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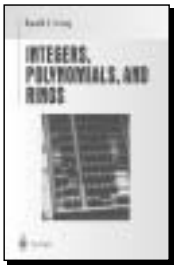

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CMS NOTES de la SMC

Volume 35 No. 8 December/décembre 2003

In this issue / Dans ce numéro

FROM THE EXECUTIVE DIRECTOR'S DESK

Graham P. Wright

Francais page 4

A Difficult Time

When the 2003 Budget was prepared in the fall of 2002, a small surplus was projected. Even though expenditures have been very well controlled and are expected to remain within budget estimates by year-end (December 31, 2002), some unforeseen factors have significantly impacted expected revenues. Taking into account the two factors mentioned below and year-end estimates, it is now expected that the small surplus projected for 2003 will now be a substantial deficit.

Many university libraries use agents to administer their periodical subscriptions. A take-over and subsequent bankruptcy of one these agents resulted in the 2003 payments made by some libraries to this agent being lost to the publisher. A number of publishers, including the CMS, have been affected by this unfortunate situation. Although steps have been taken to try to recover some of the lost subscription revenue, almost all libraries do not have funds to replace the payments that were lost when the agent declared bankruptcy. The loss of subscription revenue for the Canadian Journal of Mathematics, the Canadian Mathematical Bulletin, and CRUX with MAYHEM, for 2003 is estimated to total $30,000.

Although the rise in the Canadian dollar is seen as good news for many, it is not good news for the CMS and the income received from foreign exchange. In 2002, the Society received a total of just over $320,000 in foreign exchange income. In 2003, in comparison to the American dollar, the Canadian dollar has increased in value significantly and, consequently, a marked decrease in foreign exchange income is anticipated.

The bankruptcy situation is a one-time problem but the increase in the value of the Canadian dollar will continue to result in much lower foreign exchange income. Although every effort was made to find additional revenues and to ensure expenditures are kept as low as possible, the 2004 Budget being submitted to the Board of Directors in December projects a deficit of nearly $30,000.

The Society's has a wide program of successful activities and the CMS is under pressure to expand the scope of its activities in all areas. Our publications are of excellent quality and are produced very cost effectively.

continued on page 4

CMS NOTES
NOTES DE LA SMC

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EDITORIAL

S. Swaminathan

Robert J. MacG.. Dawson

James Humes, a public speaker and a former speech writer to the White House, used to preface a speech in which he used a borrowed idea by saying that he felt like a minister who so thoroughly bored the members of his congregation that they finally asked him to leave. "Give me one more chance," the minister pleaded. The next Sunday the congregation heard him deliver, to their surprise, an inspired sermon. After the service everyone shook his hand warmly. Asking him to continue to stay, an elder of the church said, "That was a very good sermon. But as you began to speak I noted that you raised two fingers of your left hand, and at the end two fingers of your right hand. What was the significance of those gestures?" "Those," answered the minister, "were the quotation marks."

Borrowing an idea from other writers is a practice that was prevalent among Greek and Roman authors. "It is a universal rule of life that we should wish to copy what we approve in others," wrote Quintilian in his *Institutio Oratoris* in which he devotes a chapter on imitation, claiming it to be a 'great art'. There has always been a fine, but well-understood line, between creative reference and plagiarism. The latter term, (originally meaning the theft of a slave, or selling a freeman as a slave) was used in the modern sense as long ago as the Roman author Martial (*Epigram* I, 53).

English literature contains many instances of authors who published passages and plots of other writers with or without modifications.

Shakespeare, for instance, certainly added more to *Macbeth* than he took from Holinshed; and James Joyce and T. S. Eliot (to name but two modern examples) created works filled with quotations - but used in ways that their original authors surely never expected.

Although the authors mentioned above did not, typically, reference their sources, they did not intend the reader to suppose them the creator. On the contrary, much of the strength of *Ulysses* or *The Waste Land* comes from the use of one quotation to recall an entire work, possibly longer than that in which the reference is made. In the same way, citations of other sources in scholarly work are not an admission of the author's ignorance, but links that bind the work into the greater body of scholarly writing through the ages. It is reasonable to suppose that much of the petty plagiarism that we see in student essays (should we assign them) arises through a failure to appreciate this.

EDITORIAL *continued*

More serious is the greater plagiarism in which an author attempts to take credit for the whole of another's work; this arises now and then in mathematical publications. There have been instances where an original author finds his paper published with minor alterations in a different journal. When discovered the author usually brings it to the attention of the institution where the offending person works. Very often this results, after proper verification, in docking of pay, suspension or other severe action on the offender. Why would one resort to copy another person's work? Pressure due to the publish-or-perish phenomenon is cited as a reason most of time. It could also result from psychiatric problems.

Research in mathematics often involves generalizations of the results of an author or using results in an analogous situation. Using ideas from a paper is acceptable as long as due acknowledgement is made.

Other ethical issues arise when an author submits a paper to a journal, finds that it is not accepted for publication, and later discovers that the contents and ideas of the paper appear in a different form in a different journal.

The increase in the number of journals during the past two decades does, in some ways, make plagiarism easier; and student essay banks have become, for some disciplines, a greater problem than when they existed only on paper. However, the ease with which preprints are disseminated using the computer allows researchers to establish priority more easily than before; and there are facilities on the Internet that make tracking a copied essay an easier task than it might otherwise be. "*Tempora mutantur, nos et mutamur in illis*" (anonymous; sometimes attributed to Ovid.)

Le conférencier James Humes est un ancien rédacteur de discours à la Maison Blanche. Il avait l'habitude de commencer les discours dans lesquels il empruntait une idée en racontant qu'il se sentait comme un prêtre si ennuyant qu'il s'est fait montrer la porte par ses paroissiens. « Donnez-moi une dernière chance », supplia le prêtre. Le dimanche suivant, les fidèles ont eu droit, à leur grand étonnement, à un sermon exceptionnel. Après la messe, ils faisaient la queue pour serrer la main du prêtre. En lui demandant de rester, un vieillard lui dit : « C'était un excellent sermon. Au début, toutefois, vous avez élevé la main gauche en agitant deux doigts, et vous avez fait la même chose de la main droite à la fin. Que signifiaient ces gestes? » Et le prêtre de répliquer : « C'était pour indiquer les guillemets. »

L'emprunt d'idées était pratique courante chez les auteurs grecs et romains. « C'est une règle de vie universelle de vouloir reproduire ce que nous approuvons des autres » [traduction libre], écrivait Quintilian dans son *Institutio Oratoris*, dans lequel il consacre un chapitre à l'imitation, qu'il qualifie de « grand art ». Il a toujours existé une nuance, subtile, mais bien comprise, entre la référence créative et le plagiat. Le sens moderne de ce dernier terme (dérivé du latin plagiarius, « celui qui vole les esclaves d'autrui ») remonte à l'auteur romain Martial (*Épigramme* I, 53).

La littérature anglaise compte de nombreux exemples d'auteurs qui ont publié ou repris, en les modifiant ou non, des passages d'autres auteurs. Shakespeare, par exemple, a certainement ajouté davantage à *Macbeth* qu'il n'en a repris de Holinshed. Et James Joyce et T. S. Eliot (pour ne citer que deux exemples modernes) nous ont donné des œuvres remplies de citations, qu'ils ont toutefois employées d'une manière que les auteurs d'origine n'auraient jamais soupçonnée.

Même si les auteurs ci-dessus ne citaient généralement pas leurs sources, ils ne s'attendaient pas à ce que le lecteur suppose qu'ils en étaient les créateurs. Au contraire, ce qui fait le génie d'*Ulysses* ou de *The Waste Land* tient à l'emploi d'une citation pour rappeler une œuvre en entier, souvent plus longue que l'œuvre où se trouve le renvoi. De la même façon, les citations dans les travaux de recherche n'attestent pas de l'ignorance de l'auteur, au contraire, elles situent ces travaux dans le grand contexte des écrits savants et dans le temps. Il est raisonnable de supposer qu'une bonne partie du petit plagiat que l'on trouve dans les travaux des étudiants (pour ceux qui en font encore) découle de leur ignorance à cet égard.

Bien plus grave encore sont les cas de plagiat où un auteur s'approprie l'œuvre entière d'un autre. Ce phénomène se produit à l'occasion dans des publications mathématiques. Il est déjà arrivé qu'un auteur trouve son article publié dans une autre revue avec quelques modifications mineures. Habituellement, l'auteur ainsi plagié rapporte la situation à l'établissement où travaille le plagiaire. Après vérification d'usage, il arrive très souvent que le contrevenant soit frappé d'une perte de salaire, d'une suspension ou d'une autre mesure draconienne. Pourquoi s'abaisse-t-on à copier le travail d'autrui? La raison la plus souvent évoquée est la pression : « il faut publier ou périr ». D'autres cas sont attribués à des troubles psychiatriques.

La recherche mathématique exige souvent la généralisation des résultats obtenus par d'autres ou l'utilisation

continué en page 13

FROM THE EXECUTIVE DIRECTOR'S DESK *(Continued)*

Our meetings continue to include more sessions and attract more delegates. Our educational program, particularly the competitions and math camps, reaches a large number of students and teachers. In addition to the revenues generated by these publications, research and educational activities, support is also received through grants and donations.

Faced with a deficit situation, the Society must find ways to increase revenues or decrease expenses. Failure to do so could result in existing programs being reduced or eliminated. It may also mean that the CMS will not be able to take advantage of future opportunities. This is certainly a difficult time and the Executive is focusing on a strategy to address the problem. Creative ideas from the members are very welcome.

Une période difficile

Durant la préparation du budget 2003 à l'automne 2002, on prévoyait un petit surplus. Malgré un contrôle très serré des dépenses, qui ne devraient pas dépasser les prévisions de fin d'exercice (31 décembre 2002), des événements imprévisibles ont bouleversé les prévisions de recettes. En tenant compte des deux facteurs mentionnés ci-dessous et de nos estimations de fin d'exercice, nous prévoyons que le surplus attendu pour 2003 se transformera plutôt en un imposant déficit.

De nombreuses bibliothèques universitaires confient la gestion des leurs abonnements à des agences. Suite à la prise de contrôle d'une de ces agences et à sa faillite subséquente, les paiements pour 2003 que certaines bibliothèques avaient versés à cette agence se sont volatilisés, ce qui s'est traduit par une perte pour l'éditeur. Un certain nombre d'éditeurs, y compris la SMC, ont subi les contrecoups de cette fâcheuse situation. Nous avons bien tenté de récupérer une partie des pertes en revenus d'abonnement, mais la grande majorité des bibliothèques n'ont pas les moyens de payer à nouveau les sommes déjà versées à l'agence avant qu'elle ne déclare faillite. On évalue à 30 000 $ la perte de revenus d'abonnement pour le Journal canadien de mathématiques, le Bulletin canadien de mathématiques et CRUX with MAYHEM, pour l'année 2003.

Si la hausse du dollar canadien est une bonne nouvelle pour bien des gens, ce ne l'est pas pour la SMC, qui réalise généralement un gain sur change. En 2002, la Société a cumulé des gains sur change d'un peu plus de 320 000 $. En 2003, comme le huart a considérablement augmenté par rapport à la devise américaine, nous prévoyons une chute marquée de nos recettes à ce poste.

Une faillite est un événement ponctuel, mais la hausse du dollar canadien fera toujours baisser nos gains sur le taux de change. Nous avons tout fait pour trouver des fonds supplémentaires et réduire nos dépenses le plus possible, mais nous prévoyons tout de même présenter au conseil d'administration de décembre un budget déficitaire d'environ 30 000 $ pour l'exercice 2004.

La Société présente un large éventail d'activités et subit des pressions pour élargir la portée de ses activités dans tous les domaines. Nos publications sont d'excellente qualité et sont publiées à un très bon rapport qualité-prix. À nos réunions, le nombre de sessions et de participants continue toujours d'augmenter. Notre programme éducatif, notamment les concours et les camps mathématiques, attirent un grand nombre d'élèves et d'enseignants. Outre les recettes tirées de nos publications, recherches et activités éducatives, nous recevons également du financement sous forme de subventions et de dons.

En position de déficit, la Société doit trouver des moyens d'accroître ses recettes et de réduire ses dépenses, faute de quoi, nous pourrions nous voir forcés de comprimer ou même d'éliminer certains programmes. La SMC pourrait éventuellement être contrainte de refuser des possibilités intéressantes. La Société traverse une période difficile, et le comité exécutif cherche activement une stratégie pour remédier à la situation. Nous sommes très réceptifs à toute idée originale de nos membres.

NEWS FROM DEPARTMENTS

University of Waterloo, Waterloo, ON

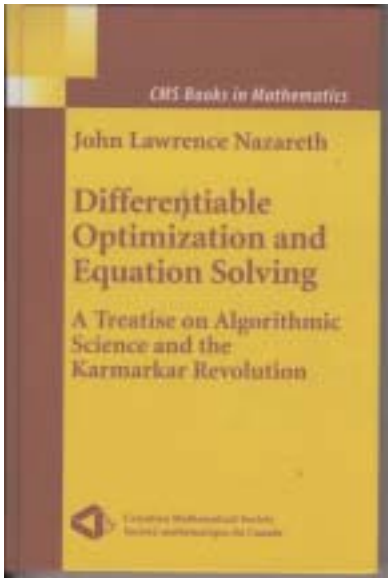
Promotions: Jan Minac (Professor, July 2003); David Riley (Professor, July 2003).

Award/Distinction : Richard Kane (University of Waterloo Faculty of Mathematics Alumni Achievement Medal)

A DELIGHTFUL TREATISE FOR BOTH NOVICE AND EXPERT

Book review by Henry Wolkowicz, University of Waterloo

Differential Optimization and Equation Solving
by John Lawrence Nazareth
CMS Books in Mathematics 13
Springer 2003 xv1 + 256 pages



The new book by John Nazareth is a delightful novel treatise in Optimization and Equation Solving. In particular, this new book deals with the interior-point revolution that has changed the way optimizers look at optimization problems. (See e.g. [11] and the details below.) Nazareth has written an excellent book that includes both introductory and advanced topics. It provides a description of many of the techniques in this area. In addition, the book is sprinkled with beautiful analogies and insights. These insights make this book an interesting read and a learning experience for both the novice and the expert. (I will outline some of these enjoyable/novel insights below.) The book is based on Nazareth's extensive experience and publications in optimization and equation solving.

Consider the (differentiable) nonlinear programming model, CCP;

$$\text{(NLP)} \qquad \begin{array}{lll} \text{minimize} & f(x) & \\ \text{subject to} & H(x) \# 0 & (\ 0\ |^m\ ) \\ & G(x) \quad 0 & (\ 0\ |^p\ ) \\ & x\ 0\ |^n, & \end{array}$$

i.e. the minimization of the function f subject to m equality constraints $h_i = 0$, $i = 1,\ldots,m$ and and p inequality constraints $g_j \# 0$, $j = 1,\ldots,p$. This general model includes: if there are no constraints, then we get the unconstrained minimization model, UM; if there are no inequality constraints, we get the nonlinear equality-constrained programming model, NECP; if the equality constraints are linear and the inequality constraints convex, we get the convex-constrained programming model, CCP; etc... Nazareth includes: nonlinear least-squares, NLSQ; nonlinear equations, NEQ; linear convex-constrained, LCCP; and the classical linear programming problem, LP. In particular, the case NEQ is treated as a special case of NLP with an unspecified objective function, rather than an unconstrained minimization problem, e.g. sum of squares.

The early years following the introduction of the Simplex Method for LP in 1948 (e.g. [3]), i.e. the Dantzig modeling-and-algorithmic revolution, was characterized by a watershed between LP and NLP. The enormous prominence of LP was due in great part to the success of the simplex method. Whereas, the world being nonlinear, NLP provides better models in general, [4]. However, the introduction of primal-dual interior-point methods, for both LP and NLP, following the Karmarkar revolution, has shown that "The great watershed in optimization isn't between linearity and nonlinearity but convexity and nonconvexity", [9]. In addition, this revolution has brought to light the importance and centrality of Newton's method.

Nazareth concentrates on UM, NEQ, one-dimensional problems and LP and the algorithms used to solve them. Several themes are followed throughout the book. Comparisons are made between the model approach with Newton's method and the variable metric approach in the spirit of Cauchy. Arguments are presented to illustrate the flaws in a least squares approach in comparison to the homotopy approach followed in the modern interior-point methods. In addition, comparisons are made to illustrate the difference between algorithmic versus implementable methods.

The popular geometric view for UM is that of a marble on a mountain rolling downhill to some minimizing point. However, as Nazareth points out: "this ignores a central tenet of algorithmic optimization, namely, that the acquisition of information at any point x incurs a significant, nonzero cost. … Thus, a much better metaphor, …, is that of a small boat floating on an opaque lake that entirely covers the landscape." Thus experiments (costly)

have to be made to estimate the depth/slope/curvature, whereas the marble samples these continuously at no expense.

Algorithms for UM are based on either the Newton (model based) or Cauchy (metric based) complementary perspectives. At the current estimate of the minimum, x_k, a direction finding problem, DfP, is solved to find a new improved point x_{k+1}. For Newton's method, one solves the so-called trust region subproblem, TRS, or quadratic model

$$\text{(TRS)} \quad \begin{array}{ll} \text{minimize} & g_k^T (x - x_k) + \tfrac{1}{2} (x - x_k)^T H_k (x - x_k) \\ \text{subject to} & \| (x - x_k) \|_{D^+} \# \delta_k, \end{array}$$

where g_k is the gradient, H_k is an approximation of the Hessian (both at x_k), and D^+ scales the norm, i.e. the objective function is replaced by a (local) quadratic approximation and we restrict to the region where we trust the model. The optimal solution (approximated) is usually used as the new point x_{k+1}, or a line search is done in the direction $x_{k+1} - x_k$. These methods have proven to be robust and efficient and they can solve large scale problems, e.g. [8,2].

A simple algorithm for UM is: Cauchy's steepest descent method which uses the negative gradient as a search direction to find a new point x_{k+1}. Variable metric methods change the geometry by changing the metric/norm under consideration using information based on curvature considerations. This leads to the classical quasi-Newton methods, e.g. BFGS and DFP methods or updates. In these methods, first order (gradient) information is used to build up second order curvature information.

There is an ongoing debate on whether these methods are still needed following the introduction of automatic differentiation, see e.g. [1] and ADIFOR with URL: *www.cs.rice.edu/~ adifor/*.

Nazareth includes details on which choices of trust regions and Newton-Cauchy methods to chose in different settings.

The interior-point revolution has emphasized the importance of using Newton's method and solving a system of nonlinear equations based on the optimality conditions of an optimization problem. Nazareth presents two opposing views for solving NEQ, e.g. $H(x) = 0$, $H : \mathbb{R}^n \to \mathbb{R}^n$. Applying Newton's method directly is equivalent to applying the Gauss-Newton method, i.e. minimize the sum of squares $\min \| H(x) \|^2$ using a truncated quadratic model. However, this can lead to local minima which are not roots of $H(x)$. Nazareth calls this approach inherently flawed. Another approach uses homotopy or path-following to solve a parameterized problem that converges to a root as the parameter is varied. (This approach is the basis behind the successful modern primal-dual interior-point methods.)

Solving the one-dimensional root problem $h(x) = 0$ can be transformed using a potential function, i.e. we can integrate and find a function whose minimum coincides with $h(x) = 0$. However, this is not true for higher dimensions, since the Jacobian of h will not be symmetric. Thus, Nazareth makes the case that one-dimensional root finding is not the correct paradigm to lead to higher dimensional root finding. Rather a nonlinear least squares approach should be used. This leads to conjugate gradient methods for minimization. Included are discussions on the simplex and Nelder-Mead methods for nondifferentiable minimization.

As it was for the first revolution (led by Dantzig), the recent interior-point revolution (started by Karmarkar) originally focused on LP. Karmarkar's basic idea was to start at a central interior point of the feasible set and construct an ellipse around it within the feasible set. Optimizing the linear function over this ellipse is easy, thus yielding an improved point. Repeating this process can result in getting stuck near the boundary, as the new ellipse will have to be small. Therefore, the problem is rescaled so that the point is central again before constructing the ellipse. A potential function is used to ensure polynomial time convergence.

However, there have not been any practical numerical implementations of Karmarkar's original approach. (Connections between Karmarkar's approach and an implementable version called the affine scaling method have been made, see [5,6]). A breakthrough came when an equivalence was made with the classical log-barrier interior-point methods, [7] for a special choice of barrier parameters. This led to the introduction of the elegant primal-dual interior-point methods. These methods can be derived using the primal or dual log-barrier problem. They consist in applying Newton's method to the optimality conditions consisting of: (i) dual feasibility; (ii) primal feasibility; (iii) complementary slackness. Nazareth's preference for these methods is to focus on potential reduction and affine scaling. He includes a careful description of the path-following approach with the Mehrotra predictor-corrector modification. This builds on his previous work in the book on path-following. He also includes a chapter introducing the connection of log-barrier methods.

There are many excellent papers and books written describing the current interior-point revolution. Three recent books are [10,12,13].

The area of Optimization has reached a certain maturity. Problems of complexity/size undreamed of fifteen years ago are now solved as a matter of course. As stated by many numerical analysts: "I would rather be using today's theory and yesterday's computer than the reverse".

Nazareth has written a book that is both readable and covers many of the important new developments in Optimization.

References

[1] M. Berz, C. Bischof, and G. Corliss, editors. Computational differentiation, Philadelphia, PA, 1996. Society for Industrial and Applied Mathematics (SIAM). Techniques, applications, and tools.

[2] A.R. Conn, N.I.M. Gould, and P.L. Toint. Trust-Region Methods. Society for Industrial and Applied Mathematics (SIAM), Philadelphia, PA, 2000.

[3] G. Dantzig. Linear Programming and Extensions. Princeton University Press, Princeton, New Jersey, 1963.

[4] G. Dantzig. Linear programming. In History of Mathematical Programming: A Collection of Personal Reminiscences. CWI North-Holland, Amsterdam, 1991.

[5] I. I. Dikin. Iterative solution of problems of linear and quadratic programming. Doklady Akademii Nauk SSSR, 174:747-748, 1967. Translated in : Soviet Mathematics Doklady, 8:674-675, 1967.

[6] B.A. Freedman, M.S. Meketon, and R.J. Vanderbei. A modification of Karmarkar's linear programming algorithm. Technical report, AT&T Bell Laboratories, Holmdel, NJ, 1985.

[7] P.E. Gill, G.H. Golub, W. Murray, and M.A. Saunders. On projected newton barrier methods for linear programming and an equivalence to karmarkar's projective method. Math. Programming, 36(2):183-209, 1986.

[8] J. Nocedal and S.J. Wright. *Numerical optimization*. Springer-Verlag, New York, 1999.

[9] R.T. Rockafellar. Lagrange multipliers and optimality. SIAM Review, 35:183-238, 1993.

[10] R.J. Vanderbei. Linear Programming: Foundations and Extensions. Kluwer Acad. Publ., Dordrecht, 1998.

[11] M. Wright. The interior-point revolution in constrained optimization. In High performance algorithms and software in nonlinear optimization (Ischia, 1997), volume 24 of Appl. Optim., pages 359-381. Kluwer Acad. Publ., Dordrecht, 1998.

[12] S. Wright. Primal-Dual Interior-Point Methods. Society for Industrial and Applied Mathematics (SIAM), Philadelphia, Pa, 1996.

[13] Y. Ye. Interior point algorithms. Wiley-Interscience Series in Discrete Mathematics and Optimization. John Wiley & Sons Inc., New York, 1997. Theory and analysis, A Wiley-Interscience Publication.

BRIEF BOOK REVIEWS

S. Swaminathan

The William Lowell Putnam Mathematical Competition 1985-2000. Problems, Solutions and Commentary

by Kiran S.Kedlaya, Bjorn Poonen and Ravi Vakil, The Mathematical Association of America, 2002.

Since 1938, on the first Saturday of December every year, except during the war years, about two thousand undergraduates from American and Canadian colleges enter the prestigious Putnam competition in Mathematics to demonstrate their early mathematical ability. The winners get praise, fame and cash; one of the five top among them get a graduate fellowship at Harvard. The first competition (1938) was won by the University of Toronto with Irving Kaplansky as the first Putnam scholar. The lists of winners over the years include a large number of creative mathematicians. The Mathematical Association of America, which conducts the competition, published two volumes of problems and solutions; the first one in 1980, covering the period 1938-1964 and the second in1985 covering 1965-1984.

The present volume presents 192 problems from 1985-2000 with solutions and commentary. It is unlike the earlier volumes in that it places the problems in the context of important mathematical themes. The authors are active research mathematicians and were themselves winners of the Putnam in most of the years covered by the volume (together they achieved the rank of Putnam Fellow eleven times). They highlight connections to other problems, to the curriculum, and to more advanced topics. The best problems contain kernels of sophisticated ideas related to important current research, and yet the problems are accessible to undergraduates.

The solutions, which have been compiled with extensive research, comprise the best ones from the American Mathematical Monthly, Mathematics Magazine, past competitors and problem enthusiasts. Techniques that are relevant to more than one problem under consideration are presented mentioning related problems, some of which are unsolved, and suggesting references for further reading. Nice features of the book include (i) a hint to each problem, separate from the full solution, (ii) background information about the competition, (iii) a list of winning individuals and teams, with current information about the career paths of winners, (iv) reprint of 'Putnam trivia for the Nineties' by Joseph A. Gallian, (v) reprint of 'Some thoughts on Writing for the Putnam' by Problems Committee member Bruce Reznick, and (vi) a topic index.

The volume is a welcome addition to the literature of problems.

Symplectic and Contact Topology: Interactions and Perspectives

edited by Yakov Eliashberg, Boris Khesin and Francois Lalonde, Fields Institute Communications, vol.35, American Mathematical Society, 2003, vi + 199pp.

This volume contains papers written by the participants of the Workshop "Symplectic and Contact Topology, Quantum Cohomology and Symplectic Field Theory" held in March – April 2001, as part of a semester-long program on "Symplectic Topology, Geometry and Gauge Theory," a joint venture of the Fields Institute in Toronto and CRM in Montreal. The conference took place in both cities.

The twelve papers in the volume include the latest developments on a variety of topics from Symplectic Topology, the interaction between symplectic and other geometric structures, Differential Geometry and Topology, Homological Mirror Symmetry, and Non-commutative Symplectic Geometry. Researchers in these areas will find some open problems mentioned in the papers.

Letters to the Editors / Lettres aux Rédacteurs

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

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

EDUCATION NOTES

Ed Barbeau

Intuition and the National Forum

Working Group 6 of the National Forum held last May in Montreal and led by Brent Davis, Gary Flewelling and Klaus Hoechsmann, dealt with mathematics and intuition. After noting how the rationalism of the last few centuries militated against the recognition of key place of intuition in mathematical learning, the group wondered how essential intuition is to sense-making, and how teachers can attend to and nurture intuition.

The members of the group pointed to two main areas that need reform, the over-specification of curricula and the lack of opportunities for teachers themselves to have mathematical learning experiences. For the first of these, they suggest that the Canadian Mathematical Society might publish a position statement on the sorts of experiences, competencies and dispositions that students shouldhave prior to undergraduate study in mathematics.

This is an interesting idea, but one that can be properly realized after only a thorough discussion of the issues and the arrival at a consensus. Those of us who teach undergraduates may well decry the lack of proficiency of many students, but realize that the cause of their difficulties is more profound and has to do with how they regard and approach the subject. I hope that this column can be a forum for members of the Society to respond to this particular issue.

CRYSTAL and NSERC

Earlier this year, NSERC consulted widely with individuals involved in school science education and found considerable enthusiasm that it too can play a role in this area. It seems that that NSERC's presence might enhance the viability of other initiatives and encourage funding from many sources. Serious issues needing attention are the loss of interest in science evinced by many middle school pupils, the dearth of science teachers and the underpreparation of many science teachers. While many organizations, such as Shad Valley, the Learning Partnership and Imperial Oil are involved in enriching the experience of students, their work is limited in scope or, in the case of Imperial Oil, due shortly to come to an end.

Accordingly, NSERC is considering setting up a national competition to select and support Centres of Research In Youth, Science Teaching and Learning (CRYSTAL). Such centres would analyze, research, support outreach, encourage teacher recruitment, advise on curricula, professionally develop teachers and foster internships. They would seek additional sponsors, exchange information with other centres and possibly build on the work of existing bodies. The Research Council would seek proposals that address how programs can be developed and assessed, and how the centres would relate to existing organizations, including school systems, universities and professional organizations. It is envisaged that NSERC might allocate an annual budget of one or two million dollars to support a network of between five and ten centres. Within the CRYSTAL setup, a particular priority would be the support of First Nations Student Science and Mathematics Education.

Rethinking provincial policy

The University of Toronto Bulletin of Monday, October 6, 2003 carried an article by Professor Kenneth Leithwood, of the Ontario Institute for Studies in Education, that responds to three issues discussed in the recent Ontario election.

1. Class size. While smaller classes do make a difference in the primary grades, implementing this is difficult because of the increased need for qualified teachers and space. Leithwood recommends broadening the focus to include schools and districts. The promised efficiencies of scale of large organizations have not materialized over two decades. Research suggests that the benefit to students diminishes once school districts reach a size of 10000 students, and that the optimum size for an elementary school is between 300 and 400 students and for a secondary school between 800 and 1200 students. He points out that marginal decreases in class size are expensive to implement, while smaller schools can be of enormous value in their communities.

2. The scope of education policy. Restricting school policy only to what happens within the school building during regular hours will not be as effective as broadening programs to encompass the communities in which the children live. Research overwhelmingly supports the value to students, for example, of programs for parenting, provision of breakfast, and cndounselling. Leithwood urges that education policy should be developed in tandem with other social policies, such as housing (to reduce student turnover) and health care (to reduce absenteeism and physical reasons for low achievement).

3. Funding. Leithwood decries the present piecemeal approach to school funding and asserts that we cannot continue in this way without jeopardizing the integrity of the education system. There are four challenges: (a) to allocate more money just to keep up with increasing costs; (b) to tackle deferred capital expenditure; (c) to modify the pegging of funding to student enrolment to

meet special situations arising from the diversity of the students and locations (schools in Northern Ontario have different problems than those in the large southern cities); (d) to increase the range of ancillary programs that would help students.

None of this is surprising, but it is nice to see that it is supported by educational research. To particularize this to mathematics, I have come to the conclusion that student success in our discipline depends not only curriculum and teaching, but also on other factors that are not particular to mathematics - the attitudes of the students towards learning, intellectual curiosity, the values of their families, peers and communities, and their priorities. The policies that Leithwood suggests allow us to address these latter issues as they provide the means for restoring to our schools that sense of community that really would promote intellectual and social growth.

Trimathlon

A glance through almost any modern school text will reveal attempts to attract pupils through activities that are supposed to resonate with them. Often the appeal to childish concerns take the form of "hooks" rather than serious attempts to demonstrate that mathematics can lend power and insight. Thus, children may be treated to banal exercises about pizzas, collecting pretty shells and throwing number cubes (the politically correct term for "dice"). A popular gambit is to play "guess-my-number" game with the children using sequences with no context (usually arithmetic progressions) that are designed to foster "pattern recognition".

This is neglects the fascination that mathematics can hold in and of itself, as well as more traditional recreational activities and genuine instances from everyday life where mathematical facility is helpful. Fortunate indeed are the children brought up in a household that harbours jigsaw puzzles, board games and card games and that allows them a measure of responsibility in dealing with numerical tasks, interpreting diagrams and maps, and planning events. The games of monopoly, casino, cribbage and, eventually, bridge embody mathematical processes and ways of thinking, and also serve the blur the distinction between child and adult. They encourage children in the belief that they too are full members of the general population and need not be patronized by the adults around them with sterile and sanitized mathematical tasks.

Sterility exacts a price. One can wonder whether certain tasks at school stunt rather than foster imagination, especially where mathematical aspects are glossed over. A disconcerting finding of some research, perhaps borne out by our own experience with university students, is that the skills of some students deteriorate as they advance through the grades, presumably because they have somehow become alienated from mathematics. However, there are a number of individuals within our international community who have done much to engage the wider population in modern mathematics; one of these is Paul J. Sally, Jr., of the University of Chicago, a noted expositor and recipient of an Award for Distinguished Public Service from the American Mathematical Society in 2000. He and his wife, Judith D. Sally, have just published a book directed to pupils, their teachers and parents, that will introduce them to some interesting mathematical situations, some of which are well known to many of us.

Judith D. Sally & Paul J. Sally, Jr., TriMathlon: *A workout beyond the school curriculum* A.K. Peters, Natick, Massachusetts, 2003. ISBN 1-56881-184-5 xiv+250 pages

There are three parts correlated with the three sports of the triathlon, swimming = arithmetic, cycling = numbers and symmetry, and running = geometry; each corresponds to a clever logo in which numbers are combined to suggest the image of the appropriate sport. In each part there are a number of guided activities, that include questions (with solutions later in the section) and extensions for the "endurance athlete". It would probably be hard for most pupils to read the book on their own, and for this reason (as well as the answers to the exercises), it is probably best used by a teacher or parent who photocopies some of the material and parcels it out. Some of the discussion involves algebraic notation with which the reader might not be completely fluent. Quite a few of the items are well-known, and the benefit of the work in this case is that it pursues them somewhat farther than is often the case.

The "race to 100" is a two-person game in which the players play alternately, each adding a number within a certain range to rise from 0 to exactly 100, the winner being the one who achieves 100. Then follows a "roll back" that involves starting with 100 and trying to reduce it to exactly 0 (but not beyond) with five rolls of a die, where, at each roll, one is permitted to subtract either the number or ten times the number on its face. In the third chapter, letters of the alphabet are assigned numbers and pupils have the task of finding words whose letters either sum or multiply to a given value. All of these ideas are fine, if not particularly exciting, but I am prepared on the basis of the experience of the authors to accept that the children will be interested. Certainly, all seem to be readily accessible.

In the second part, the first task is to replace the dots in the sides of an open triangle and an open square by numbers 1 to 6 (for the triangle) or 1 to 8 (for the square), so that the sum of the numbers along each side is the same. The strength of this task lies in several factors: there are many possible solutions, so that one is led to examine the range of cases; some solutions are related to others either through geometrical symmetry or arithmetic symmetry. Thus, issues of structure, clasification and duality come to the fore, and

the authors gently and thoroughly lead the reader through these aspects. The fifth chapter on palindromes begins with enumerating the number of palindromic integers of various lengths, but then gets into the more interesting problem of how long one has to perform the recursive operation of starting with a number, adding it to its reverse to produce another number, to produce a palindrome.

The next chapter also deals with a shiny chestnut: Start with four numbers at the vertices of a square; for a second square of numbers whose entries are the absolute difference of adjacent pairs of number of the first square. It is know that repeating this process sufficiently often leads to four zeros, so pupils are invited to investigate how long the process can take and to understand why it terminates.

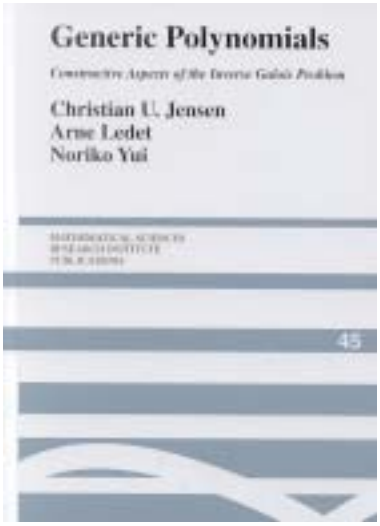
The final part on geometry discusses tessellations of the plane with polygons and in particular guides pupils towards the result that the plane can be tiled with copies of any quadrilateral. This is followed by chapters on circle packing in the plane, polygons that can be realized in a lattice and their areas (leading to Pick's formula) and dissections of polygons. The final project is to establish that one of two polygons of the same area can be dissected into another, a result that is very well described in a movie that must be now forty years old, *Equidecomposible polygons*.

This is a book worth owning by any school teacher of mathematics and any of us who work extramurally with the young. However, anyone who takes fostering of mathematical interest seriously needs to go beyond this, and a good place to start is a set of similarly intended books by Anthony D. Gardiner of the University of Birmingham in the United Kingdom, particularly his *Discovering mathematics: the art of investigation*, published by Oxford in 1987.

HIGHLY RECOMMENDED TO ANYONE INTERESTED IN GALOIS THEORY

Book review by Zinovy Reichstein, University of British Columbia

Generic Polynomials
by C.U. Jensen, A. Ledet and N. Yui
MSRI Publication Series 45
Cambridge University Press 2002 ix + 258 pages



Around 1830 Galois described a procedure for assigning a finite group G to a polynomial

$$p(x) = x^n + a_1 x^{n-1} + \ldots + a_{n-1}\, x + a_n \,,$$

where $a_1, \ldots, a_n$ are rational numbers. This group (which is now called the Galois group of $p(x)$) "measures" the difficulty in finding the roots of this polynomial; in particular, it tells us whether or not $p(x)$ can be solved in radicals. Galois' contemporaries did not understand the importance of his ideas. His most significant papers were rejected for publication, then lost by the French Academy of Sciences, and Galois himself was killed in a duel before reaching the age of 21.

Galois' construction naturally leads to the following question: Can every finite group can be realized as the Galois group of some polynomial with rational coefficients? While there is no direct evidence that Galois himself ever posed this question, we are free to speculate that he might well have done it in one of his lost papers. In any case, this question, under the name of Inverse Galois Problem, has become one of the most famous unsolved problems in mathematics and the focus of much research over the past 150 years. Among the high points of this research are the positive solutions for solvable groups by Shafarevich in 1954 and for the monster group by Thompson in 1984. The interest in this problem has been on the rise in the past two decades, as witnessed by the publication of a number of books and conference proceedings, such as *Galois groups over* $\mathbb{Q}$, edited by Y. Ihara, K. Ribet and J.-P. Serre (1987); *Topics in Galois Theory*, by J.-P. Serre (1992); *Recent Developments in the Inverse Galois Problem*, edited by M. D. Fried (1993); *Groups as Galois groups, an Introduction*, by H. Völklein (1996); and *Inverse Galois Theory*, by G. Malle and B. H. Matzat (1999).

Much of the research on the inverse Galois problem has been influenced by two ideas. One, due to Hilbert, is to consider polynomials over $\mathbb{Q}(t)$; the Hilbert Irreducibility Theorem says that if a given group can be realized over $\mathbb{Q}(t)$ then it can be realized over $\mathbb{Q}$. This gives a geometric flavor to the subject by bringing into play the rich geometry of the affine line and its coverings. Every finite group is known to be realizable over $\mathbb{C}(t)$ (by the Riemann Existence Theorem) or $\mathbb{Q}_p(t)$ (by the Harbater Existence Theorem, 1987), and it is hoped that the same should be true over $\mathbb{Q}(t)$. The second idea, due to Emmy Noether, is to look for a polynomial $p(x) \in \mathbb{Q}[x]$ with a given Galois group G by initially assuming that the roots $x_1, \ldots, x_n$ are independent variables, permuted by G. These roots satisfy the polynomial $P(x) = (x - x_1) \ldots (x - x_n)$ whose coefficients lie in the field $\mathbb{Q}(x_1, \ldots, x_n)^G$ of G-invariant rational functions in $x_1, \ldots, x_n$. If this field happens to be is a purely transcendental extension of $\mathbb{Q}$, then after specializing the coefficients of $P(x)$ to suitable rational numbers, we obtain a desired polynomial $p(x) \in \mathbb{Q}[t]$ with Galois group G.

The book under review focuses on two byproducts of Noether's idea: generic polynomials and the Noether problem. (The Noether problem asks whether or not $\mathbb{Q}(x_1, \ldots, x_n)^G$ is a purely transcendental extension of $\mathbb{Q}$. A polynomial $P(x) \in \mathbb{Q}(s_1, \ldots, s_d)[x]$ with Galois group G is called versal if every G-Galois extension L/K of characteristic zero can be obtained by suitably specializing $s_1, \ldots, s_d$ in K. If $s_1, \ldots, s_d$ can also be chosen to be algebraically independent then $P(x)$ is called generic. In particular, Noether's construction always produces a versal polynomial $P(x)$, and if the Noether problem has a positive solution for G, then this polynomial is also generic.) The authors give a concrete and accessible introduction to this area of research. The writing is very clear, and the technical prerequisites are kept to a minimum; in fact, the first three chapters may even be suitable for a topics course in algebra at the first year graduate level. The only real prerequisite is

a solid course in Galois Theory; the reader is not expected to know cohomology theory or algebraic geometry. In spite of these modest technical requirements, the book takes the reader to the frontiers of research in this area of Inverse Galois Theory. Much of it is an exposition of previously published results, but the reader will also find some original material, as well as numerous insights and improvements by the authors, often in the form of remarks or exercises.

At the heart of the book is the theory of generic field extensions and generic polynomials originated by Saltman. The authors should be commended for bringing this beautiful subject to a wide mathematical audience. Most of the necessary prerequisites (the Hilbert Irreducibility theorem, an introduction to the Galois theory of commutative rings, etc.) are included in the book. The authors take a very concrete and constructive approach to the subject; one of the distinctive features of this book is a great number of explicit examples of generic polynomials. Of course, one cannot hope to obtain similarly explicit formulas for much larger groups. On the other hand, the numerous generic polynomials collected by the authors will undoubtedly be of help to anyone doing Galois-theoretic computations, especially in an arithmetic setting, where roots of unity are not available.

In the last chapter the authors discuss the notions of essential and generic dimension of a group G. The generic dimension is the minimal number d of independent parameters $s_1, ..., s_d$, as $P(x) \in \mathbb{Q}(s_1, ..., s_d)[x]$ ranges over all generic polynomials; the essential dimension is defined in a similar way by allowing $P(x)$ to range over all versal polynomials (and only counting the number of independent parameters among $s_1, ..., s_d$). The study of generic and essential dimension over $\mathbb{Q}$ is still in its infancy; in particular, it is not even known whether or not they are really different (assuming the generic dimension is finite). Also, even for cyclic groups, there are no known lower bounds on the essential dimension over $\mathbb{Q}$, beyond $\mathbb{Q}(\mathbb{Z}/n\ \mathbb{Z}) \geq 2$ for most n. The authors put together an excellent survey of known results and several interesting conjectures; I even learned something new by reading their account of my own work in Chapter 8. It is my hope that this book will stimulate further progress in this new and exciting area of research, at the crossroads of algebra, number theory and geometry.

I have not noticed many mistakes or misstatements in the book. One, brought to my attention by J.-P. Serre and N. Yui, is the assertion that $PGL_2(\mathbb{Q})$ does not contain an element of order 4 on p. 189, which is easily seen to be false. The conclusion the authors draw, to the effect that the groups C_4, D_4, A_4, S_4, C_5, D_5, F_{20}, A_4, A_5, and S_5 have generic dimension ≥ 2 over $\mathbb{Q}$ is correct, but in the case of C_4, D_4, A_4, and S_4, a different argument is required. I was also puzzled by the note on p. 188, where the authors say that the first examples of unirational but non-rational varieties over $\mathbb{Q}$ were constructed in a 1985 paper of Beauville, Colliot-Thélène, Sansuc and Swinnerton-Dyer. (Earlier examples were constructed by Swan [1969], Voskresenskii [1970] and Manin-Iskovskih [1971].) Personally I would also have liked to see more geometric motivation for the explicit formulas in the book, and a greater emphasis on the Multiplicative Noether Problem (which only makes a brief appearance in the last chapter), as opposed to the General Noether Problem.

These minor quibbles aside, Jensen, Ledet, and Yui have written a user-friendly book that has a lot to offer, both to a beginner and an experienced researcher. I highly recommend this book to anyone who is interested in Galois Theory.

ÉDITORIAL *(suite)*

de leurs résultats dans un contexte semblable. Il est acceptable d'employer les idées des autres pour autant que l'on cite ses sources.

D'autres situations soulèvent aussi un questionnement moral, notamment lorsqu'un auteur qui, après avoir présenté un article à une revue, qui le lui a refusé, retrouve plus tard le contenu et les idées de son article dans une autre publication, sous une forme différente.

D'une certaine façon, la multiplication des revues, au cours des vingt dernières années, facilite le plagiat. Et les banques de travaux d'étudiants sont désormais plus problématiques, dans certaines disciplines, qu'à l'époque où l'on n'avait accès qu'à des versions papier. Cependant, la facilité de diffusion des prétirages, grâce à l'informatique, aide les chercheurs à établir leurs priorités, et il existe maintenant des sites Web où l'on peut facilement retrouver la trace de travaux copiés. *Tempora mutantur, nos et mutamur in illis* (anonyme; parfois attribué à Ovide.)

CALL FOR SESSIONS / PROPOSITIONS DE SÉANCES

CMS Winter Meeting December 2004 / Réunion d'hiver de la SMC 2004

Additional self-supported sessions play an important role in the success of our meetings. The CMS welcomes and invites proposals for self-supported sessions for this joint meeting (December 11 - 13, 2004) at McGill University, Montreal Proposals should include a brief description of the focus and purpose of the session, the number and expected length 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 in the meeting programme. The following provides information on the sessions confirmed to date.

Those wishing to organize a session should send a proposal to the Meeting Director by the deadline below.

Les séances complémentaires autonomes jouent un rôle important dans le succès de nos Réunions. La SMC vous invitent à proposer des séances autonomes pour son congrès conjoint qui se tiendra à l'Université McGill, Montréal (du 11 décembre au 13 décembre 2004). Toute proposition comprendra une brève description de l'orientation et des objectifs de la séance, le nombre de communications prévues et leur durée ainsi que le nom, l'adresse complète, le numéro de téléphone, le courriel et autres coordonnées de l'organisateur. Ces séances complémentaires seront intégrées aux autres séances au programme, dans des cases horaires prévues à cet effet par les directeurs de la Réunion. Toutes les séances seront annoncées dans les Notes de la SMC, sur les sites Web des deux sociétés et, si possible, dans le bulletin de l'AMS et les publications d'autres sociétés. Les conférenciers de ces séances complémentaires devront présenter un résumé qui sera publié dans le programme de la Réunion. Vous trouverez ci-dessous de l'information sur les séances déjà confirmées.

Toute personne qui souhaiterait organiser une séance est priée de faire parvenir une proposition au directeur de la Réunion avant la date limite ci-dessous.

Deadline: January 15, 2004 / Date limite : 15 janvier, 2004

Meeting director / directeur de la réunion :

Olga Kharlampovich
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Number Theory: Andrew Granville (Université de Montréal)

Combinatorial and Geometric Group Theory: Dani Wise (McGill)

Arithmetic Geometry: E. Goren and Adrian Iovita, (McGill)

Applications of Computer Science in Algebra:
Alexei Miasnikov (McGill), and Vladimir Shpilrain (CUNY)

Harmonic Analysis: Galia Dafni (Concordia)

Mathematical Methods in Statistics: David Wolfson,
Alain Vandal, and Russell Steele (McGill)

Regularization Problems in Statistics: Jack Ramsay

Mathematics Education: organizer to be confirmed

Contributed Papers: William Brown (McGill)

Théorie des nombres : Andrew Granville (Université de Montréal)

Théorie des groupes combinatoire et géométrique :
Dani Wise (McGill)

Géométrie arithmétique : E. Goren et Adrian Iovita (McGill)

Applications de l'informatique en algèbre :
Alexei Miasnikov (McGill), et Vladimir Shpilrain (CUNY)

Analyse harmonique : Galia Dafni (Concordia)

Méthodes mathématiques en statistique :
David Wolfson, Alain Vandal, et Russell Steele (McGill)

Problèmes de régularisation en mathématique : Jack Ramsay

Didactique des mathématiques : organisateur à être confirmer

Communications libres : William Brown (McGill)

TOULOUSE 2004

July 12-15, 2004, Centre de congrès Pierre-Baudis, Toulouse

We are happy to announce the First joint Canada-France meeting of the mathematical sciences. This meeting is a partnership between the following societies:

Société Mathématique de France
Société de Mathématiques Appliquées et Industrielles
Société Française de Statistique
Canadian Mathematical Society
Canadian Applied and Insdustrial Mathematical Society
Statistical Society of Canada
Institut de mathématiques de Toulouse

SPECIAL SESSIONS and ORGANIZERS

Operator Algebras
C. Anantharaman (Orléans) and I. Putnam (Victoria)

Symplectic Topology and Geometry
D. Auroux (MIT/X) and F. Lalonde (Montréal)

Number Theory
D. Roy (Ottawa) and M. Waldschmidt (Paris)

The Langlands Program
W. Casselman (UBC) and JP Labesse (Marseille)

Spectral and Geometric Analysis
O. Hijazi (Nancy) and N. Kamran (McGill)

Partial Differential Equations
M. Esteban (Paris) and C. Sulem (Toronto)

Dynamical Systems
R. Roussarie (Dijon) and C. Rousseau (Montréal)

Differential Equations and Control
F. Clarke (Lyon) and R. Stern (Concordia)

Variational Analysis and Optimization
J-B Hiriart-Urruty (Toulouse) and A. Lewis (SFU)

Stochastic Analysis
M. Barlow (UBC) and D. Bakry (Toulouse)

Multifractals and Long Memory
J-M Azaïs (Toulouse)
and B. Remillard (HEC, Montréal)

The Probability/Statistics Interface
P. Besse (Toulouse) and L. Devroye (McGill)

Statistical Analysis of Functional Data
J. Ramsay (McGill)
and H. Cardot (INRA Castanet-Tolosan)

Numerical Analysis
A. Fortin (Laval) and J. Blum (Nice)

Éducation mathématique
J-L Dorier (IUFM Lyon) and E. Muller (Brock)

Low Dimensional Topology and Geometrical Group Theory
M. Boileau (Toulouse) and S. Boyer (UQAM)

Mathematical Biology
G. Wolkowicz (McMaster)

Complex Dynamical Systems
X. Buff (Toulouse), A. Cheritat (Toulouse)
and M. Yampolsky (Toronto)

There will be a poster session
as well as a meeting to discuss
Les mathématiques et la francophonie.

PLENARY LECTURERS

Grégoire Allaire (Ec Poly, Palaiseau)
Michèle Artigue (Jussieu)
Maïtine Bergounioux (Orléans)
Jon Borwein (Simon Fraser)
David Brillinger (Berkeley)
Alain Connes (IHES) (to be confirmed)
Walter Craig (McMaster)
Henri Darmon (McGill)
Emmanuel Giroux (ENS-Lyon)
Laurent Lafforgue (IHES)
Gabor Lugosi (Barcelona)
Mikhail Lyubich (Toronto)
Christophe Reutenauer (UQAM)
Alain-Sol Sznitman (ETH Zurich)
Murrad Taqqu (Boston)
Henry Wolkowitz (Waterloo)

SCIENTIFIC COMMITTEE

Chair: Francis Clarke
(Université Lyon et Institut universitaire de France)
Claire Anantharaman - Université d'Orléans-CNRS
Jean-Marc Azais - Université Paul Sabatier - Toulouse III
Guy Barles - Université F. Rabelais Tours
Martin T. Barlow - University of British Columbia
Phillippe Besse - Université Paul Sabatier - Toulouse III
Jacques Blum - Université de Nice Sophia-Antipolis
James Ramsay, McGill University
Pierre Cartier - Institut des hautes études scientifiques
François Lalonde - Université de Montréal
Eric R. Muller - Brock University
Bruno Salvy - INRIA Rocquencourt
Catherine Sulem - University of Toronto

LOCAL ARRANGEMENTS

Chair: Jean-Pierre Ramis
Université Paul Sabatier - Toulouse III

Members from the *Institut de mathématiques de Toulouse*

Serge Cohen, Laure Coutin, Anne Cumenge, Thierry Delmotte, Fabrice Gamboa, Jean-Baptiste Hirriart Urruty, Michel Ledoux, Marcel Mongeau, Bertrand Monthubert, Marc Reversat, Jean Marc Schlenker.

Travel grants will be available for students and postdocs
For more information visit: *www.cms.math.ca/Events/Toulouse2004/*

TOULOUSE 2004

Du 12 au 15 juillet, 2004, Centre de congrès Pierre-Baudis, Toulouse

Nous sommes heureux de vous annoncer la première réunion conjointe Canada-France des sciences mathématiques. Cette réunion est en partenariat avec les sociétés suivantes:

Société mathématique de France
Société de mathématiques appliquées et industrielles
Société française de statistique
Société mathématique du Canada
Société Canadienne de Mathématiques Appliquées et Industrielles
Société de Statistique du Canada
Institut de mathématiques de Toulouse

SYMPOSIUMS et ORGANISATEURS

Algèbres d'opérateurs
C. Anantharaman (Orléans) et I. Putnam (Victoria)

Topologie et géométrie symplectiques
D. Auroux (MIT/X) et F. Lalonde (Montréal)

Théorie des nombres
D. Roy (Ottawa) et M. Waldschmidt (Paris)

Le programme de Langlands
W. Casselman (UBC) et JP Labesse (Marseille)

Analyse géométrique et spectrale
O. Hijazi (Nancy) et N. Kamran (McGill)

Équations aux dérivees partielles
M. Esteban (Paris) et C. Sulem (Toronto)

Systèmes dynamiques
R. Roussarie (Dijon) et C. Rousseau (Montréal)

Équations différentielles et commande
F. Clarke (Lyon) et R. Stern (Concordia)

Analyse variationnelle et optimisation
J-B Hiriart-Urruty (Toulouse) et A. Lewis (SFU)

Analyse stochastique
M. Barlow (UBC) et D. Bakry (Toulouse)

Processus multifractals et à longue mémoire
J-M Azaïs (Toulouse)
et B. Remillard (HEC, Montréal)

L'interface entre les probabilités et la statistique
P. Besse (Toulouse) et L. Devroye (McGill)

Analyse statistique des données fonctionnelles
J. Ramsay (McGill)
et H. Cardot (INRA Castanet-Tolosan)

Analyse numérique
A. Fortin (Laval) et J. Blum (Nice)

Topologie de petite dimension et théorie géométrique des groupes
M. Boileau (Toulouse) et S. Boyer (UQAM)

Biologie mathématique
G. Wolkowicz (McMaster)

Systèmes dynamiques complexes
X. Buff (Toulouse), A. Cheritat (Toulouse)
et M. Yampolsky (Toronto)

Il y aura une session d'affiche ainsi qu'une discussion sur les Mathématiques et la francophonie.

CONFÉRENCIERS PRINCIPAUX

Grégoire Allaire (Ec Poly, Palaiseau)
Michèle Artigue (Jussieu)
Maïtine Bergounioux (Orléans)
Jon Borwein (Simon Fraser)
David Brillinger (Berkeley)
Alain Connes (IHES) (to be confirmed)
Walter Craig (McMaster)
Henri Darmon (McGill)
Emmanuel Giroux (ENS-Lyon)
Laurent Lafforgue (IHES)
Gabor Lugosi (Barcelona)
Mikhail Lyubich (Toronto)
Christophe Reutenauer (UQAM)
Alain-Sol Sznitman (ETH Zurich)
Murrad Taqqu (Boston)
Henry Wolkowitz (Waterloo)

COMITÉ SCIENTIFIQUE

Président: Francis Clarke
(Université Lyon et Institut universitaire de France)
Claire Anantharaman - Université d'Orléans-CNRS
Jean-Marc Azais - Université Paul Sabatier - Toulouse III
Guy Barles - Université F. Rabelais Tours
Martin T. Barlow - University of British Columbia
Phillippe Besse - Université Paul Sabatier - Toulouse III
Jacques Blum - Université de Nice Sophia-Antipolis
James Ramsay, McGill University
Pierre Cartier - Institut des hautes études scientifiques
François Lalonde - Université de Montréal
Eric R. Muller - Brock University
Bruno Salvy - INRIA Rocquencourt
Catherine Sulem - University of Toronto

LOGISTIQUE LOCALE

Président: Jean-Pierre Ramis
Université Paul Sabatier - Toulouse III

Membres de l'Institut de Mathématiques de Toulouse

Serge Cohen, Laure Coutin, Anne Cumenge, Thierry Delmotte, Fabrice Gamboa, Jean-Baptiste Hirriart Urruty, Michel Ledoux, Marcel Mongeau, Bertrand Monthubert, Marc Reversat, Jean Marc Schlenker.

Des subventions pour ce voyage seront disponible pour les étudiants et les postdoctoraux.
Pour plus de renseignements: *www.smc.math.ca/Reunions/Toulouse2004*

The CMS/CAIMS Summer 2004 Meeting with the participation of the 16th Canadian Symposium on Fluid Dynamics and the Canadian Society for History and Philosophy of Mathematics

Department of Mathematics and Statistics, Dalhousie University
June 13 - 15, 2004 Halifax, NS

Réunion 2004 de la SMC/SCMAI en collaboration avec le 16e Symposium canadien sur la dynamique des fluides et la Société canadienne d'histoire et de philosophie des mathématiques

Département des mathématiques et statistiques, Université Dalhousie
Halifax (Nouvelle-Écosse) 13-15 juin 2004

We are happy to announce the provisional outline for the Canadian Mathematical Society Summer Meeting 2004. Look for the First Announcement in the February 2004 issue of the CMS Notes or at: *www.cms.math.ca/Events/summer04/.*

Nous sommes heureux d'annoncer l'horaire provisoire pour la réunion d'été 2004 de la SMC. Veuillez consulter notre première annonce dans le numéro de février 2004 des Notes de la SMC ou au *www.cms.math.ca/events/été04/*

PUBLIC LECTURE / CONFÉRENCIER POPULAIRE
Edward Barbeau (University of Toronto)

PLENARY LECTURERS / CONFÉRENCIERS PRINICIPAUX
Peter Cameron (Queen Mary University)
Alan C. Newell
(University of Arizona/University of Warwick)
Peter Olver (University of Minnesota)
Mark Lewis (University of Alberta)
Mikhail Zaicev (Moscow State University)
Frank T. Smith (University College London)

PRIZES and AWARDS / PRIX
CMS Jeffery-Williams Prize: Joel Feldman (UBC)
CMS Krieger-Nelson Prize: TBA
CAIMS Doctoral Dissertation Award: TBA
CAIMS Research Prize: TBA

CONTRIBUTED PAPERS / COMMUNICATION LIBRES
WRS Sutherland (Dalhousie)

POSTER SESSIONS / AFFICHES
Alan Coley (Dalhousie)
and Franklin Mendivil (Acadia)

MEETING DIRECTORS / DIRECTEURS DE RÉUNION
R.J. Wood and Ray Spiteri (Dalhousie)

LOCAL ARRANGEMENTS / LOGISTIQUE LOCALE
Peter Fillmore (Dalhousie)

SESSIONS and ORGANIZERS

16th Canadian Symposium on Fluid Dynamics
Richard Karsten (Acadia) and
Serpil Kocabiyik (Memorial)

Applications of Invariant Theory to Differential Geometries
R. Milson (Dalhousie)
and M. Fels (Utah State)

Classical Analysis in honour of David Borwein's 80th Birthday
Jonathan Borwein

Combinatorial Game Theory
Richard Nowakowski (Dalhousie)

Dynamical Systems
Michael A. Radin
(Rochester Institute of Technology)

Financial Mathematics
Joe Campoliati, David Vaughan
and Yongzeng Lai (Wilfred Laurier)

General Topology and Topological Algebras
Ilijas Farah (York) and Vladimir Pestov (Ottawa)

Graph Theory and the Web
Jeannette Janssen (Dalhousie)

History of Mathematics
Tom Archibald (Acadia)

Hopf Algebras and Related Topics
Yuri Bahturin (Memorial), Luzius Grunenfelder
(Dalhousie), Susan Montgomery (USC),
and Earl Taft (Rutgers)

Mathematical Education
Richard Hoshino (Dalhousie)
and John Grant McLoughlin (UNB)

Nonlinear Dynamics in Biology and Medicine
Shigui Ruan (Dalhousie)

Numerical Algorithms for Differential Equations and Dynamical Systems
Tony Humphries (McGill)

Qualitative Behaviour and Controllability of Partial Differential Equations
Holger Teismann (Acadia)

Topos Theory
Myles Tierney (Rutgers)

Topology
Keith Johnson (Dalhousie)
and Renzo Piccinini (Milan)

SYMPOSIUMS et ORGANISATEURS

16th colloque canadien sur la dynamique des fluides : Richard Karsten (Acadia) et
Serpil Kocabiyik (Memorial)

Application de la théorie des invariants à la géométrie différentielle
R. Milson (Dalhousie) et M. Fels (Utah State)

L'analyse classique en l'honneur du 80ième anniversaire de David Borwein
Jonathan Borwein

La théorie combinatoire des jeux
Richard Nowakowski (Dalhousie)

Les systèmes dynamiques
Michael A. Radin (Rochester Institute of Technology)

Les mathématiques financières
Joe Campoliati, David Vaughan
et Yongzeng Lai (Wilfred Laurier)

La topologies gnénrales et les algébres topologiques
Ilijas Farah (York) et Vladimir Pestov (Ottawa)

Les théories des graphes et le web
Jeannette Janssen (Dalhousie)

Histoire des mathématiques
Tom Archibald (Acadia)

Les algébres de Hopf et sujets reliés
Yuri Bahturin (Memorial), Luzius Grunenfelder
(Dalhousie), Susan Montgomery (USC), et Earl Taft
(Rutgers)

Éducation mathématique
Richard Hoshino (Dalhousie)
et John Grant McLoughlin (UNB)

Les dynamiques non-linéaires en biologie et médecine
Shigui Ruan (Dalhousie)

Des algorithmes numériques pour les équations différentielles et les systèmes dynamiques
Tony Humphries (McGill)

Le comportement qualitatif et la controlabilité des équations différentielles partielles
Holger Teismann (Acadia)

La théorie des Topos
Myles Tierney (Rutgers)

Les topologies
Keith Johnson (Dalhousie) et Renzo Piccinini (Milan)

DALHOUSIE University

CAIMS SCMAI

CALL FOR NOMINATIONS / APPEL DE MISE EN CANDIDATURES

2004 CMS Doctoral Prize
Le Prix de doctorat 2004 de la SMC

The CMS Doctoral Prize recognizes outstanding performance by a doctoral student. The prize is awarded to the person who received a Ph.D. from a Canadian university in the preceding year (January 1st to December 31st) and whose overall performance in graduate school is judged to be the most outstanding. Although the dissertation will be the most important criterion (the impact of the results, the creativity of the work, the quality of exposition, etc.) it will not be the only one. Other publications, activities in support of students and other accomplishments will also be considered.

Nominations that were not successful in the first competition, will be kept active for a further year (with no possibility of updating the file) and will be considered by the Doctoral Prize Selection Committee in the following year's competition.

The CMS Doctoral Prize will consist of an award of $500, a two-year complimentary membership in the CMS, a framed Doctoral Prize certificate and a stipend for travel expenses to attend the CMS meeting to receive the award and present a plenary lecture.

Nominations

Candidates must be nominated by their university and the nominator is responsible for preparing the documentation described below, and submitting the nomination to the address below.

No university may nominate more than one candidate and the deadline for the receipt of nominations is **January 31, 2004.**

The documentation shall consist of:

- A curriculum vitae prepared by the student.
- A resumé of the student's work written by the student and which must not exceed ten pages. The resumé should include a brief description of the thesis and why it is important, as well as of any other contributions made by the student while a doctoral student.
- Three letters of recommendation of which one should be from the thesis advisor and one from an external reviewer. A copy of the external examiner's report may be substituted for the latter. More than three letters of recommendation are not accepted.

La SMC a créé ce Prix de doctorat pour récompenser le travail exceptionnel d'un étudiant au doctorat. Le prix sera décerné à une personne qui aura reçu son dipôme de troisième cycle d'une université canadienne l'année précédente (entre le 1er janvier et le 31 décembre) et dont les résultats pour l'ensemble des études supérieures seront jugés les meilleurs. La dissertation constituera le principal critère de sélection (impact des résultats, créativité, qualité de l'exposition, etc.), mais ne sera pas le seul aspect évalué. On tiendra également compte des publications de l'étudiant, de son engagement dans la vie étudiante et de ses autres réalisations.

Les mises en candidature qui ne seront pas choisies dans leur première compétition seront considérer pour une année additionelle (sans possibilité de mise à jour du dossier), et seront révisées par le comité de sélection du Prix de doctorat l'an prochain

Le lauréat du Prix de doctorat de la SMC aura droit à une bourse de 500 $. De plus, la SMC lui offrira l'adhésion gratuite à la Société pendant deux ans et lui remettra un certificat encadré et une subvention pour frais de déplacements lui permettant d'assister à la réunion de la SMC où il recevra son prix et présentera une conférence.

Candidatures

Les candidats doivent être nommés par leur université; la personne qui propose un candidat doit se charger de regrouper les documents décrits aux paragraphes suivants et de faire parvenir la candidature à l'adresse ci-dessous.

Aucune université ne peut nommer plus d'un candidat. Les candidatures doivent parvenir à la SMC au plus tard le **31 janvier 2004.**

Le dossier sera constitué des documents suivants :

- Un curriculum vitae rédigé par l'étudiant.
- Un résumé du travail du candidat d'au plus dix pages, rédigé par l'étudiant, où celui-ci décrira brièvement sa thèse et en expliquera l'importance, et énumérera toutes ses autres réalisations pendant ses études de doctorat.
- Trois lettres de recommandation, dont une du directeur de thèse et une d'un examinateur de l'extérieur (une copie de son rapport serait aussi acceptable). Le comité n'acceptera pas plus de trois lettres de recommandation.

Chair/Président
Doctoral Prize Selection Committee/Comité de sélection du Prix de doctorat
CMS Executive Office/Bureau administratif de la SMC
577 King Edward, Suite 109
P.O. Box 450, Station A/C.P. 450, Succursale A
Ottawa, Ontario Canada
K1N 6N5

UNIVERSITÉ DE MONTRÉAL

Département de mathématiques et de statistique
Faculté des arts et des sciences
Poste en mathématiques appliquées

Le Département de mathématiques et de statistique de la Faculté des arts et des sciences de l'Université de Montréal recherche une professeure ou un professeur au rang d'adjoint ou d'agrégé à plein temps en mathématiques appliquées. Pour toute information sur le Département et le Centre de recherches mathématiques avec qui le Département entretient des liens étroits, veuillez visiter les sites www.dms.umontreal.ca et www.crm.umontreal.ca.

Fonctions
Enseignement aux trois cycles, encadrement d'étudiants aux cycles supérieurs, activités de recherche.

Exigences
Détenir un doctorat en mathématiques appliquées ou dans une discipline connexe. La qualité du dossier en recherche est primordiale. En particulier la candidate ou le candidat doit avoir démontré des expertises en mathématiques et dans une autre discipline, par exemple en sciences naturelles, en médecine ou dans une technologie en émergence, avec le potentiel de développer un solide programme de recherche pluridisciplinaire. La candidate ou le candidat doit posséder une excellente aptitude pour l'enseignement.

Traitement
L'Université de Montréal offre un salaire concurrentiel jumelé à une gamme complète d'avantages sociaux.

Date d'entrée en fonction : A compter du 1er juin 2004 (sous sous réserve d'approbation budgétaire).

Les personnes intéressées doivent faire parvenir un curriculum vitae complet incluant une courte description des intérêts de recherche, au moins trois lettres de recommandation et au maximum trois tirés à part des plus importantes contributions à la recherche à l'adresse suivante. Le Comité commencera l'étude des dossiers en février 2004. La soumission de dossiers par voie électronique est découragée.

Directeur
Département de mathématiques et de statistique
Université de Montréal
C.P. 6128, succursale Centre-ville
Montréal QC H3C 3J7
Téléphone : (514) 343-6710 Télécopieur : (514) 343-5700
directeur@dms.umontreal.ca

Selon les règles de nomination de l'Université de Montréal, tous les professeurs réguliers du Département ont accès aux dossiers soumis. Pour que le dossier ne soit accessible qu'au comité de sélection, la candidate ou le candidat doit en faire la demande dans sa lettre d'accompagnement. Cette restriction de l'accessibilité d'un dossier se termine si le candidat est convoqué en entrevue.

Conformément aux exigences prescrites en matière d'immigration au Canada, cette annonce s'adresse en priorité aux citoyens canadiens et aux résidents permanents. L'Université de Montréal souscrit à un programme d'accès à l'égalité en emploi pour les femmes et au principe d'équité en matière d'emploi.

The Department of Mathematics and Statistics at Concordia University invites applications for one Senior (Tier I) Canada Research Chair. In order to successfully compete for a Canada Research Chair, the candidate is expected to have an outstanding research profile, an innovative and original research program, and the ability to attract excellent graduate students. Please forward applications, including a curriculum vita, a list of publications, a research proposal, an account of teaching experience, and the names of five referees to:

Dr. Hershy Kisilevsky, Chair, Department of Mathematics and Statistics, Concordia University,
7141 Sherbrooke St. West, Montreal, Quebec H4B 1R6.

Applications may be sent by e-mail to *chair@mathstat.concordia.ca*. The review of applications is presently underway and will continue until the position is filled. Concordia University is committed to employment equity.

UNIVERSITÉ DE MONTRÉAL

Département de mathématiques et de statistique
Faculté des arts et des sciences
Poste en mathématiques appliquées

The Département de mathématiques et de statistique of the Faculté des arts et des sciences of the Université de Montréal invites applications for a tenure-track position in applied mathematics at the rank of assistant or associate professor. For information about the Département and the Université, the candidates are invited to visit the webpage of the Département (www.dms.umontreal.ca) as well as that of the Centre de recherches de mathématiques (www.crm.umontreal.ca) with which it has close collaborations.

Duties:
Undergraduate and graduate teaching, supervision of graduate students, and research.

Requirements:
To hold a Ph.D. in applied mathematics or in a closely related field. The research record must be outstanding. In particular the candidate must have shown expertise in mathematics and in another field, e.g. in one of the natural sciences, in medicine or an emerging technology, and must have the potential to develop a multidisciplinary research program. The candidate must possess excellent teaching skills. Teaching at Université de Montréal is done in French. Candidates who do not speak French must acquire an adequate knowledge of it within a reasonable period after the appointment.

Salary
The Université de Montréal offers competitive salaries and a complete package of social benefits.

Starting Date
June 1, 2004, or thereafter (subject to final budgetary approval).

The interested candidates must submit a curriculum vitae including a concise statement of their research interests, at least three letters of reference, and copies of at most three of their most important research publications to the following address. The Selection Committee will start studying applications during February 2004. Electronic applications are discouraged.

Chair
Département de mathématiques et de statistique
Université de Montréal
C.P. 6128, succursale Centre-ville
Montréal QC H3C 3J7
Téléphone : (514) 343-6710 Télécopieur : (514) 343-5700
chair@dms.umontreal.ca

The selection process of Université de Montréal gives access to submitted files to all regular professors of the Department unless the candidate explicitly states that access to the file should be limited to the selection committee in her or his covering letter. In all cases this restriction on accessibility will be lifted if the candidate is invited for an interview.

In accordance with Canadian immigration requirements, priority will be given to Canadian citizens and permanent residents of Canada. The Université de Montréal subscribes to an affirmative action program for women and to employment equity.

YORK UNIVERSITY

The School of Analytic Studies and Information Technology, Atkinson Faculty of Liberal and Professional Studies invites applications for a **full-time tenure track position** in mathematics at the assistant professor level effective July 1, 2004.

All positions at York University are subject to final budgetary approval. Details are available at: *www.yorku.ca/acadjobs*.

York University is an Affirmative Action Employer. The Affirmative Action Program can be found on York's website at *www.yorku.ca/acadjobs* or a copy can be obtained by calling the affirmative action office at 416-736-5713.

All qualified candidates are encouraged to apply; however, Canadian citizens and Permanent Residents will be given priority.

UNIVERSITY OF ALBERTA

Functional Analysis

The Department of Mathematical and Statistical Sciences, University of Alberta invites applications for a tenure track position at the Assistant Professor level in functional analysis. We are looking for a person with a PhD, a strong record of outstanding research, excellent communication and teaching skills and leadership potential. The successful candidate must also have a strong commitment to undergraduate and graduate education.

We are interested in a person whose research interests would complement and strengthen the functional analysis group in our department. These interests include, in particular, the areas of abstract harmonic analysis, asymptotic geometric analysis, Banach algebras, Banach spaces and operator theory/algebras/spaces.

For more information about the Department and our University, please see our web page: http://*www.math.ualberta.ca*

Applications should include curriculum vitae, a research plan and teaching dossier. Candidates should arrange for at least three confidential letters of reference to be sent to:

Anthony To-Ming Lau, Chair
Department of Mathematical and Statistical Sciences
University of Alberta
Edmonton, Alberta T6G 2G1 Canada

The closing date for applications is **January 15, 2004**. Early applications are encouraged.

All qualified candidates are encouraged to apply; however, Canadians and permanent residents will be given priority. The University of Alberta hires on the basis of merit. We are committed to the principle of equity in employment. We welcome diversity and encourage applications from all qualified women and men, including persons with disabilities, members of visible minorities, and Aboriginal persons.

UNIVERSITY OF ALBERTA

Edmonton, Alberta

www.math.ualberta.ca

Department of Mathematical and Statistical Sciences

Classical Analysis

The Department of Mathematical and Statistical Sciences, University of Alberta invites applications for one tenure track position at the Assistant level in classical analysis. We are looking for a person with a Ph.D., a strong record/outstanding potential for research, excellent communication and teaching skills and leadership potential.

The successful candidate must have a commitment to undergraduate and graduate education. Preferences will be given to an individual whose research interests promote contact with other university researchers and/or industry. We are particularly interested in areas of approximation theory, classical Fourier analysis, applied harmonic analysis, real analysis, and related inequalities and function spaces.

The closing date for applications is **January 1, 2004**. Early applications are encouraged. For more information about the Department and our University, please see our web page: *http://www.math.ualberta.ca*

All qualified candidates are encouraged to apply; however, Canadians and permanent residents will be given priority. The University of Alberta hires on the basis of merit. We are committed to the principle of equity in employment. We welcome diversity and encourage applications from all qualified women and men, including persons with disabilities, members of visible minorities, and Aboriginal persons.

Applications should include curriculum vitae, a research plan and teaching dossier. Candidates should arrange for at least three confidential letters of reference to be sent to:

Anthony To-Ming Lau, Chair
Department of Mathematical and Statistical Sciences
University of Alberta
Edmonton, Alberta T6G 2G1 Canada

CALENDAR OF EVENTS / CALENDRIER DES ÉVÉNEMENTS

DECEMBER 2003 DÉCEMBRE

6 - 8 CMS Winter Meeting / Réunion d'hiver de la SMC
Simon Fraser University
(Harbour Centre, Vancouver, British Columbia)
Monique Bouchard: meetings@cms.math.ca

15 - 19 28th Australasian Conference on Combinatorial Mathematics and Combinatorial Computing
(Melbourne, Australia)
www.cm.deakin.edu.au/comb2003melbourne

17 - 20 First Joint AMS-India Mathematics Meeting
(Bangalore, India) *www.ams.org/meetings/*

22 - 25 International Conference on Analysis and Applications (BHU, Varanasi, India)
rspathak@banaras.ernet.in

JANUARY 2004 JANVIER

5-9 Workshop on Large N limits of U(N) Gauge Theory in Physics and Mathematics
(CRM, U. de Montreal, Montreal, QC)
crm@ere.umontreal.ca

21 - 30 Advanced Course on Ramsey Methods in Analysis
(Bellaterra, Barcelona, Spain)
Joan Bagaria: www.crm.es/RamseyMethods

FEBRUARY 2004 FÉVRIER

2 - 13 Advanced Course on Contemporary Cryptology
(Bellaterra, Barcelona, Spain)
Paz Morillo: www.crm.es/ContemporaryCryptology

9-13 Session on Geometric Aspects of Functional Analysis (GAFA) of the Joint Meeting of the New Zealand Mathematical Society and Israeli Mathematical Union
www.mcs.vuw.ac.nz/~mathmeet/vic2004/index.shtml

23-25 The Point of Point Processes (Fields Institute/University of Ottawa Workshop Series 2004)
www.mathstat.uottawa.ca/fields/fields.htm

MARCH 2004 MARS

4-6 Workshop on Spectral Geometry
(CRM, U. de Montreal, Montreal, QC)
crm@ere.umontreal.ca

APRIL 2004 AVRIL

4 -7 Fractal 2004, Complexity and Fractals in Nature, 8th International Multidisciplinary Conference
(Vancouver, BC)
www.kingston.ac.uk/fractal/

MAY 2004 MAI

3-8 AARMS-CRM Workshop on Singular Integrals and Analysis on CR Manifolds
(Dalhousie University, Halifax, NS)
http://math.mun.ca/aarms

4-7 Workshop on Spectral Theory and Automorphic Forms (CRM, U. de Montreal, Montreal, QC)
crm@ere.umontreal.ca

24-28 Workshop on Hamiltonian Dynamical Systems (jointly with the Fields Institute)
(CRM, U. de Montreal, Montreal, QC)
crm@ere.umontreal.ca

28 - 31 International Conference on Mathematics and its Applications (Hong Kong)
http://www.cityu.edu.hk/rcms/icma2004

JUNE 2004 JUIN

1-11 Workshop on Semi-classical Theory of Eigenfunctions and PDEs (CRM, U. de Montreal, Montreal, QC) *crm@ere.umontreal.ca*

10-14 CCWEST 2004, National Conference for the Advancement of Women in Engineering, Science and Technology (Brock University, St. Catharines, ON)
http://www.brocku.ca/fms/ccwest2004

13 - 15 CMS Summer Meeting / Réunion d'été de la SMC (Dalhousie University, Halifax, Nova Scotia)
Monique *Bouchard: meetings@cms.math.ca*

18-23 Mathematical Foundations of Learning Theory
(Barcelona, Spain)
Gábor Lugosi: www.crm.es/MathematicalFoundations

27 - July 2 European Congress of Mathematics
(Stockholm, Sweden)
Ari Laptev: laptev@math.kth.se

30-July 7 Fourth World Congress of Nonlinear Analysis(WCNA 2004) (Hyatt Orlando, Florida)
http://kermani.math.fit.edu/ — wcna2004@yahoo.com

JULY 2004 JUILLET

4 - 11 The 10th International Congress on Mathematical Education (Copenhagen, Denmark) *www.ICME-10.dk*

5-9 19th "Summer" Conference on Topology and its Applications (University of Cape Town, South Africa) *http://www.mth.uct.ac.za/Conferences/Topology*

5 - 16 Advanced Course on Automata Groups (Bellaterra, Barcelona, Spain) *Warren Dicks: www.crm.es/AutomataGroups*

12 - 15 First Joint Canada-France meeting of the mathematical sciences / Premier congrès Canada-France des sciences mathématiques, (Toulouse, France) *www.cms.math.ca/Events/Toulouse2004/ www.smc.math.ca/Reunions/Toulouse2004/*

12 - August 6 Third Annual AARMS Summer School (Memorial University, St. John's), *edgar@math.mun.ca*

18-24 International Conference on General Relativity and Gravitation (Dublin, Ireland) *m.a.h.maccallum@qmul.ac.uk*

JULY 2004 JUILLET

26-30 Workshop on Spectral Theory of Schrödinger Operators (CRM, U. de Montreal, Montreal, QC) *crm@ere.umontreal.ca.*

AUGUST 2004 AOÛT

2-6 Workshop on Dynamics in Statistical Mechanics(CRM, U. de Montreal, Montreal, QC) *crm@ere.umontreal.ca*

6-7 New Directions in Probability Theory (Fields Institute, Toronto,ON) *http://www.imstat.org/meetings/NDPT/default.htm*

DECEMBER 2004 DÉCEMBRE

11 - 13 CMS Winter Meeting / Réunion d'hiver de la SMC, (McGill University, Montréal, Québec) *Monique Bouchard: meetings@cms.math.ca*

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