland and Labrador Ministry of Education; the Quebec Ministry of Education; the Northwest Territories Ministry of Education; the Saskatchewan Ministry of Education; the Samuel Beatty Fund; Maplesoft; Centre de recherches mathématiques; the Fields Institute; the Pacific Institute for the Mathematical Sciences; the Centre for Education in Mathematics and Computing, University of Waterloo; the Department of Mathematics and Statistics, Dalhousie University; the Department of Mathematics and Statistics, University of Calgary; the Department of Mathematics and Statistics, University of New Brunswick at Fredericton; the Department of Mathematics and Statistics, University of Ottawa; the Department of Mathematics and Statistics, York University; and the Department of Mathematics, University of Toronto.

A report from the leaders of the 2006 Canadian IMO team will appear in a subsequent issue of the CMS Notes.



UNIVERSITE LAVAL, Québec, QC Département de mathématiques et de statistique

<http://www.mat.ulaval.ca/>

Le Département de mathématiques et de statistique de l'Université Laval sollicite des candidatures pour un poste de carrière en algèbre qui sera disponible le premier septembre 2007.

Cette annonce s'adresse à tous les candidats exceptionnels détenant un PhD dans un domaine quelconque de l'algèbre. Cependant, la possibilité pour un candidat de s'intégrer aux activités du Centre interuniversitaire en calcul mathématique algébrique (CICMA)¹ sera considérée comme un atout. Les candidats devront faire la preuve d'un excellent potentiel en recherche et de capacités pédagogiques exceptionnelles aussi bien pour l'enseignement spécialisé que pour l'enseignement des cours de service.

L'Université Laval applique un programme d'accès à l'égalité qui consacre la moitié des postes vacants à l'engagement des femmes. Conformément aux exigences prescrites en matière d'immigration au Canada, la priorité sera accordée aux citoyens canadiens et aux résidants permanents du Canada. Le salaire est déterminé par la convention collective suivant l'ancienneté et le rang universitaire accordés.

Les personnes intéressées sont priées de faire parvenir, à l'adresse ci-dessous, un dossier de candidature comprenant une copie de leur curriculum vitae, des tirés-à-part de quelques publications récentes, un résumé, d'au plus deux pages, de leur programme de recherche ainsi que trois lettres de recommandation témoignant de leurs aptitudes professionnelles. La liste des nom et adresse (incluant numéros de téléphone et de télécopieur ainsi qu'adresse courriel) des répondants devra être incluse dans le dossier de candidature.

Le concours se terminera le 30 novembre 2006.

Roger Pierre, directeur

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1 <http://www.crm.umontreal.ca/labs/cicma/fr/>

2 Les candidats non francophones devront s'engager à acquérir une bonne maîtrise du français en un court laps de temps.

OBITUARY: NATHAN MENDELSOHN (1917-2006)



Nathan Saul Mendelsohn was born in New York on April 14, 1917. He died in Toronto on July 4, 2006, of hepatitis C contracted through tainted blood.

NATHAN MENDELSOHN: A PERSONAL TRIBUTE

Nathan Mendelsohn was a genius. Nathan Mendelsohn was a mench. Nathan Mendelsohn was a bit of a rogue. A genius is a person who makes connections of significance where others would not see anything. Nathan Mendelsohn grew up on Euclid Avenue – so Nathan Mendelsohn put his genius to becoming a mathematician and became one of the world's finest. The page proofs for his last paper arrived the morning he died. He saw his father get taken by a street huckster selling dried apples as “Mexican Apple Figs” so he studied hucksters and pitchmen at the Exhibition and became one of the finest amateur magicians in the country. Even when he was confused and could only watch TV, he watched infomercials – telling my brother “I learned all my magic from these guys.”

When he heard the story of how his mother, before he was born, was an acquaintance of the wife of the philosopher John Dewey, he later incorporated Dewey's ethics into his concept of mitzvot and Jewish ethics. Dewey had argued that ethical inquiry is of the same substance as empirical inquiry. It is the use of reflective intelligence to revise one's judgments in light of the consequences of acting on them. Value judgments are tools for enabling the satisfactory redirection of conduct when habit no longer suffices to direct it. Dad's version of the miracle of Hannukah was “I bet the priests snuck in at night and added extra oil so the people would not lose heart”.

He did not know then that another genius, Rabbi Mordecai M. Kaplan, had also made this synthesis, founding Reconstructionist Judaism. It was because his ethics and Judaism, as he taught them to us, were so in consonance with Reconstructionist Judaism, that I, my brother and our children, even his great granddaughter, are part of that movement.

Nathan Mendelsohn was a mench. He valued his duties independent of the reward (but he did enjoy the rewards). His duty to his country sent him into defense research during the

war, first doing artillery simulations (by methods he helped develop, then secret, but now the basis of much computer simulation work) then code breaking. His duty forbade him to talk about it or take credit for it long after others had broken their silence.

When the anti-Semitism of the 1940's exiled him from family and friends, he set about as was his duty, building his assigned mathematics department, doing his mathematics and building a new life for his wife and children in Winnipeg. His duty to the Jewish Community of Winnipeg made him one of their leading lights. His duty to his wife gave him a marriage of 62 years with his devoted Helen. She was his confidant and advisor, filling in when his flights of genius took him away from immediate needs. His devoted care to her in her last years was without complaint even though it shortened his own life. Of course the rogue in him sometimes hoped, if he just played absent-minded professor, no one would notice he hadn't done something – Helen's gentle but firm “Nathan!” would remind him. If she said “Nathan- the symphony”, he would immediate spring into action, baking dozens of perfect cream puffs for the symphony tea and enjoying every minute of it. We boys loved the few imperfect ones we were allowed to eat.

His duty as chair of department he fulfilled diligently and successfully; there have been warm tributes from all his former department members. In order to provide for his children in those pre-sputnik days of very low academic salaries, he would take the family from Winnipeg to north of Quebec City every year for a summer job, turning the travel into an adventure for us. His duty to mathematics produced over 140 research papers – late at night coming home from a date, I would find Nathan still seated at the kitchen table with a pencil and paper napkin scribbling just as I had left him hours before.

Nathan treated all from the governor-general to the gas station attendant equally and with grace, and if they had a story to tell even better. I remember him and his buddy the puzzleist Mel Stover meeting a couple and taking a young impressionable boy along. She had mint green platinum blonde hair, four inch stiletto heels, and probably not the “heart of gold” that Damon Runyon would have ascribed to her. Nathan and Mel listened intently to his latest scheme using high pressure door to door sales techniques to sell prepaid cemetery plots in a “cemetery or mausoleum as the case may be” which may or may not have existed. We listened carefully as he played the instructional records on his portable record player. Nathan was fascinated and asked him many questions. Afterward he borrowed the records and made a copy of them. I think I still have the tape somewhere. Nathan was the consummate host putting up with eccentricities of Paul Erdos and the formality of British number theorists with equanimity. Which brings us to Nathan the rogue.

Nathan's roguish sense of humour was everywhere, lighting up our lives. His mother told the story of how he liked, at the age of 3 or 4, to take apart clocks. When he visited his

grandparent's one day, he found the clock they had hidden, took it apart and was trying to reassemble it when he was caught. He smiled that Nathan smile, looked up and said "Too many pieces".

His students always came to the last class of the year, not for hints about the exam, but for the display of sleight of hand and close up magic. He was as proud of coming second to a young magician named Johnny Carson in the International Brotherhood of Magicians (he called it the original IBM) new trick contest as he was of his Order of Canada. He did think that his trick was better than Johnny Carson's. When someone asked him how he did a trick, his eyes would twinkle as with a broad smile he would say "I did it very well".

Where most mathematicians have an idea that there is an ideal world in which the best mathematical ideas exist, and it is their noble quest to find them, Nathan thought of Mathematics as a muse who could be duped by a trickster to give up her secrets. A twist, a nudge, a quick bit of misdirection *et voilà* – a new concept or a new theorem. Two of the products of this, not, 'out of the box', but 'up the sleeve', thinking now bear his name the: Dulmage-Mendelsohn decomposition and Mendelsohn

Triple systems. Both are that just a genius's slight twist on an old idea to get Mathematics to give up one of Her profound secrets. The first has extensive applications in computer science and physics, the second, only last month, almost 40 years after their discovery, were found to have applications in automatic software testing. There is a story Dad loved about a magician aboard the Titanic. Whenever the magician would perform a trick, a parrot would heckle him by squawking how the trick was done: "black on black!", "French force!" or "hat, hen, ham, hare, hill, shoe, cow, hive,!" either revealing the trick or confusing the magician. After the iceberg struck, the magician was in the sea clinging to his saw-a-woman-in-half-box when the parrot alighted on it and said "Ok, I give up: where did the ship go?" OK, Dad, I give up: that wonderful joyous interconnected love-filled universe your genius and humanity created, and that we were privileged to be part of, where did it go?

*Written by Eric Mendelsohn
Son of Nathan Saul Mendelsohn*

SELECTED BACK ISSUES OF THE CMB AND CJM NEEDED

The CMS is participating in a project involving destructive scanning of back issues of the Canadian Mathematical Bulletin (CMB) and the Canadian Journal of Mathematics (CJM). There are a number of issues that are not available in the CMS inventory in order to have two complete sets for each journal. The details of the missing issues (and the number needed) are given as follows:

CMB 1959 (VOL 2)	issues 2 and 3 (two of each needed)
CMB 1963 (VOL.6)	issues 1 and 2 (two of each needed)
CMB 1964 (VOL.7)	issues 1 and 2 (two of each needed)
CMB 1967 (VOL.10)	issue 2 (one needed)
CMB 1967 (VOL 10)	issues 3 and 6 (two of each needed)
CMB 1967 (VOL.10)	issue 2 (one needed)
CMB 1968 (VOL 11)	issue 5 (one needed)
CMB 1968 (VOL 11)	issue 6 (two needed)
CMB 1975 (VOL 17)	issue 5 (two needed)
CMB 1981 (VOL 24)	issue 3 (two needed)
CJM 1976 (VOL 28)	issue 5 (two needed)
CJM 1985 (VOL.37)	issue 6 (two needed)
CJM 1990 (VOL 42)	issue 1 (one needed)
CJM 1995 (VOL 47)	issue 2 (one needed)

If you would be willing to donate copies of any of the above issues to the CMS, please contact Graham Wright (Tel: 613-562-5702 and email: director@cms.math.ca) for more information and to make appropriate delivery arrangements.

Many thanks for your help with this important project

David Rodgers, Chair - CMS Electronic Services Committee

Graham Wright, CMS Executive Director

RECHERCHE D'ANCIENS NUMÉROS DU BCM ET DU JCM

La SMC participe à un projet de balayage destructif d'anciens numéros du Bulletin canadien de mathématiques (BCM) et du Journal canadien de mathématiques (JCM). En effet, il nous manque certains numéros pour que nous puissions disposer de deux séries complètes de chaque revue. Voici la liste des numéros qui nous manquent ainsi que le nombre d'exemplaires de chacun que nous cherchons à obtenir :

BCM 1959 (VOL. 2)	numéros 2 et 3 (deux de chaque)
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BCM 1964 (VOL. 7)	numéros 1 et 2 (deux de chaque)
BCM 1967 (VOL. 10)	numéro 2 (un)
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Si vous êtes disposé à donner à la SMC des exemplaires d'un ou de plusieurs de ces numéros manquants, veuillez communiquer avec Graham Wright (tél.: 613-562-5702 ou directeur@smc.math.ca) pour avoir plus d'information à ce propos ou pour organiser la livraison de vos exemplaires à la Société.

Nous vous remercions de votre collaboration à cet important projet.

David Rodgers, Président, **Comité des services électroniques**

Graham Wright, **Directeur administratif**

CALENDAR OF EVENTS / CALENDRIER DES ÉVÉNEMENTS

SEPTEMBER	2006	SEPTEMBER	NOVEMBER	2006	NOVEMBRE
14-17	Conference On Routing And Location 2006 (CORAL 2006), Satellite to ICM 2006 (Puerto de la Cruz, Tenerife) www.icm2006.org		27-Dec.1	Workshop on Cryptography: Underlying Mathematics, Provability and Foundations (the Fields Institute, Toronto) www.fields.utoronto.ca/programs/scientific/06-07/crypto/crypto_foundations/	
15-17	Asymptotic Analysis in Stochastic Processes, Nonparametric Estimation and Related Problems (Wayne State University, Detroit, MI) www.math.wayne.edu/~conf/		1-5	CCA 2006 Third International Conference on Computability and Complexity in Analysis (University of Florida, Gainesville, FL) http://ccanet.de/cca2006/	
18-20	The 10th Workshop on Elliptic Curve Cryptography(ECC 2006), (Fields Institute, Toronto, ON) www.cacr.math.uwaterloo.ca/conferences/2006/ecc2006/				
19-23	New Techniques in Hopf Algebras and Graded Ring Theory (Vrije Universiteit Brussel, Belgium) http://homepages.vub.ac.be/~scaenepe				
21-23	First Joint CMS/SMM Meeting www.cms.math.ca				
OCTOBER	2006	OCTOBRE	DECEMBER	2006	DÉCEMBRE
2-6	Quantum Cryptography And Computing Workshop (The Fields Institute, Toronto) www.fields.utoronto.ca/programs/scientific/06-07/crypto/quantum		9-11	CMS Winter 2006 Meeting / Réunion d'hiver 2006 de la SMC Toronto, ON www.cms.math.ca/events , meetings@cms.math.ca	
10-13	Data Mining and Mathematical Programming (Centre de Recherches Mathématiques, Montreal, PQ) paradis@crm.umontreal.ca		4-8	Finding and Keeping Graduate Students in the Mathematical Sciences (AIM Research Conference Center, Palo Alto, CA) http://aimath.org/ARCC/workshops/keepinggrads.html	
17-20	Polyhedral Computation (Centre de Recherches Mathématiques, Montreal, PQ) paradis@crm.umontreal.ca		13-15	Workshop on "Geometry of vector distributions, differential equations, and variational problems" (International School for Advanced Studies (SISSA), Trieste, Italy) www.Sissa.it/~zelenko/CEIHomepage.html	
30-Nov.3	Computational challenges arising in algorithmic number theory and cryptography (the Fields Institute, Toronto) www.fields.utoronto.ca/programs/scientific/06-07/crypto/number_theory/		16-18	The 5th International Conference on Differential Equations and Dynamical Systems (University of Texas-Pan American, Edinburg,TX) xzliu@uwaterloo.ca , www.watam.org/deda06.html	
JANUARY	2007	JANVIER			
			4-7	Joint Mathematics Meetings: AMS, MAA, AWM,etc. www.ams.math.org	

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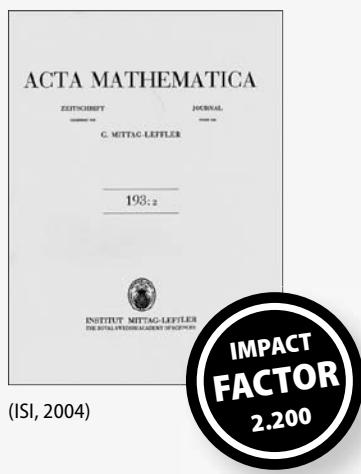
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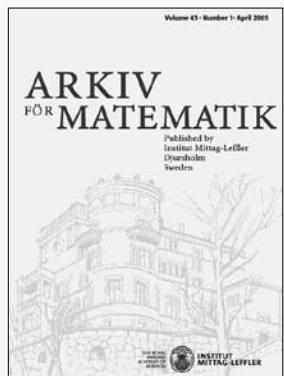
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