

CMS

NOTES

de la SMC

Volume 32

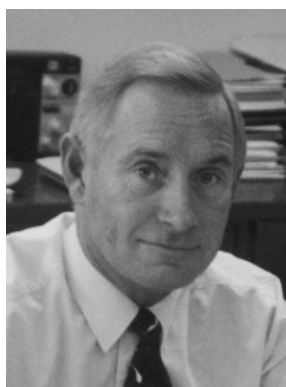
No. 7

November / novembre 2000

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FROM THE EXECUTIVE DIRECTOR'S DESK



Graham Wright

A dynamic period

2000 has been a very active year for the CMS and for mathematics in Canada. In addition to the regular program of activities, several new initiatives have been instituted and, as part of World Math Year 2000, a number of special activities have taken place. The President, Dr. Jonathan Borwein, described some of our these in his article in the September issue of the *Notes*.

The Society is exploring joint initiatives with a variety of other mathematical societies and associations. One example was Math 2000, which brought together six national organizations, and the CMS Job Fair, organized by MITACS, broke attendance records. I am sure the CMS 2000 Winter Meeting in Vancouver will also be a most

successful meeting. The Winter Meeting will feature a public lecture given by Roger Howe (Yale University), nine plenary lectures, including the Coxeter-James Prize Lecture (Damien Roy - University of Ottawa) and the CMS Doctoral Prize Lecture (Stephen Asstels - University of Georgia), as well as 11 sessions. The 2000 Winter Meeting will also mark the first talk sponsored by the new CMS Student Committee. The talk will be given by Ravi Vakil, a graduate from the University of Toronto and currently a Moore Instructor at the Massachusetts Institute of Technology. Ravi was a member of the Canadian IMO teams in 1986, 1987 and 1988 winning two gold medals and a silver medal. I look forward to seeing many of you in Vancouver in December.

Although Jonathan Borwein took over from Richard Kane a few months ago and Jon will continue as President until 2002, the terms of the four vice-presidents and one-half of the members on the Board of Directors will end in June 2001. The CMS Nominating Committee has already begun the process for the next election of officers and directors. A proposed slate of candidates will be published in the February 2001 issue of the *CMS Notes* and members will be invited to propose additional names. If any member wishes to suggest names at this time, please

(see EXEC-page 10)

CMS NOTES
NOTES DE LA SMC

Les *Notes de la SMC* sont publiées par la Société mathématique du Canada (SMC) huit fois l'an (février, mars, avril, mai, septembre, octobre, novembre et décembre).

Rédacteurs en chef

Peter Fillmore; S. Swaminathan
notes-redacteurs@smc.math.ca

Rédacteur-gérant

Robert W. Quackenbush

Rédaction

Éducation: Edward Barbeau
notes-education@smc.math.ca

Réunions: Monique Bouchard
notes-reunions@smc.math.ca

Recherche: Noriko Yui;
James D. Lewis
notes-recherche@smc.math.ca

Assistante à la rédaction

Caroline Baskerville

Note aux auteurs : indiquer la section choisie pour votre article et le faire parvenir aux *Notes de la SMC* à l'adresse postale ou de courriel ci-dessous :

Société mathématique du Canada
577, rue King Edward
C. P. 450, Succursale A
Ottawa, Ontario, Canada K1N 6N5
Téléphone : (613) 562-5702
Télécopieur : (613) 565-1539
courriel : notes-articles@smc.math.ca
Site Web : www.smc.math.ca

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ISSN : 1193-9273

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2000

EDITORIAL



S. Swaminathan

The teaching of mathematics at any level is done at present with an intentional, yet unfortunate, absence of historical reference to the many mathematicians whose theorems are taught. Many graduate students, and, indeed, some instructors too, have an appalling ignorance of the history of mathematics. How has this situation come about? One reason could be that courses are streamlined to fit into a scheme of lectures of only three sessions per week in a semester and so anything regarded as inessential is ignored. Secondly, more emphasis is laid on teaching only the basics of the subject in the first two semesters. An approach that integrates historical details by referring to examples of great mathematicians of the past would provide students with role models, besides providing a perspective of how modern mathematics advanced through the centuries.

Mathematical models are used to solve problems in applied mathematics where assumptions are made to approximate real situations. While the real situation does not change, the models may change to give better solutions. In dealing with these, knowledge of the history of the problem is necessary to appreciate the solutions offered.

The history of mathematics, offered as a separate course, would help if it were made obligatory. Courses on the history of science may not emphasize those mathematical aspects that are best taught from a historical standpoint.

If we do not learn from history, we will be repeating its mistakes.

De nos jours, l'enseignement des mathématiques à tous les niveaux se fait, intentionnellement mais bien malheureusement, sans aucune référence historique aux nombreux mathématiciens dont on enseigne les théorèmes. Un grand nombre d'étudiants diplômés et sans doute d'enseignants ignorent à peu près tout de l'histoire des mathématiques. Comment en sommes-nous arrivés là? La rationalisation des cours pourrait expliquer partiellement ce phénomène : pour tout faire cadrer dans trois séances par semaine et par semestre seulement, il a fallu éliminer tout ce qui n'était pas jugé essentiel. Autre explication : on insiste d'avantage sur l'enseignement des notions de base au cours des deux premiers semestres. Une approche qui intégrerait des détails historiques en renvoyant à des grands mathématiciens du passé offrirait aux étudiants des modèles dont ils pourraient s'inspirer, en plus de leur montrer comment les mathématiques modernes ont progressé au fil des siècles.

En mathématiques appliquées, les modèles servent à résoudre des problèmes et à formuler des hypothèses pour estimer des situations réelles. S'il est impossible de changer les situations, on peut toutefois recourir à d'autres modèles pour obtenir de meilleures solutions. C'est alors qu'il est primordial de connaître l'histoire du problème afin d'évaluer les solutions possibles.

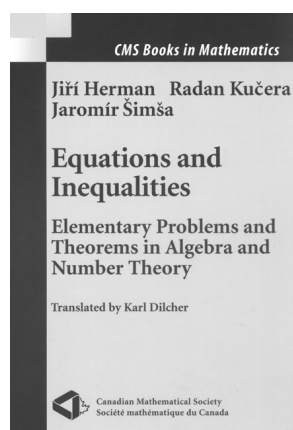
Un cours obligatoire portant uniquement sur l'histoire des mathématiques serait certes d'une grande utilité, car les cours d'histoire des sciences ne font peut-être pas ressortir les aspects des mathématiques qui s'enseignent le mieux d'une perspective historique.

Si l'histoire ne nous apprend rien, nous commettrons sans cesse les mêmes erreurs.

A Genuine Text for Advanced Problem Solving

Book Review by Robert Dawson, Saint Mary's University

**Equations and Inequalities:
Elementary Problems and
Theorems in Algebra and Number
Theory**
by Jiří Herman, Radan Kučera, and
Jaromír Šimša
Translated by Karl Dilcher
Springer-Verlag New York, Inc., 2000
xi + 344 pages



This is the inaugural volume of the CMS Books in Mathematics series with Springer-Verlag (replacing the red-covered CMS-Wiley series). Watch for reviews of subsequent volumes.

There are not many books designed to teach the art of advanced, “Putnam-style”, problem-solving. To be sure, there are some — those by Larson [5], and by Erickson and Flowers [2] come to mind. There are many fine collections of problems — some documenting one competition, such as the Canadian [1] or USSR [9] Mathematical Olympiads; others, such as Hardy and Williams’ “Red” and “Green” books [4,12], or the anthologies of Yaglom and Yaglom [13] contain problems selected expressly for publication. Such books are typically designed as practice or recreation, not as textbooks; they usually have detailed answers at the end, but in order not to “spoil the surprise” they make little or no attempt

to explain general principles ahead of time. These are fine for the experienced solver, and useful for the trainer, but not ideal for the learner — especially the unaided learner.

There are also a few books on the theory, psychology, or philosophy of problem-solving, such as Pólya’s classics [7,8] and Wickelgren [11]; but the conventions and peculiarities of mathematics contests are not central to these.

Again, in recent years there have been increasing numbers of textbooks — to pick a few favorites, Galovich [3], Morash [6], and Smith *et al.* [10], intended for so-called “bridge courses”, which may contain some problems appropriate for at least an internal or local competition. But these courses (and textbooks) are intended for “run of the catch” math majors, and the harder questions (if present) are extras. The text does not say much about how to solve them, and the instructor with an average class will be well advised not to assign too many of them, nor to expect most students to learn how to solve them.

Equations and Inequalities is a genuine text for those who would learn to solve contest-level problems better. This is a specialized niche, and not everybody will need such a book; but for those who are preparing themselves or others for contests, it is a rare and valuable resource.

True to its title, it does not attempt to cover every subject that might arise in a contest. There are three main chapters, covering equations, inequalities, and number theory respectively. There is nothing on geometry or calculus; and linear algebra and combinatorics are only touched on obliquely. This narrow focus, though, permits the authors to go much more deeply into the areas that they do cover, while keeping the book’s size reasonable.

The book’s philosophy is illustrated nicely by the second section of the first

chapter, “Finite Sums”. Many books approach this primarily by way of induction, and as a ready source of examples for that widely applicable method; here, more specialized techniques such as telescoping, termwise differentiation, and the binomial expansion are stressed instead. The assumption is that the student already knows how to use a hammer, and can now benefit from an introduction to the nail gun, the brad driver, and the biscuit jointer.

The chapter continues with sections on polynomials, symmetric polynomials, systems of equations, irrational equations, and applications of complex numbers. Each of these is dealt with at some length, and several techniques introduced. Many of the techniques are quite specialized: for instance, section 6.15, “Equations of the Form $\sqrt[n]{a + \varphi(x)} + \sqrt[n]{a - \varphi(x)} = c$ ”. [The book omits the second n ; such typographical errors are rare.]

The second section “Algebraic Inequalities” again takes the study of such problems well beyond the usual reduction to squares. This does appear in section 4, “The Method of Squares”, but various other methods are considered as well. Finally, the third section, “Number Theory”, includes sections on prime numbers, congruences, diophantine equations, integer and fractional parts, base representations, and Dirichlet’s pigeonhole principle, all of which go considerably deeper than do most other books on problem solving.

The style of the book is clear and fairly easy to read. One annoying quirk is the use of propositional logic notation within definitions and statements of basic properties; surely it is as clear, and less intimidating to the novice, to write (page 174) “if $a|b$ and $b|c$, then $a|c$ ” rather than “ $a|b \wedge b|c \implies a|c$ ”.

How could this book best be used pedagogically? While it would be too advanced, yet not broad enough in scope, for a “bridge course”, it would form an excellent basis for an advanced problem-solving course. Despite the translator’s hope expressed in the introduction, I suspect it may also be (alas!) too high-powered to form a standard part of the training of Canadian high school math teachers — but a mathematics department wishing to host a workshop for the more enthusiastic math teachers might find this book a good choice.

However, contest training is this book’s *forte*. It should definitely be in the university library as a resource for contestants, and also in the trainer’s own collection. The trainer would, of course, have to find supplementary material on topics not covered. There is clearly a place — right beside this book on the shelf — for a companion volume (or two) giving problems in linear algebra, calculus, abstract algebra, combinatorics, probability, and geometry the same thorough treatment.

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FROM THE INSTITUTES

CRM-ISM Postdoctoral Fellowships

The Institut des sciences mathématiques (ISM) and the Centre de recherches mathématiques (CRM) are inviting applications for their joint postdoctoral fellowship program starting normally in September 2001. The annual stipend is \$32,000 for one year, renewable for a second year. The stipend of the fellowship includes no teaching assignments. Fellows may be offered teaching duties, in which case they will receive an additional salary. CRM-ISM postdoctoral fellowships are awarded to beginning researchers who recently obtained a Ph.D. Researchers who received their doctorate more than five years before the application deadline are not eligible for the fellowship.

The ISM coordinates the graduate programs in mathematics of six Québec universities (Concordia, Laval, McGill, Sherbrooke, Université de Montréal and UQAM). More than 200 faculty members participate in its ten programs: Algebra and Number Theory, Analysis, Combinatorics, Algebraic

Computation and Algorithms, Nonlinear Dynamics, Geometry and Topology, Applied and Computational Mathematics, Mathematical Physics, Probability: Theory and Applications, Mathematical and Applied Statistics, and Category Theory and Applications.

The CRM is a national research center in the mathematical sciences. Its ongoing areas of research include: algebra and combinatorics, analysis, differential equations and approximation theory, geometry and topology, numerical analysis, optimisation and multidisciplinary research, mathematical physics, probability and statistics, and dynamical systems. Each year, the CRM organizes a wide range of events attracting participants from around the world. The main theme for 2001-2002 is Groups and Geometry. However, high-quality applications in all fields of interest to the CRM or to the ISM are welcome.

Applications must arrive at the CRM by Friday, January 5, 2001. The following documents are required: a curriculum

vitae, a statement of research, and three letters of recommendation. An e-mail address (if available) must be provided with all correspondence. Please indicate in your application which ISM program best represents your research interests. Candidates are strongly encouraged to mention on their applications the professors and research groups with whom they would like to work. To find out more about individual professors' research interests, please consult the web sites of each affiliated Mathematics Department, which are all accessible through the ISM website at <http://www.math.uqam.ca/ISM/>. Applications must be sent to:

Monsieur Jacques Hurtubise
 Directeur
 Centre de recherches mathématiques
 Université de Montréal
 Case postale 6128, succursale Centre-ville
 Montréal (Québec)
 H3C 3J7 Canada
 fax : (514) 343-2254
 email : hurtubis@crm.umontreal.ca

Bourses Postdoctorales CRM-ISM

L'Institut des sciences mathématiques (ISM) et le Centre de recherches mathématiques (CRM) sollicitent des candidatures dans le cadre de leur programme conjoint de bourses postdoctorales débutant normalement en septembre 2001. Les bourses sont d'une valeur de 32 000 \$ pour un an, renouvelables pour une deuxième année. Le montant de la bourse correspond à une tâche sans enseignement. Il se peut que les boursiers se fassent offrir une tâche d'enseignement, auquel cas ils recevront une rémunération supplémentaire. La bourse postdoctorale CRM-ISM s'adresse aux chercheurs débutants qui ont récemment obtenu un doctorat. Les candidats qui, à la date de réception des candidatures, auront obtenu un doctorat depuis plus de cinq ans ne seront pas admissibles au concours.

L'ISM coordonne les programmes d'études supérieures en mathématiques de six des universités québécoises (Concordia, Laval, McGill, Sherbrooke, Université de Montréal et UQAM). Plus de 200 professeurs et professeures participent à ses dix programmes: Algèbre et théorie des nombres, Analyse, Combinatoire algorithmique et calcul algébrique, Dynamique non linéaire, Géométrie et topologie, Mathématiques appliquées et calcul scientifique, Physique mathématique, Probabilités: théorie et applications, Statistique mathématique et statistique appliquée, et Théorie des catégories et applications.

Le CRM est un centre national de recherche en sciences mathématiques. Les recherches qu'on y poursuit portent entre autres sur les domaines suivants: l'algèbre et la combinatoire, l'analyse, les équations différentielles et la théorie de l'approximation, la géométrie et la topologie, l'analyse numérique, l'optimisation et les recherches multidisciplinaires, la physique mathématique, les probabilités et

la statistique, et les systèmes dynamiques. Le CRM organise annuellement un large éventail d'activités scientifiques impliquant une participation internationale. Les thèmes principaux de l'année 2001-2002 porteront sur les groupes et la géométrie. Cependant, toute candidature méritoire touchant à un domaine d'intérêt du CRM ou de l'ISM sera bienvenue.

Les candidatures doivent parvenir au CRM au plus tard le vendredi 5 janvier 2001. Les documents suivants doivent être joints: un curriculum vitae, un résumé des intérêts de recherche, et trois lettres de recommandation. Une adresse électronique (si disponible) doit être incluse avec toute correspondance. Vous êtes prié d'indiquer sur votre demande lequel des programmes de l'ISM correspond le mieux à vos intérêts de recherche. Les personnes intéressées sont fortement encouragées à contacter les professeurs et les groupes de recherche avec lesquels elles aimeraient travailler. Pour s'informer des intérêts de recherche des professeurs, les candidats sont invités à consulter les sites web des départements membres de l'ISM qui sont tous accessibles par le site web de l'ISM à l'adresse <http://www.math.uqam.ca/ISM/>. Les candidatures doivent être envoyées à:

Monsieur Jacques Hurtubise, Directeur
 Centre de recherches mathématiques
 Université de Montréal
 Case postale 6128, succursale Centre-ville
 Montréal (Québec)
 H3C 3J7 Canada
 télécopieur : (514) 343-2254
 courriel : hurtubis@crm.umontreal.ca

Washington to Join PIMS

The Board of Directors of the Pacific Institute for the Mathematical Sciences (PIMS) has approved a resolution to initiate the full integration of the mathematical sciences community at the University of Washington into the operations and management of the Institute. The goal is to develop a world class model for the Mathematical Sciences, that addresses simultaneously the imperatives of Research, of Education and of Technology Transfer.

The Board of Directors of PIMS and the senior administration at the University of Washington are extremely supportive of this groundbreaking collaborative effort between Canada and the US and are fully committed to the development of the new PIMS that will include the University of Washington as a full participating member. They have contributed seed money to jumpstart the joint scientific effort during the first year of operations and are calling on the National Science Foundation (NSF) and the Natural Sciences and Engineering Research Council of Canada (NSERC) to assist in the development of this important bi-national scientific effort. The partnership will be instrumental for the development of continental resources for the mathematical sciences like PIMS-K:

The "International Research Center in Kananaskis" as well as other more focused collaborative research centers.

The University of Washington will be joining the five founding partners of PIMS: The University of Alberta, The

University of British Columbia, The University of Calgary, The University of Victoria and Simon Fraser University. Dr. Tatiana Toro will act as the first PIMS-UW site director.

AMERICAN MATHEMATICAL SOCIETY

Conference Proceedings, Canadian Mathematical Society

This series is published for the Canadian Mathematical Society by the AMS. It consists of the proceedings of internationally attended conferences on pure and applied mathematics sponsored by the CMS. CMS members may order at the AMS member prices. (ISSN 0731-1036) Softcover.

NEW! Volume 29
Stochastic Processes, Physics and Geometry: New Interplays. II
 A Volume in Honor of Sergio Albeverio

NEW! Volume 28
Stochastic Processes, Physics and Geometry: New Interplays. I
 A Volume in Honor of Sergio Albeverio

Fritz Gesztesy, *University of Missouri, Columbia*,
Helge Holden, *Norwegian University of Science and Technology, Trondheim*, **Jürgen Jost**, *Max Planck Institut für Mathematik, Leipzig, Germany*, **Sylvie Paycha**, *Université Blaise Pascal, Aubiere, France*, **Michael Röckner**, *Universität Bielefeld, Germany*, and **Sergio Scarlatti**, *Università G. D'Annunzio, Pescara, Italy*, Editors

These volumes present state-of-the-art research currently unfolding at the interface between mathematics and physics. Included are select articles from the international conference held in Leipzig (Germany) in honor of Sergio Albeverio's sixtieth birthday. The theme of the conference, "Infinite Dimensional (Stochastic) Analysis and Quantum Physics", was chosen to reflect Albeverio's wide-ranging scientific interests. The articles in these books reflect that broad range of interests and provide a detailed overview highlighting the deep interplay between stochastic processes, mathematical physics, and geometry.

The contributions are written by internationally recognized experts in the fields of stochastic analysis, linear and nonlinear (deterministic and stochastic) PDEs, infinite dimensional analysis, functional analysis, commutative and noncommutative probability theory, integrable systems, quantum and statistical mechanics, geometric quantization, and neural networks. Also included are applications in biology and other areas.

Most of the contributions are high-level research papers. However, there are also some overviews on topics of general interest. The articles selected for publication in these volumes were specifically chosen to introduce readers to advanced topics, to emphasize interdisciplinary connections, and to stress future research directions. Volume I contains contributions from invited speakers; Volume II contains additional contributed papers.

Volume 28; 2000; 333 pages; Softcover; ISBN 0-8218-1999-3; List \$75; Individual member \$45; Order code CMSAMS/28CMS00
 Volume 29; 2000; approximately 664 pages; Softcover; ISBN 0-8218-1960-7; List \$125; Individual member \$75; Order code CMSAMS/29CMS00

NEW! Constructive, Experimental, and Nonlinear Analysis
Michel Théra, *University of Limoges, France*, Editor

This volume presents twenty original refereed papers on different aspects of modern analysis, including analytic and computational

number theory, symbolic and numerical computation, theoretical and computational optimization, and recent development in nonsmooth and functional analysis with applications to control theory. These papers originated largely from a conference held in conjunction with a 1999 Doctorate Honoris Causa awarded to Jonathan Borwein at Limoges. As such they reflect the areas in which Dr. Borwein has worked. In addition to providing a snapshot of research in the field of modern analysis, the papers suggest some of the directions this research is following at the beginning of the millennium.

Volume 27; 2000; approximately 302 pages; Softcover; ISBN 0-8218-2167-9; List \$70; Individual member \$42; Order code CMSAMS/27CMS00

Stochastic Models
Luis G. Gorostiza, *Centro de Investigación and de Estudios Avanzados, Mexico City, Mexico*, and **B. Gail Ivanoff**, *University of Ottawa, ON, Canada*, Editors

This book presents the refereed proceedings of the International Conference on Stochastic Models held in Ottawa (ON, Canada) in honor of Professor Donald A. Dawson. Contributions to the volume were written by students and colleagues of Professor Dawson, many of whom are eminent researchers in their own right.

A main theme of the book is the development and study of the Dawson-Watanabe "superprocesses", a fundamental building block in modelling interaction particle systems undergoing reproduction and movement. The volume also contains an excellent review article by Professor Dawson and a complete list of his work.

This comprehensive work offers a wide assortment of articles on Markov processes, branching processes, mathematical finance, filtering, queueing networks, time series, and statistics.

Volume 26; 2000; 480 pages; Softcover; ISBN 0-8218-1063-4; List \$99; Individual member \$59; Order code CMSAMS/26CMS00


Geometric Control and Non-holonomic Mechanics
V. Jurdjevic and **R. W. Sharpe**, *University of Toronto, ON, Canada*, Editors

Control theory, a synthesis of geometric theory of differential equations enriched with variational principles and the associated symplectic geometry, emerges as a new mathematical subject of interest to engineers, mathematicians, and physicists. This collection focuses on several distinctive research directions having origins in mechanics and differential geometry, but driven by modern control theory.

This book provides quick access to new research directions and also demonstrates the effectiveness of new insights and methods that control theory brings to mechanics and geometry.

Volume 25; 1998; 239 pages; Softcover; ISBN 0-8218-0798-1; List \$49; Individual member \$29; Order code CMSAMS/25CMS00

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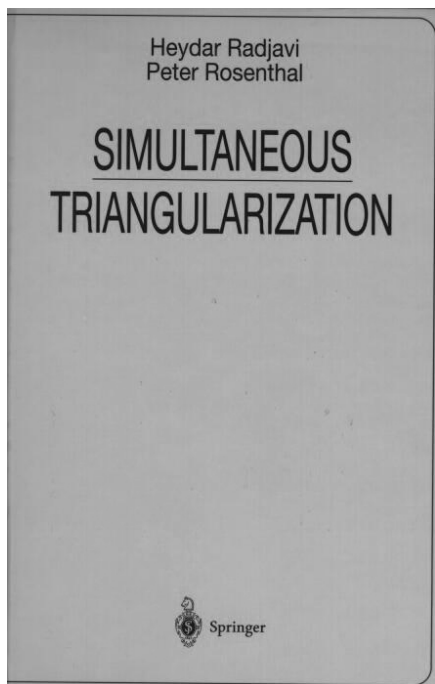
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AMERICAN MATHEMATICAL SOCIETY

Simultaneous Triangularization

Book Review by Kenneth R. Davidson, University of Waterloo

Simultaneous Triangularization
H. Radjavi and P. Rosenthal
 Springer-Verlag New York, Inc., 2000
 xii + 318 pages



Every complex matrix is similar to a matrix in upper triangular form. This immediately exhibits certain information such as the eigenvalues (including multiplicity) and a collection of invariant subspaces. While the triangular form does not contain the detailed algebraic information contained in the Jordan form, it has several advantages—for example, it is more computable and it can be obtained by a unitary similarity. It is the connection with invariant subspaces which attracted the authors. The focus of this nice little book is on the development of the upper triangular form in two directions. First they wish to find triangular form theorems for larger classes of matrices with a particular focus on semigroups, and secondly they discuss infinite dimensional analogues on Hilbert and Banach spaces.

In finite dimensions there are many classical and beautiful results about simultaneous triangularization that do not find their way into any linear algebra text that I know of. Here is an example. Notice that if \mathcal{A} is an algebra of matrices which is triangularizable, then every commutator $AB - BA$ for $A, B \in \mathcal{A}$ is strictly upper triangular and hence nilpotent. The converse turns out to be true, but perhaps not very

checkable. McCoy's Theorem provides a much stronger converse when the algebra \mathcal{A} is generated by two matrices A and B . *If each matrix $p(A, B)(AB - BA)$ is nilpotent for every non-commuting polynomial in A and B , then A and B are simultaneously triangularizable and thus so is the algebra that they generate.*

Various conditions such as commutativity allow simultaneous triangularization. Two other classical results are Engel's Theorem: *every Lie algebra of nilpotent matrices is triangularizable*, and Levitzki's Theorem: *every semigroup of nilpotent matrices is triangularizable*. All of this material is contained in the first forty pages. It is nicely written, and could be used for an undergraduate seminar.

The next two chapters deal with various conditions on semigroups that imply or are related to triangularizability. I will mention one nice result. Say that the spectrum is *sublinear* on a set \mathcal{S} if $\sigma(S + \lambda T) \subset \sigma(S) + \lambda\sigma(T)$ for every $S, T \in \mathcal{S}$. Then a semigroup \mathcal{S} is triangularizable if and only if the spectrum is sublinear on \mathcal{S} . I must admit that I found these chapters too encyclopedic, so I skipped ahead to the chapters on operator theory.

Chapter 6 is an introduction to compact operators on Banach space. It could be read by a sophisticated student who has not had functional analysis, but I suspect that most readers of the last half of this book would be familiar with these ideas. They quickly get to invariant subspace results, beginning with the famous result of Lomonosov: *if K is a non-zero compact operator, then there is a proper subspace which is invariant for the commutant of K* . In infinite dimensions, a triangular form does not always mean a discrete basis in which the operator is upper triangular. One has to expand the notion to allow a maximal chain of closed subspaces (a nest) which are invariant. For example the Volterra operator on $L^p(0, 1)$ given by $Vf(x) = \int_0^x f(t) dt$ has invariant subspaces $L^p(t, 1)$ for every $t \in [0, 1]$, and there are no others. This provides a continuous triangularization for V .

Chapter 7 contains a treatment of Ringrose's beautiful theorem that every compact operator K has a (generalized) upper triangular form, and the non-zero points in the spectrum (including multiplicity) can be read off as the diagonal entries corresponding to discrete parts of the nest—that is, if $\mathcal{M}_- \subset \mathcal{M}$ are two elements of the nest with $\dim(\mathcal{M}/\mathcal{M}_-) = 1$, then there is a unique scalar λ such that $(K - \lambda I)\mathcal{M} \subset \mathcal{M}_-$ and λ is an eigenvalue for K . In the Hilbert space case, this is more transparent. There is a unit vector $e \in \mathcal{M} \ominus \mathcal{M}_-$ and $\lambda = \langle Ke, e \rangle$. This theorem should be better known, and could easily be included in an introductory course in functional analysis or operator theory.



The authors

Returning to the question of triangularizability, there is the analogue of McCoy's Theorem for compact operators replacing the word nilpotent by quasinilpotent, which means spectrum $\{0\}$. Chapter 8 deals with semigroups of compact operators in detail. The highlight is a recent theorem of Turovskii: *every semigroup of compact quasinilpotent operators on a Banach space is triangularizable*. The analogue of the

result on the equivalence of triangularizability and sublinearity of the spectrum goes through for semigroups of compact operators.

The last chapter deals with bounded operators. Here the area consists mainly of open questions and interesting counterexamples. For example, there is a semigroup of nilpotent operators of index 2 on a Hilbert space with no invariant subspaces! Naturally one serious barrier is the famous Invariant Subspace Problem: *does every bounded operator on Hilbert space have a proper invariant subspace?* The situation is worse in Banach space, where there are counterexamples. However there are some sorts of hypotheses which lead to triangularizability even here.

Overall this is a very nicely written book. For the student or expert in operator theory, it is a stimulating read. For the dilettante, I would suggest the first two chapters for the matrix theory, and then the first few sections of chapters 7, 8 and 9 for a taste of the infinite dimensional theory.

EDUCATION NOTES

Ed Barbeau, Column Editor

Reinventing the math teacher

In August, 2000, a very interesting two-day conference took place at the Fields Institute. About twenty teachers gathered under the leadership of Peter Taylor of Queen's University, assisted by Gary Flewelling and Nathalie Sinclair, to discuss and reflect upon three aspects of the profession of mathematics teacher: *Teacher as scholar*, *Teacher as student*, *Teacher as teacher*. While I was present briefly at the beginning and the ending of the meeting, I am indebted to the excellent notes taken by Nathalie Sinclair for the account that follows.

After a round of introductions, Peter kicked off the proceedings with the following problem:

How many different trains of length 10 can one form with three types of cars: cars of length 1, type A cars of length 2 and type B cars of length 3? Two trains, each the reverse of the other, are to be considered as distinct. One example is 1BA1AA and this is distinct from AA1AB1.

The participants worked on these in small groups, and as expected came up with quite different approaches. For example, by looking at lengths smaller than 10, it was possible to at least conjecture a recursion that covered trains of length n . Peter showed how this problem could be housed in the larger realm of linear algebra. But this problem could be given to school students, and it was how to do this and what might happen that next engaged the teachers. Thus, the train problem became the occasion upon which those present were led to consider themselves in three different roles, as student, as

scholar and as teacher.

Teacher as student. When the participants shared their undergraduate experiences, it was clear that their reactions ranged from revulsion to appreciation:

"I had really bad lectures. I never felt empowered. I had to get 90% on my own, just 10% in lecture. I only got the course when I studied for the final exam."

"By and large, I felt cheated by my university career. There was next to nothing that I learned that was useful to me as a teacher."

"The main thing I learned in my undergraduate years was to learn how to enjoy the struggle. That's what I want to bring to the classroom. I understand what it feels like to sit in the classroom and not understand one single thing."

"I learned quite a bit about pure mathematics. I really enjoyed the analysis of pure mathematics, to be able to exist in these neat little worlds of mathematics and study them for the beauty of mathematics. It prepared me to a certain degree to be a good teacher."

These anecdotes provoked a long discussion on the issue of relevance, and how this should be addressed in teaching. It was observed that "relevance" is a tricky and much misunderstood word, and that "engagement" might be closer to the mark.

In their education programs, some were aware of the delicate balance to be maintained between theory and practice.

Many felt that they would have benefited from a longer program that would have allowed them to try out some of the theories in the classroom and reflect on them.

Teacher as scholar. What does it mean to be a scholar? Is it important for teachers to be scholars? The participants suggested that to be a scholar was to be engaged in a struggle, to be motivated and curious enough to learn new things. Teachers could be scholars inside, as well as outside, of the classroom; they change their practice as they reflect on the learning of their students. One participant emphasized scholarship entailed detachment, objectivity, the ability to make independent judgments and to stand against the flow of fashion. The group agreed that teachers had to be scholars to work effectively, and that one had to be a mathematician in order to teach mathematics.

How could one assess the teacher as scholar? Measures such as the number of conferences attended or papers published seemed unsatisfactory. Perhaps it could be assessed in terms of the reactions and accomplishments of one's own students. Perhaps scholarship could be seen in some set of characteristics, particularly in interaction with colleagues.

Teacher as teacher. The discussion began with constraints that teachers had to face, such as the prescribed curriculum, inadequate material and emotional support, lack of professional interaction with colleagues, lack of background and experience, modes of assessment, and the effect that these had on morale. Assessment in particular informed the discussion, as the group came to grips with their feelings about the use of rubrics. A very important issue was that of trust; many felt that the detail of the curriculum document reflected mistrust of teachers, mitigated their freedom and did not respect their professional judgment.

Finally, the teachers commented on the value of the conference itself. They pointed to the sense of community, the diversity of age and experience of the participants, the energy of being with enthusiastic colleagues and the high level of discussion.

The 9th International Congress on Mathematical Education (ICME 9)

A Japanese experience Participants to ICME 9 were treated to an example of efficient Japanese organization. I was registered in a record 25 seconds at a peak time for registration. It is true that my own registration posed no difficulties as everything had been arranged ahead of time by email and fax. Nevertheless the organizers get all the credit. The large reception area of the new Makuhari Messe Congress Centre, was well laid out with at least a dozen individuals behind the registration desk. The Congress site, situated about halfway between the Narita International Airport and downtown Tokyo, included the Makuhari Messe and the nearby Chiba Institute of Technology.

Canadians were well represented both on the International Program Committee (IPC) and on the Scientific Program.

Bernard Hodgson, the ICMI Secretary was directly and indirectly involved in all aspects of the Congress. Gila Hanna was on the IPC and invited lectures were presented by Peter Taylor and Natalie Sinclair, Gila Hanna, and Walter Whiteley. Also taking various roles in the Working Groups, Topic Groups or ICMI Affiliated Groups were Ann Anderson, William Higginson and Ronald Dunkley. The Canadian contingent of fourteen was small compared to recent ICMEs, in fact the Congress itself had fewer participants than the previous two Congresses as it drew about 2,200 participants including an impressive contingent of 950 mathematics educators coming from Japan.

It is impossible to participate in every aspect of the scientific program and my impressions reflect only those parts of the program that I sampled. The opening ceremony, in the huge congress hall, was very impressive. Many dignitaries welcomed everyone to Japan and ICME 9. A large video screen made me feel part of the activities even though I was seated a great distance from the stage. The sound was excellent. These ceremonies were followed by an international round table joining panelists located at the Congress, in the US and in Singapore. The technology only showed a few hiccups. I attended some of the Plenary and invited lectures and I benefited from them all. Unfortunately, I was disappointed with the Working Group that I had selected. Working Groups are a major component of these Congresses because participants devote six hours of the congress to work on a chosen area. Having worked on the IPC for ICME 7 and having organized a Working Group for ICME 8, I believe that it is the responsibility of organizers to facilitate the involvement of everyone in their group. This part of the Program provides a unique opportunity for scholars from different countries to participate in discussion and development of the chosen theme. In this Working Group we were treated to a series of presentations, some of which had already been posted on the Web. This was a real loss of opportunity for me and others, from different countries, to get to know each other and to share and compare knowledge and experiences.

I found interesting and very worthwhile the reports on the two ICMI Studies that had occurred since the previous Congress. Proceedings of the two Studies, "The Role of History of Mathematics in the Teaching and Learning of Mathematics" and "The Teaching and Learning of Mathematics at the University Level," will appear in one or two years. The exhibition Hall did not have many commercial exhibits. However, it did have a large area dedicated to non-commercial Japanese exhibits. This area was manned by mathematics school teachers and university professors offering examples of hands on activities that they use for teaching and popularization of mathematics. It is unfortunate that quite a lot of this material is not translated into English. Explanations were provided with great patience, often using sign language, and we came home enriched. The origami centre had spectacular

displays of completed pieces and origami masters were available and willing to teach everyone, even incapacitated paper folders like me.

The social activities were well organized and provided generous liquid and solid nourishment, enough to allow those on limited budgets to pass on a meal. This visit confirmed for me that Japan is expensive. It was especially so around the Congress site. From the various Congress tours we chose the one to Nikko, a large temple and shrine site in the hills some two hours by bus from Tokyo. The visit was well worth it, made all the more pleasant as we left behind, for a day, the hot and humid weather that hovered over Tokyo. The Congress organizers offered the possibility of a "home stay" – a version of the Canadian bed and breakfast. We took up their offer and stayed with a family who live in a house about 45 minutes by

train and bus from the Congress site. This couple was ever so generous; a marvelous sushi meal was waiting for us on the first night. Sleeping on the floor and the generous Japanese breakfasts of soup, rice, fish, etc., were new experiences. Living in a typical older section of the Chiba Prefecture gave us a different glimpse of Japan, and gave us a better feel for life in this densely populated region of Japan.

In 2004 the ICME 10 will be in Denmark. As CMESG continues to play a significant role for Canadian mathematics educators and now that CMS, CRM, The Fields Institute and PIMS support an ever-increasing range of mathematics education activities it should be time once again for Canada to have as significant a presence in Denmark as it had at ICME 7 in Quebec City.

Eric Muller, ICMI Canadian Representative

(EXEC—continued from page 1)

contact Dr. Catherine Baker, Chair - CMS Nominating Committee (chair-nomc@cms.math.ca). The term of the four vice-presidents representing the Atlantic Provinces, Québec, Ontario and the Western Provinces and Territories is two years. The 11 directors that will be elected to the Board of Directors will serve for four years until June 2005. The Society has been very fortunate to have so many members volunteering to serve on the Board of Directors, the Executive and other committees, and on the various editorial boards.

In April, the Membership and Publications Agent (Ms. Chantal Stevenson) left the Executive Office to return to college and the part-time Financial Assistant (Ms. Claire Ryan) also left in June. The situation regarding their replacements is described below. During this period, Task Force 8 on Office Strategies was considering many aspects of the Society's administrative operations. The final report of Task Force 8 and the other task forces can be found on the CMS web site:

<http://www.cms.math.ca/Projects/1998/future.html>

Some recommendations from the task forces have already been discussed by the Executive and Board and some changes have already been implemented. Each standing committee has also been asked to review the various reports and provide feed-back to the October meeting of the Executive Committee. It is expected that the current strategic planning exercise will be completed by next year.

As the CMS continues to expand its program of activities, the work of the Executive Office staff to administer and coordinate these activities increases. This is particularly true for our financial operations. For several years the financial duties have been carried-out by two part-time staff (the Financial Assistant, mentioned above, and Ms. Diane Ellis, the Comptroller) with Ms. Monique Bouchard, the Operations Manager, having some financial responsibilities. Since July 2000, all of the financial duties have been consolidated

into one full-time position and, as reported in the September Notes, Mr. Roch McLean has been hired as the new Manager, Finance and Accounting. Roch will be responsible for all the accounting tasks, all federal and provincial filings, as well as providing the critical support for the budget and audit. Diane Ellis has been the Society's Comptroller for a number of years and I wish to take this opportunity of thanking her for service to the CMS.

In 2000, for the first time, the rates for our periodicals included electronic access. This required the Society consider the most efficient and cost effective way to deliver this service to all the subscribers. In particular, it was preferable for the Executive Office to take over responsibility for all CJM and CMB subscriptions, similar to CRUX with MAYHEM subscriptions and CMS memberships. Formerly, non-member subscriptions for the CJM and the CMB were handled by the Journals Division, University of Toronto Press. This change reflected most on the work-load of the Membership and Publications Agent, particularly as regards the maintenance of the database. Following a review of the situation, a new part-time Database Clerk position has been created. Ms. Elizabeth Atkinson-Thangaraj, a mathematics student from the University of Ottawa and now attending teachers college, will be the Database Clerk for the next academic year. It is hoped to fill the Membership and Publications Agent position before the 2001 renewal campaign commences. Any members who have visited the Executive Office know that space is very limited. Monique had to be very inventive to find room for the larger number of staff.

Although the changes highlighted above will enable the Executive Office to better deliver the numerous administrative and financial services, staff changes necessarily impact on the ability of the Office to provide a desired level of service during the transitional period. The staff much appreciates the understanding of our members and subscribers during this time.

DU BUREAU DU DIRECTEUR ADMINISTRATIF

Une période marquée par le dynamisme

L'an 2000 a été une année fort occupée tant à la SMC que dans la communauté mathématique canadienne. En plus des activités habituelles, plusieurs initiatives ont vu le jour, et d'autres ont été organisées à l'occasion de l'année internationale des mathématiques. Le professeur Jonathan Borwein, président de la SMC, a d'ailleurs décrit certaines de ces activités dans son article des *Notes* de septembre.

La Société étudie ces temps-ci les possibilités de collaboration avec d'autres sociétés et associations mathématiques. Le congrès Math 2000 était justement le fruit d'une telle collaboration : il a mis en scène six organisations nationales. Et le carrefour emploi de la SMC, organisé par le réseau MITACS, a attiré un nombre record de personnes. Je suis convaincu que notre Réunion d'hiver 2000, qui se déroulera à Vancouver, sera une réussite tout aussi éclatante. Au programme de cette Réunion : une conférence publique prononcée par Roger Howe (Yale), neuf conférences principales, y compris celles des lauréats du prix Coxeter-James (Damien Roy - Université d'Ottawa) et du prix de doctorat de la SMC (Stephen Astels - Georgia), ainsi que onze autres séances. Cette Réunion marquera en outre la première conférence commanditée par le nouveau Comité des étudiants de la SMC. Cette conférence sera donnée par Ravi Vakil, étudiant diplômé de l'Université de Toronto, qui enseigne actuellement au Massachusetts Institute of Technology (Moore Instructor). Ravi a fait partie des équipes qui ont représenté le Canada aux OIM de 1986, 1987 et 1988, où il a remporté deux médailles d'or et une d'argent. Il me fera plaisir de vous accueillir en grand nombre à Vancouver en décembre.

Jonathan Borwein a succédé à Richard Kane à la présidence il y a quelques mois et demeurera président jusqu'en 2002, mais le mandat des quatre vice-présidents et de la moitié des membres du Conseil d'administration prendra fin en juin 2001. Le comité des mises en candidature a déjà entrepris le processus de recrutement en vue de la prochaine élection des membres du Comité exécutif et du Conseil et proposera une liste de candidats dans les *Notes* de février 2001, à laquelle les membres de la SMC seront invités à ajouter des noms s'ils le souhaitent. Si vous désirez proposer des candidats en ce moment, veuillez communiquer avec Mme Catherine Baker, présidente du Comité des mises en candidature de la SMC (chair-nomc@cms.math.ca). Les quatre vice-présidents représentant les provinces de l'Atlantique, le Québec, l'Ontario ainsi que les provinces de l'Ouest et les territoires sont élus pour deux ans. Les onze autres membres du Conseil d'administration auront un mandat de quatre ans, qui prendra fin en juin 2005. La Société est très choyée de pouvoir compter sur un si grand nombre de membres qui acceptent de

faire partie du Conseil d'administration, du Comité exécutif, des autres comités et des divers conseils de rédaction.

La responsable de l'adhésion et des publications, (Chantal Stevenson) a quitté le bureau administratif en avril pour faire un retour aux études, et notre adjointe aux finances à temps partiel (Claire Ryan) nous a aussi quittés en juin. Les démarches prises pour les remplacer sont décrites plus loin. Pendant cette période, le groupe de travail no 8 sur les stratégies administratives étudiait les diverses facettes des activités administratives de la Société. On trouvera son rapport, aux côtés de ceux des autres groupes de travail, sur le site Web de la SMC à l'adresse suivante :

<http://www.cms.math.ca/Projects/1998/future.html>

Le Comité exécutif et le Conseil ont déjà discuté de quelques-unes des recommandations des groupes de travail et ont même déjà apporté certains changements. On a aussi demandé à tous les comités permanents d'étudier les rapports et de remettre leurs commentaires au Comité exécutif lorsqu'il se réunira en octobre. On s'attend à boucler l'exercice de planification stratégique d'ici l'an prochain.

À mesure que la SMC élargit son programme d'activités, la tâche du personnel du bureau administratif qui en assure l'administration et la coordination ne cesse de s'alourdir, en particulier dans le secteur des finances. Pendant plusieurs années, les tâches associées aux finances ont été confiées à deux employées à temps partiel (l'adjointe aux finances mentionnée ci-dessus et la contrôleur, Diane Ellis). En tant que chef des opérations, Monique Bouchard avait également certaines responsabilités d'ordre financier. Depuis juillet 2000, toutes les tâches financières ont été confiées à un employé à plein temps. En effet, comme nous l'avons annoncé dans les *Notes* de septembre, Roch McLean occupe désormais le nouveau poste de Directeur des finances et de la comptabilité. Roch s'occupera de la comptabilité, des rapports à remettre aux gouvernements (fédéral et provincial), ainsi que de fournir son appui indispensable au moment de l'établissement du budget et de la vérification. Je profite de l'occasion pour remercier Diane Ellis, contrôleur de la SMC pendant plusieurs années, de ses bons et loyaux services.

Pour la première fois, les tarifs d'abonnement à nos périodiques incluaient cette année l'accès aux versions électroniques. La Société a dû trouver la manière la plus efficace et la moins coûteuse possible d'offrir ce service à ses abonnés. Nous avons notamment conclu qu'il serait préférable de remettre la responsabilité des abonnements au JCM et au BCM entre les mains du bureau administratif, qui

s'occupe déjà des abonnements au CRUX with MAYHEM et de l'adhésion. Auparavant, c'est la division des revues scientifiques des Presses de l'Université de Toronto qui s'occupait de l'abonnement au JCM et au BCM pour les non-membres. Ce changement a particulièrement alourdi la tâche de la responsable de l'adhésion et des publications, surtout en ce qui concerne la gestion de la base de données. Pour remédier à cette surcharge, nous avons créé un poste de préposé à la saisie de données à temps partiel et y avons embauché Elizabeth Atkinson-Thangaraj, une étudiante en mathématiques de l'Université d'Ottawa qui suit en ce moment des cours en enseignement. Mme Atkinson-Thangaraj occupera le poste pendant toute l'année scolaire. Nous espérons pourvoir au

poste de responsable de l'adhésion et des publications avant le début de la campagne de recrutement de 2001. Si vous êtes allés au bureau administratif dernièrement, vous aurez constaté que l'espace y est maintenant très restreint. Monique a dû faire preuve de beaucoup d'ingéniosité pour loger tout le nouveau personnel.

Même si les changements dont je viens de vous faire part visent à améliorer nos nombreux services administratifs et financiers, tout mouvement de personnel se répercute nécessairement sur la capacité du bureau de garantir la qualité de son service pendant la transition. Le personnel du bureau administratif remercie les membres et les abonnés de leur compréhension à cet égard.

CAMEL BYTES

The Camel Club: A Note to the Community from the Electronic Services Committee

Jason Brown, on behalf of the Electronic Services Committee

The Electronic Services Committee of the CMS is planning a new initiative for the CMS web site. The initiative, called the Camel Club, would be an online service, provided free of charge for CMS members and nonmembers alike, that will inform subscribers of the latest, most interesting mathematical content available on the world wide web. Club members would be contacted via email and encouraged to peruse the site, which should be updated quarterly. The club's content would include:

- a mathematical "site of the month"
- links to relevant mathematical software tools
- a hyperlinked archive for both research and education
- interactive articles that introduce research-level topics

- other special features as may be requested from time to time

The Camel Club promises to be an exciting and relevant addition to the Camel Web Site, but it will require significant volunteer support to maintain. Specifically, we envisage the need for three editors prepared to invest 5-8 hours per quarter, some programmers/web designers who would create the site and any necessary cgi scripts, and an overall managing editor who might be expected to devote as many as 25 hours a quarter to ensure that all content is collected for each issue and implemented correctly. The ESC would act as a supervisory committee providing programmers with a detailed description of the Camel Club site structure, including the development of a membership application and survey form so that subscribers can easily contact the site.

More information and a demonstration will be given at our committee's meeting in Vancouver, likely the afternoon of Sunday December 10. Interested individuals are encouraged to attend. Suggestions or comments on this proposal are welcome at any time.

CMS MEMBERSHIP ...

The 2001 Membership Notices have been mailed. Please renew your membership now.

ADHÉSION À LA SMC ...

Les avis d'adhésion 2001 était postés. S'il vous plaît renouveler votre adhésion maintenant.

AWARDS / PRIX

2000 Canada Wide Science Fair - CMS Awards

The CMS sponsored a set of three Special Awards at the 2000 Canada Wide Science Fair, held in London, Ontario this past May. This annual event is sponsored by the Youth Science Foundation Canada. Here are the prize-winning entries:

Double Trouble



Junior – Julia Dean (Grade 8), with David Borwein

In my project, I basically learned about double stars, for instance, what they are, how they are formed, the evolution of each separate star, how they are measured, etc. Then I videotaped some real double stars, measured separation and position angle of each, and compared my results with actual measurements of astronomers.

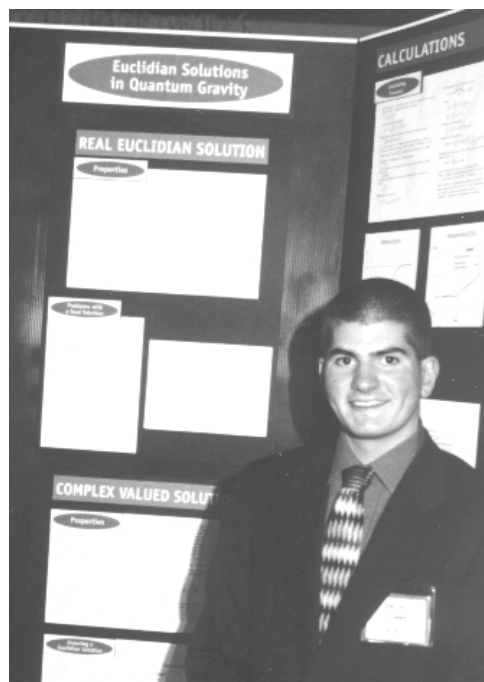
Intra-abdominal Pressure Mechanism



Intermediate – Jun Ma (Grade 10)

Lumbar spine stability must be maintained in all physical activities. Intra-abdominal pressure may help to accomplish this task. I asked the question, "Is there a relationship between increased IAP, antagonistic muscle coactivation and the stability of the lumbar spine?" Through physical and theoretical models, I concluded that with increased IAP spine stability increased as well.

In Search of Perfection



Senior – Daniel Green (Grade 12)

Recent developments in Quantum Gravity theory resulted in the Hartle–Hawking wave function. This project examined solutions to this equation to determine the behavior of quantum gravity. A solution much different from those currently known was found. As a result, it was determined that Hawking's choice of sign for the wave function is wrong.

More than 450 students participated in this year's Canada Wide Science Fair, with awards totalling over \$130,000 in cash, scholarships, trips and other prizes. The fair was attended by judges, delegates, officials, guests, VIPs, international delegations, and YSFC/NSFC members and agents, as well as thousands of visitors. Included in the seven-day event were two days of judging, opening and closing banquets, an awards ceremony, and public viewing of projects, as well as

tours, cultural activities, seminars, workshops and many social events for fair participants.

Prime Minister Honours Outstanding Teachers

Prime Minister Jean Chrétien announced the 1999-2000 recipients of the Prime Minister's Awards for Teaching Excellence (PMA) at a gala event on Parliament Hill in honour of national level winners. Sixteen teachers from across Canada received national recognition from Prime Minister Chrétien who congratulated them on helping students develop the skills and attitudes required for a successful future.

"The world students enter when they leave school today is bigger, faster and more competitive than ever before," said the Prime Minister. "New technologies have conquered time and distance and change now occurs in the blink of an eye. The teachers we honour tonight have embraced this challenge. Through their creativity and tremendous enthusiasm for learning, they have prepared students not only to make it in the world, but also to help make it a better world."

This year's award recipients teach many different subjects to different grades and differing levels of ability. Subjects taught range from astronomy to auto mechanics. Many work with kids "at risk" and have been successful in helping these

students stay in school and go on to further studies and careers. A common theme is the innovative use of information and communications technologies (ICT). Almost 75 per cent of the 1999-2000 recipients use some form of ICT to enrich their teaching practices.

A total of 66 awards were announced at the ceremony (16 national and 50 local). Awards are worth \$5,000 at the national level and \$1,000 at the local level. Funds are given to winning teachers' schools to be spent under the direction of the recipient. Here are the award winners whose teaching responsibilities included mathematics: Robert Rose, Prince of Wales Collegiate, St. John's NF; Francine Rossignol, Ecole Notre-Dame, Edmundston NB; France Lafleur, Ecole Victor-Thérien, Lachine PQ; Carol-Ann Telford, Waterloo-Oxford District Secondary School, Baden ON; Mary Margaret Fraser, W.I. Dick Middle School, Milton ON; Linda Dickson, Summit Alternative School, Ottawa; Brenda Gale, Riverdale Collegiate Institute, Toronto; Victoria Brady, Saint Joseph's College School, Toronto; staff of John W. Gunn School, Winnipeg; Guy Kerbrat, Rouleau School, Rouleau SK; Stephen Gallagher, W.P. Wagner School of Science and Technology, Edmonton; Ellen Leroux, Chaffey-Burke Elementary School, Burnaby BC; Jacquie Facca, Fernie Secondary School, Fernie BC; Daniel Rubin, False Bay School, Lasqueti Island BC.

THE UNIVERSITY OF MINNESOTA – MINNEAPOLIS, MINNESOTA, USA BIOLOGICAL MATHEMATICS

Future development of advanced biotechnology will depend on a better fundamental understanding of complex cellular processes. The Department of Mathematics and the Biological Process Technology Institute at the University of Minnesota seek an individual engaged in modelling and analysis of self-organization and biocomplexity at the cellular level for a joint appointment. Possible areas of concentration include: protein folding, biocatalysis, bioinformatics, functional genomics or proteomics, analysis of complex metabolic or gene control networks, and molecular evolution.

This will be a tenure-track or tenured position, with the level of appointment to be commensurate with qualifications. Ph.D. in mathematics or a related field is required by the beginning date of appointment. Salary competitive. **Consideration of applications will begin November 1, 2000 and will continue until position is filled.** Send curriculum vitae, description of research, and a minimum four (4) letters of recommendation to:

Professor Hans Othmer
School of Mathematics
University of Minnesota
127 Vincent Hall
206 Church Street SE
Minneapolis MN 55455
USA
Phone (612) 624-8325

See also <http://www.math.umn.edu> The University of Minnesota is an equal opportunity educator and employer.

**CMS Winter Meeting 2000
Hotel Vancouver
Vancouver, British Columbia
December 10 - 12, 2000**

Programme Update

The most up-to-date information concerning the programmes, including scheduling, and electronic registration is available at the following world wide web address:

<http://www.cms.math.ca/Events/winter00>

Meeting registration forms and hotel accommodation forms can be found in the September 2000 issue of the *CMS Notes* and are also available on the website, along with on-line forms for registration and submission of abstracts.

Updates on Symposia Speakers

There have been a number of additions to the list of invited speakers. Please refer to the web site for the most up-to-date information.

Abstracts will also appear on the web site as they become available.

Prizes

In the 1st announcement, we neglected to announce the following important award presentation:

The **CMS Distinguished Service Award** will be presented to **Arthur Sherk**, University of Toronto, at the banquet.

**Réunion d'hiver de la SMC
Hotel Vancouver
Vancouver (C.B.)
10-12 décembre 2000**

Mise à jour du programme

Vous trouverez l'information la plus récente sur les programmes, y compris les horaires et le formulaire d'inscription électronique, à l'adresse Web suivante :

<http://www.cms.math.ca/Events/winter00>

Les formulaires d'inscription et de réservation d'hôtel seront aussi publiés dans le numéro de septembre 2000 des *Notes de la SMC*. Vous les trouverez également sur notre site web, ainsi que les formulaires de résumés de conférences.

Liste de conférenciers

Il y a eu quelques additions à la liste de conférenciers. Veuillez consulter le site Web pour l'information la plus récente.

Les résumés de conférences paraîtront sur le site dès que nous les recevrons.

Prix

Dans la première annonce de la Réunion, nous avons oubliés d'annoncer que **Arthur Sherk** (Université de Toronto) recevra le **Prix de la SMC pour service méritoire**. Professeur Sherk recevra son prix au banquet.

“Not a word was said to us about the meaning or utility of mathematics; we were simply asked to explain how an equilateral triangle could be constructed by the intersection of two circles, and to do sums in a , b and x instead of in pence and shillings, leaving me so ignorant that I concluded that a and b must mean eggs and cheese and x nothing, with the result that I rejected algebra as nonsense, and never changed that opinion until in my advanced twenties Graham Wallas and Karl Pearson convinced me that instead of being taught mathematics I had been made a fool of.”

George Bernard Shaw, quoted in *The World of Mathematics*, edited by James R. Newman, Vol.3, p.1523.

CMS Winter Meeting 2000 - Réunion d'hiver 2000 de la SMC					
Hotel Vancouver, Vancouver, British Columbia					
For updates, see our website / Pour l'info. plus récente, consulter notre site Web. http://www.camel.math.ca/CMS/Events/winter00/					
Time	Friday / vendredi Dec 8 déc	Saturday / samedi Dec 9 déc	Sunday / dimanche Dec 10 déc	Monday / lundi Dec 11 déc	Tuesday / mardi Dec 12 déc
8:00am - 5:00pm			Registration / Inscription Exhibits / Expositions	Registration / Inscription Exhibits / Expositions	Registration / Inscription
8:30			Opening / Overture - Maria Klawe	8:30-10:00 Symposia 1, 2, 3, 4, 7, 8, 9, 10	PAUL ROBERTS
9:00			PETER SARNAK		
10:00			COFFEE / PAUSE CAFÉ		
10:30			ROGER HOWE	STANLEY PLISKA	CMS Doctoral Prize Prix de Doctorat STEPHEN ASTELS
11:00		11am - 1pm CMS Development Group Luncheon (Boardroom)	Delegates' Luncheon Lunch des participants (British Ballroom)	Lunch / déjeuner	Lunch / déjeuner
11:30				RICHARD DURRETT	IZABELLA LABA
1:30		CMS Board of Directors Meeting / Réunion du Conseil d'administration de la SMC (Tweedsmuir Room)	2:00-5:30 Symposia 1, 2, 3, 5, 6, 7, 8, 9, 11	PATRICK DEHORNOY	2:30-5:30 Symposia 1, 4, 6, 7, 9, 10, 11
2:00				3:30-5:30 Symposia 1, 2, 4, 5, 6, 7, 9, 10	
2:30					
3:00			Education Panel / Discussion sur l'enseignement		
3:30					
4:00					
5:30		CMS Executive Committee Meeting / Réunion du Comité exécutif de la SMC (Suite 245)	Registration/ Inscription Reception / Réception (The Roof)	Reception / Réception (The Roof)	Coxeter-James Lecture Conférence Coxeter-James DAMIEN ROY
6:00	Reception / Réception (Pacific Ballroom Lobby)				
6:30	7:00 pm Bus to UBC / départ d'autobus à UCB		7:30 pm Bus to UBC / départ d'autobus à UCB	Banquet (Pacific Ballroom)	
7:00					
7:30					
8:00	8:15 ROGER HOWE (IRC - UBC)	8:00 pm Hypatia's Street Theatre (UBC)			
9:30	Reception IRC Lobby Bus to Hotel Vanc follows		Bus to Hotel Vanc follows		
#	Session			Room / Salle	
	Registration and Exhibits			Boardroom	
1	Algebraic Geometry / Géométrie algébrique			Tweedsmuir/Saturna	
2	Classical and Computational Analysis / Analyse classique et quantitative			Moresby/Gabriola/Tweedsmuir	
3	Financial Mathematics / Mathématiques financières			Gabriola	
4	History of Mathematics / L'histoire des mathématiques			Moresby	
5	Mathematical Education / Enseignement des mathématiques			Saturna	
6	Number Theory / Théorie des nombres			Cortes	
7	Operator Algebras / Algèbres des opérateurs			Garibaldi	
8	Ordered Groups / Groupes ordonnés			Galliano/Cortes	
9	Partial Differential Equations / Équations aux dérivées partielles			Waddington	
10	Probability and its Applications / Théorie des probabilités et leurs applications			Galliano	
11	Contributed Papers / Communications libres			TBA	

CALL FOR NOMINATIONS / APPEL DE CANDIDATURES

2001 Canadian Mathematical Society Doctoral Prize Le Prix de doctorat 2001 de la Société mathématique du Canada

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.

Individuals who made a nomination last year can renew this nomination by simply indicating their wish to do so by the deadline date. Only materials updating the 2000 nomination need be provided as the original has been retained.

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, 2001**.

The documentation shall consist of:

- A curriculum vitae prepared by the student.
- A résumé of the student's work written by the student and which must not exceed ten pages. The résumé 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 diplôme de troisième cycle d'une université canadienne l'année précédente (entre le 1^{er} 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.

Il est possible de renouveler une mise en candidature présentée l'an dernier, pourvu que l'on en manifeste le désir avant la date limite. Dans ce cas, le présentateur n'a qu'à soumettre des documents de mise à jour puisque le dossier original a été conservé.

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 2001**.

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 fera aussi l'affaire). 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

McMASTER UNIVERSITY – HAMILTON, ONTARIO
DEPARTMENT OF MATHEMATICS & STATISTICS
Number Theory

The Department of Mathematics & Statistics, McMaster University, invites applications for a tenure track Assistant or Associate Professorship starting July 1, 2001.

Candidates should have a Ph.D. and a research record of high quality in a major area of Number Theory, as well as demonstrated interest and ability in teaching. The salary and rank will be based on qualifications and experience.

McMaster is committed to Employment Equity and encourages applications from all qualified candidates, including aboriginal peoples, persons with disabilities, members of visible minorities and women.

In accordance with Canadian immigration requirements, priority will be given to Canadian citizens and permanent residents of Canada.

Applications, including curriculum vitae and three letters of reference, should be received before **November 15, 2000** by:

E. Sawyer, Acting Chair
Mathematics & Statistics
McMaster University
Hamilton, Ontario
Canada, L8S 4K1

McMASTER UNIVERSITY – HAMILTON, ONTARIO
DEPARTMENT OF MATHEMATICS & STATISTICS
Algebraic Geometry & Number Theory

The Department of Mathematics & Statistics, McMaster University, invites applications for a tenured faculty position in Mathematics at the rank of Associate Professor or Professor, with anticipated starting date July 1, 2001.

The successful candidate should be internationally recognized for his or her fundamental contributions to research in a major area of Algebraic Geometry or Number Theory, be actively engaged in significant research projects, and have demonstrated excellence in teaching. Research areas of particular interest to the Department include Arithmetic Algebraic Geometry, Algebraic Number Theory and related areas.

For an appointment at the level of Professor of Mathematics the successful candidate should have attracted substantial research grant support and demonstrated leadership in organizing research efforts through the supervision of graduate students and postdoctoral researchers.

The salary and rank will be based on qualifications and experience.

McMaster is committed to Employment Equity and encourages applications from all qualified candidates, including aboriginal peoples, persons with disabilities, members of visible minorities and women.

In accordance with Canadian Immigration requirements, Canadian citizens and permanent residents of Canada will be considered first for this position.

Applications, including curriculum vitae and three letters of reference, should be received before **November 15, 2000** by:

E. Sawyer, Acting Chair
Mathematics & Statistics
McMaster University
Hamilton, Ontario
Canada, L8S 4K1

McMASTER UNIVERSITY – HAMILTON, ONTARIO
DEPARTMENT OF MATHEMATICS & STATISTICS
Statistics

The Department of Mathematics Statistics, McMaster University, invites applications for a tenure track Assistant or Associate Professorship starting July 1, 2001.

Candidates should have a Ph.D. and a research record of high quality in a major area of Statistics, as well as demonstrated interest and ability in teaching. The salary and rank will be based on qualifications and experience.

McMaster is committed to Employment Equity and encourages applications from all qualified candidates, including aboriginal peoples, persons with disabilities, members of visible minorities and women.

In accordance with Canadian immigration requirements, priority will be given to Canadian citizens and permanent residents of Canada.

Applications, including curriculum vitae and three letters of reference, should be received **before November 15, 2000** by:

E. Sawyer, Acting Chair
Mathematics & Statistics
McMaster University
Hamilton, Ontario
Canada, L8S 4K1

Mathematical Finance (MF-01)

The Department of Mathematical Sciences, University of Alberta invites applications for a tenure-track position in Mathematical Finance. We are looking for a person with a strong record/outstanding potential for research, excellent communication and teaching skills and leadership potential. The successful candidate must have a commitment to graduate and undergraduate education. Preference will be given to an individual whose research interests promote contact with other university researchers and/or industry. Current research strengths in the Department include stochastic analysis and finance. The position requires a PhD in a mathematical discipline and expertise in the areas of probability theory, stochastic analysis or stochastic differential equations, and mathematical finance. In accordance with Canadian Immigration requirements, this advertisement is directed to Canadian citizens and permanent residents. If suitable Canadian citizens and permanent residents cannot be found, other individuals will be considered. Applications should include a curriculum vitae, a research plan and a teaching dossier. Candidates should arrange for at least three confidential letters of reference to be sent to the Chair at the address below. The closing date for applications is January 5, 2001 or until a suitable candidate is found. Early applications are encouraged. A.H. Rhemtulla, Chair, Department of Mathematical Sciences, **University of Alberta**, Edmonton, Alberta, Canada T6G 2G1. For more information about the Department and our University, please see our web page at www.math.ualberta.ca

The records arising from this competition will be managed in accordance with provisions of the Alberta Freedom of Information and Protection of Privacy Act (FOIPP).

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.

NEWS FROM DEPARTMENTS

University of New Brunswick, Fredericton, NB

Appointments: Renjun Ma (Assistant Professor, Multivariate analysis, July 2000, a joint appointment with CRISP, the Canadian Research Institute for Social Policy); John Stockie (Assistant Professor, Fluid dynamics and mathematical modelling July 2000); James Watmough (Assistant Professor, Mathematical Biology/Ecology July 2000). Colin Ingalls (Assistant Professor, Non-commutative algebraic geometry, July 2001).

Resignation: Yuly Billig

Acting Chair: Gordon Mason.

Université Laval, Québec, PQ

Promotions: André Fortin (Full Professor, August 1, 2000)

Retirements: M. Marie-Louis Lavertu and M. Bernard Au-petit both retired on September 1, 2000 after long and fruitful careers.

Distinctions: Walter Hengartner was named Professor Emeritus of mathematics in June 2000.

Simon Fraser University, Burnaby, BC

CORRECTION: The Department of Mathematics and Statistics at Simon Fraser University will continue to exist as a functioning academic unit through 30 April 2001. On 1 May 2001 it will be replaced by two new Departments. One will be a Department of Mathematics and the other will be a Department of Statistics and Actuarial Science. This item was reported incorrectly in the September issue.

**QUEEN'S UNIVERSITY – KINGSTON, ONTARIO
MATHEMATICS AND ENGINEERING**

The Department of Mathematics and Statistics will be making a renewable (tenure-track) appointment in Mathematics and Engineering at the Assistant Professor level to begin July 2001. We seek candidates specializing in the areas of computational fluid dynamics, partial differential equations, dynamical systems, scientific computation, or statistical data analysis. Candidates must have an earned Ph.D. in Applied Mathematics, Statistics, or a closely related field.

Membership or eligibility for membership in a Canadian professional engineering association is required. Candidates are expected to have a strong research record, develop an independent research programme, be willing and competent to teach a broad range of applied mathematics/statistics courses, and supervise graduate students.

Interested candidates should arrange that a curriculum vitae, a description of teaching and research interests, at least three letters of recommendation, and copies of their three most significant publications are sent to the address below. At least one letter should comment on the candidate's teaching.

Applications will be accepted **until December 20, 2000**, or until the position is filled.

Dr. Joan M. Geramita, Associate Head
Department of Mathematics and Statistics
Queen's University, Kingston
Ontario, K7L 3N6, Canada
fax: (613) 533-2964
e-mail: position@mast.queensu.ca
<http://www.mast.queensu.ca>

In accordance with Canadian immigration requirements, priority will be given to Canadian citizens and permanent residents. Queen's University is committed to employment equity and welcomes applications from all qualified women and men, including visible minorities, aboriginal people, persons with disabilities, gay men, and lesbians.

**UNIVERSITY OF VICTORIA – VICTORIA, BRITISH COLUMBIA
DEPARTMENT OF MATHEMATICS AND STATISTICS
Assistant Professor in Mathematics**

The Department of Mathematics and Statistics at the University of Victoria invites applications for a tenure-track position at the Assistant Professor level to commence on July 1, 2001. Applicants for the position should have a Ph.D. in Mathematics and their main research area should be either Noncommutative Geometry (in the sense of A. Connes) or Operators on Manifolds. The successful applicant should be able to interact with our strong groups in operator algebras and analysis. A demonstrated record of excellence in research is expected from all applicants and a strong commitment to undergraduate and graduate teaching is essential.

The University of Victoria is an equity employer and encourages applications from women, persons with disabilities, visible minorities, and aboriginal peoples. In accordance with Canadian Immigration requirements, this advertisement is directed to Canadian Citizens and Permanent Residents. However, if suitable Canadian applicants cannot be found, other individuals will be considered.

Applications should include a curriculum vitae and three letters of reference, and should be sent to:

Chair
Department of Mathematics and Statistics
University of Victoria
PO Box 3045 STN CSC
Victoria BC V8W 3P, Canada
Telephone: (250) 721-7436
FAX: (250) 721-8962
E-Mail: acme@math.uvic.ca OR Website: <http://www.math.uvic.ca/>

The CLOSING DATE for applications is **DECEMBER 31, 2000**.

UNIVERSITY OF OTTAWA / UNIVERSITÉ D'OTTAWA
DEPARTMENT OF MATHEMATICS & STATISTICS
DÉPARTEMENT DE MATHÉMATIQUES ET DE STATISTIQUES

The Department of Mathematics and Statistics of the University of Ottawa invites applications from recent Ph.D.s for a tenure-track position at the assistant professor level beginning July 1, 2001. Applications in all areas of mathematics and statistics will be considered. Applicants should send a curriculum vitae, a research plan, and arrange for four confidential letters of recommendations, with one addressing teaching, to be sent to :

Erhard Neher, Chairman,
Department of Mathematics and Statistics,
University of Ottawa,
Ottawa, ON
Canada, K1N 6N5

by December 15, 2000. Applicants are also encouraged to include up to three copies of their most significant publications.

Active bilingualism is a condition for tenure. Conditions of employment are set by a collective agreement. Employment equity is University policy and the University strongly encourages applications from women. In accordance with Canadian immigration requirements, this advertisement is directed to Canadian citizens and permanent residents.

Information about the department can be found at <http://www.science.uottawa.ca/mathstat>.

Le Département de mathématiques et de statistique de l'Université d'Ottawa met au concours un poste de professeur adjoint menant à la permanence. Entrée en fonction: le 1er juillet 2001. Les candidat(e)s doivent avoir obtenu récemment un doctorat en mathématiques ou en statistique et doivent faire parvenir leur dossier de candidature au directeur du département,

Erhard Neher, directeur
Département de mathématiques et de statistiques,
Université d'Ottawa,
Ottawa ON
Canada, K1N 6N5

au plus tard le 15 décembre 2000. Les dossiers doivent comprendre le curriculum vitae, le plan de recherche, quatre lettres de recommandation confidentielles dont une sur l'enseignement ainsi qu'au plus trois tirés à part des contributions récentes les plus importantes du candidat(e).

Le bilinguisme actif est une condition exigée pour la permanence. Conformément aux exigences prescrites en matière d'immigration au Canada, cette annonce s'adresse aux citoyens canadiens et aux résidents permanents. Les conditions d'emploi suivent les dispositions d'une convention collective. L'Université a une politique d'équité en matière d'emploi. Les femmes sont fortement encouragées à poser leur candidature.

Pour plus de renseignement voir :

<http://www.science.uottawa.ca/mathstat>.

UNIVERSITY OF WATERLOO – WATERLOO, ONTARIO
DEPARTMENT OF PURE MATHEMATICS

The Department of Pure Mathematics at the University of Waterloo expects one or more tenure-track positions starting July 1, 2001. Candidates in any area of Pure Mathematics will be considered.

In order to be considered for a position, a Ph.D. is required. Postdoctoral experience is preferred. An appointment will be offered only to someone with very strong research and teaching qualifications. The closing date for receipt for applications is **December 1, 2000**. Applicants should submit their curriculum vitae, together with the names of at least three referees, and should arrange for letters of reference to be sent directly from the referees.

In accordance with Canadian immigration requirements, this advertisement is directed to Canadian citizens and permanent residents. The University of Waterloo encourages applications from all qualified individuals, including women, members of visible minorities, native people, and persons with disabilities. This appointment is subject to the availability of funds.

Please send applications to:

Dr. B. Forrest, Chair,
Department of Pure Mathematics,
University of Waterloo,
Waterloo, Ontario, Canada N2L 3G1
The department's Web page is at:
http://math.uwaterloo.ca/PM_Dept/homepage.html

CMS TRACTS IN MATHEMATICS TRAITÉS DE MATHÉMATIQUES DE LA SMC

The Canadian Mathematical Society is pleased to announce the launch of a *new* series of short monographs and lecture notes:

CMS Tracts in Mathematics

Editors:

K.R. Davidson and C.L. Stewart
Department of Pure Mathematics
University of Waterloo

The CMS Tracts in Mathematics will consist of original monographs of about 150 to 200 pages giving an exposition of a research topic of current interest, or lecture notes for an advanced graduate level course.

The Editors encourage potential authors to contact them at an early stage. Final manuscripts should be submitted to the Editors for consideration. Authors of accepted manuscripts will be expected to provide a LaTeX file using the series style file, available from the CMS TeX Office (tex-editor@cms.math.ca).

The series is a joint publication with the American Mathematical Society. Volumes will be paperbound. The final TeX files will be produced by the CMS, and the books will be printed and distributed by the AMS.

La Société mathématique du Canada est fière d'annoncer le lancement de sa nouvelle collection de courtes monographies et de notes de cours :

Traité de mathématiques de la SMC

Directeurs de collection :

K. R. Davidson et C. L. Stewart
Département de mathématiques pures
Université de Waterloo

Les Traités de mathématiques de la SMC seront des ouvrages originaux de 150 à 200 pages portant sur des domaines de recherche d'intérêt actuel, ou encore des notes de cours pour le deuxième ou le troisième cycle.

Les directeurs de la collection encouragent les auteurs potentiels à communiquer avec eux le plus tôt possible. Les directeurs procéderont à l'examen des textes finaux qui leur seront soumis. Les auteurs de textes acceptés devront remettre leur document en format LaTeX, composé à l'aide du fichier de style de la collection, qu'ils pourront se procurer au bureau de rédaction TeX de la SMC (tex-editor@smc.math.ca).

Les ouvrages de la collection, publiée en collaboration avec l'American Mathematical Society (AMS), seront des volumes brochés (à couverture souple). La SMC se chargera de préparer les fichiers TeX définitifs, et l'AMS, de l'impression et de la distribution des livres.

CALENDAR OF EVENTS / CALENDRIER DES ÉVÉNEMENTS

NOVEMBER 2000

18–22 International Conference on “Mathematics for Living” (Jordan)

<http://www.vsg.edu.au/egypt99/>

NOVEMBRE 2000

DECEMBER 2000

9–13 The Ninth International Workshop on Matrices and Statistics, in celebration of C.R.Rao's 80th birthday, (Osmania University, Hyderabad, India).

<http://eos.ect.uni-bonn.de/HYD2000.htm>

10–12 CMS Winter Meeting / Réunion d'hiver de la SMC (Hotel Vancouver, Vancouver, B. C.)

<http://www.cms.math.ca/CMS/Events/winter00>

DÉCEMBRE 2000

JANUARY 2001

9–14 Quasiclassical and Quantum Structures, in the Symplectic Topology, Geometry, and Gauge Theory Program (Fields Institute, Toronto and CRM, Montreal)

<http://www.fields.utoronto.ca/symplectic.html>

JANVIER 2001

10–13 Joint Mathematics Meeting. AMS MAA (New Orleans Marriott ITT Sheraton New Orleans Hotel, New Orleans, Louisiana)

<http://www.ams.math.org/meetings/>

MARCH 2001

25–30 Sixth International Conference on Approximation and Optimization, (Guatemala City, Guatemala)

<http://www.ing.usac.edu.gt/apopt6/>

26–April 7 Symplectic and Contact Topology, Field Theory and Higher Dimensional Gauge Theory, in the Symplectic Topology, Geometry, and Gauge Theory Program (Fields Institute, Toronto and CRM, Montreal)

<http://www.fields.utoronto.ca/symplectic.html>

MAY 2001

25–29 Annual meeting of the Canadian Mathematics Education Study Group, (University of Alberta, Edmonton)

<http://cmesg.math.ca>

MARS 2001

MAI 2001

25–27 Annual meeting and special session on French mathematics, Canadian Society for History and Philosophy of Mathematics / Société canadienne d'histoire et de philosophie des mathématiques (Université Laval, Québec)
<http://www.cshpm.org>

JUNE 2001

2–4 CMS Summer Meeting / Réunion d'été de la SMC
 (University of Saskatchewan, Saskatoon, Saskatchewan)
<http://www.cms.math.ca/CMS/Events/summer01>

4–13 Hamiltonian Group Actions and Quantization, in the Symplectic Topology, Geometry, and Gauge Theory Program (Fields Institute, Toronto and CRM, Montreal)
<http://www.fields.utoronto.ca/symplectic.html>

AUGUST 2001

7–9 Nordic Conference on Topology and its applications, NORDTOP 2001, (Sophus Lie Centre at Nordfjordeid, Norway)
nordtop2001@mail.mathatlas.yorku.ca

SEPTEMBER 2001

22–26 Applications of Discrete Mathematics, Australian Mathematical Society (Australian National University, Canberra)
 Ian Roberts: iroberts@darwin.ntu.edu.au or Lynn Batten: imbatten@deakin.edu.au

JUIN 2001**DECEMBER 2001**

8–10 CMS Winter Meeting / Réunion d'hiver de la SMC
 (Toronto Colony Hotel, Toronto, Ontario)
<http://www.cms.math.ca/CMS/Events/winter01>

MAY 2002

3–5 AMS Eastern Section Meeting (CRM, Université de Montreal)
<http://www.ams.math.org/meetings/>

JUNE 2002

CMS Summer Meeting / Réunion d'été de la SMC
 (Université Laval, Québec, Québec)
 Monique Bouchard: meetings@cms.math.ca

AUGUST 2002

20–28 International Congress of Mathematicians, (Beijing, China)
cms@math08.math.ac.cn; <http://icm2002.org.cn/>

DECEMBER 2002

CMS Winter Meeting / Réunion d'hiver de la SMC
 (University of Ottawa / Université d'Ottawa, Ottawa, Ontario)
 Monique Bouchard: meetings@cms.math.ca

MAI 2002**JUIN 2002****AOÛT 2002****DÉCEMBRE 2002****RATES AND DEADLINES 2001 / 2001 TARIFS ET ÉCHÉANCES**

Net rates/Tarifs nets	Institutional Members Membres institutionnels	Corporate Members Membres organisationnels	Others Autres
Full Page	\$ 215	\$ 405	\$ 540
3/4 Page	\$ 195	\$ 375	\$ 495
1/2 Page	\$ 130	\$ 245	\$ 325
1/4 Page	\$ 75	\$ 145	\$ 190
Inserts: maximum 4 pages	\$ 175	\$ 325	\$ 430
Surcharges apply for prime locations - contact notes-ads@cms.math.ca Des suppléments sont applicables pour des places de choix - communiquer avec notes-ads@smc.math.ca			

Issue/Numéro:	Deadline/Date limite:
February/février	December 1 décembre
March/mars	January 15 janvier
April/avril	February 15 février
May/mai	March 15 mars
September/septembre	July 1 juillet
October/octobre	August 15 août
November/novembre	September 15 septembre
December/décembre	October 15 octobre
Max. page size/Taille max. des pages: Back page/4e de couverture: 7.5 x 8.5 in./pouces Inside page/page intérieure: 7.5 x 10 in./pouces	

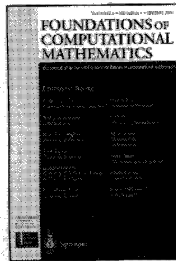
Les Notes de la SMC sont postées la première semaine du mois de parution. L'adhésion à la SMC comprend l'abonnement aux Notes de la SMC. Le tarif d'abonnement pour les non-membres est de 45 \$ CAN si l'adresse de l'abonné est au Canada et de 45 \$ US autrement.

SPRINGER FOR MATHEMATICS

INTRODUCING A NEW JOURNAL APPEARING IN 2001!

FOUNDATIONS OF COMPUTATIONAL MATHEMATICS

The Journal of the Society for the Foundations of Computational Mathematics



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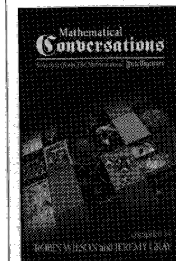
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