CMS NOTES de la SMC

Volume 36 No. 8 December/décembre 2004

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MESSAGE FROM THE EXECUTIVE DIRECTOR

Graham P. Wright

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Establishing Endowed Funds

Preamble

At present, the Canadian Mathematical Society (CMS) maintains an Operations Fund (OF), consisting of four Divisions (General, Education, Research and Publications), and three Restricted (Investment) Funds (the Endowment Fund (EF), the Mathematical Olympiads Fund (MOF) and the Designated Activities Fund (DAF)). The revenues and expenditures for activities relating to each of the four Division and three Restricted Funds are recorded and reported upon separately.

The Restricted Investment Funds are managed by TD Asset Management and the Finance Committee is responsible for reviewing the performance of these assets and for making recommendations on the asset mix and performance benchmarks as necessary. Although the Restricted Investment Funds are separated from the Operations Fund, the funds have not been established as true endowment funds with corresponding terms of reference. The CMS Finance Committee has recommended that the Society establish Terms of Reference for the "**CMS Endowed Funds**".

It is proposed to transfer the majority of the Restricted Investments Funds to two Endowment Funds – the CMS Endowment Fund and the Mathematical Olympiad Endowment Fund. These two Endowment Funds, together with any future Endowment Funds established and approved by the Board, would comprise the CMS Endowed Funds. The remaining portion of the Restricted Investment Funds not transferred to the CMS Endowed Funds would be transferred to a "Contingency Fund" which would reside within the Operations Fund. Although every effort will be made to ensure that the Operations Fund does not experience a deficit, the Contingency Fund would be used to offset a deficit if such a situation were to arise. Conversely, unexpected surpluses arising within the Operations Fund would be transferred to the Contingency Fund.

Given below is a description of the CMS Endowed Funds and the Terms of Reference for the CMS Endowment Fund and the Mathematical Olympiads Endowment Fund as well as an outline of the Principles for the Preservation of Capital. It is anticipated that an Endowed Funds Committee would be established to oversee the CMS Endowed Funds.

The Finance and Executive Committees have approved, in principle, the terms of reference and the preservation of capital principles described below. We now seek input from CMS members regarding this matter. Please send your comments by email to me (***director@cms.math.ca***) no later than **February 15, 2005**. Based upon the comments received, a final proposal will be prepared and submitted for the approval of the CMS Board of Directors in June 2005.

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CMS NOTES
NOTES DE LA SMC

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Editors-in-Chief
Robert Dawson, Srinivasa Swaminathan
notes-editors@cms.math.ca

Managing Editor
Graham P. Wright
gpwright@cms.math.ca

Contributing Editors
Education: Edward Barbeau
notes-education@cms.math.ca

Book Reviews: Peter Fillmore
notes-reviews@cms.math.ca

Meetings: Gertrud Jeewanjee
notes-reunions@cms.math.ca

Research: Vacant
notes-research@cms.math.ca

Editorial Assistant
Nathalie Blanchard

The Editors welcome articles, letters and announcements, which can be sent to the *CMS Notes* at:

Canadian Mathematical Society
577 King Edward Ave.
Ottawa, Ontario, Canada K1N 6N5

Telephone: (613) 562-5702
Fax: (613) 565-1539

notes-articles@smc.math.ca
www.cms.math.ca

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EDITORIAL

S. Swaminathan

Is it obvious?

It is said that G. H. Hardy once declared during a lecture that a certain statement was trivial. Then he hesitated for a moment and queried, "Is it trivial?" and then, after another pause for thought, said, "Yes, it is trivial."

Almost every mathematics lecturer meets with a similar experience some time or the other. It may happen that the claim that a certain statement is obvious can be easily explained. But it may not be so more often than not. A tedious argument or some lengthy calculations may be needed to substantiate the validity of the statement. In textbooks and journal articles we come across statements like 'it is clear that', 'it is easy to see that', etc. It could be that upon moving along accepting such a claim one might see the light. But frequently one gets annoyed when one cannot deduce the asserted statement from whatever was presumed.

Martin Gardner states the following problem in one of his articles: Draw three non-overlapping circles of different radii in the plane and let the three pairs of common tangents to each pair of circles meet in P, Q and R. The problem is to show that P, Q and R are collinear. This can be done by adding additional lines to the figure. When this problem was shown to a professor of engineering he studied the figure for a few minutes and then exclaimed "Yes, that's perfectly clear." The professor explained that he viewed the figure as a planar intersection of a three dimensional configuration in which there were three non-overlapping spheres of different radii and their three pairwise tangent cones with vertices at P, Q and R. This is a case in which obviousness stems from intuition. A hint to the effect that the problem should be looked at in three dimensions might be helpful.

A recent book 'Euclid in the Rainforest' by Joseph Mazur, a brother of Barry Mazur of Harvard University, contains the story of how Camille Jordan, in one of his lectures in 1886, on Cours d'Analyse at the Ecole Polytechnique, Paris, claimed that 'a curve that doesn't cross itself, and begins and ends at the same point, divides the plane into exactly two regions.' A vigilant student challenged this claim and Jordan spent most of his subsequent time in trying, without success, to establish the statement. After sometime he thought he had completed a lengthy proof only to find that Giuseppe Peano had constructed a space filling curve which conflicts with his arguments. It was only in 1905 that Oswald Veblen gave the correct proof of the palpable claim of Camille Jordan, which is now known as the Jordan Curve Theorem.

Consider the following statements: (A) The product of an infinite number of two-element sets is nonempty. (B) A solid sphere can be dissected into five sets that can be reassembled into two spheres each the size of the original. Many people find (A) to be obvious and (B) to be obviously wrong; yet the first, equivalent to the Axiom of Choice, implies the second.

Why is it that what is obvious to one person is not so to another? When one has been working on a subject for a length of time one becomes quite familiar with various aspects of the situation, having possibly analyzed it from different points of view. The interrelations between facts leading to an assertion may seem to be so clear to the author that he/she feels that they are unlikely to be missed by a reader.

Delving deeper into this question is a matter for psychologists.

Corrigendum: In the October editorial we credited Martin Gardner with the idea that "there are fewer small numbers than there are tasks for them to perform". While this was first published in a column by Gardner (in 1980), it was credited there to a then-unpublished manuscript by Richard Guy.

MESSAGE FROM THE EXECUTIVE DIRECTOR *(continued)*

Description

The Endowed Funds of the Canadian Mathematical Society (CMS) are to provide income to be applied generally or specifically in support of activities that promote and advance the discovery, learning and application of mathematics and for other similar purposes.

The Endowed Funds shall initially consist of two funds, the CMS Endowment Fund and the Mathematical Olympiads Endowment Fund, contributed from the CMS Restricted Funds. The Endowed Funds shall also include other Endowment Funds that may be established using additional moneys and property as may from time to time be donated to the Endowed Funds or to the CMS, subject to approval by the CMS Board of Directors.

The Terms of Reference that have been approved for a specific Endowment Fund by the CMS Board of Directors and the original donor (if applicable) shall govern all gifts or donations to that Endowment Fund.

Gifts and donations to the Endowed Funds shall be invested in accordance with the CMS Principles for the Preservation of Capital.

The CMS will strive, with the assistance of the original donors (where possible), to increase the capital in each existing Endowment Fund through other donations, pledges, gifts etc.

The CMS Endowed Funds Committee, or another committee determined by the CMS Board of Directors, will be responsible to the Board for the administration of the CMS Endowed Funds. The membership of an Endowed Funds Committee, or another committee determined by the Board, may be changed as necessary.

CMS Endowment Fund

Terms of Reference

The CMS Endowment Fund is to be used to provide annual income for support of activities that promote and advance the discovery, learning and application of mathematics and for other similar purposes, including:

(a) mathematics prizes and scholarships that are awarded through competition to students and academic staff at schools, universities and colleges in Canada;
(b) mathematics research, through the communication of current research to both the specialist and non-specialist, public recognition of research accomplishments and collaboration with the research institutes, granting agencies and the users of mathematics;
(c) mathematics education, through joint projects with mathematics educators at all levels, promotion of educational advancements, and partnerships with Provincial ministries of education and organizations supporting mathematics education;
(d) mathematics competitions and other activities that promote and advance the discovery, learning and application of mathematics in the Canadian provinces and territories;
(e) grants to students and teachers in developing countries to provide access to publications of Canadian mathematical societies and the Canadian mathematics research institutes and for other similar purposes;
(f) initiatives that explain, promote and increase the general understanding of mathematics, provide extra-curricula opportunities for students, and encourage partnerships with corporate, government and not-for-profit agencies.

Mathematical Olympiads Endowment Fund

Terms of Reference

The Mathematical Olympiads Endowment Fund is to be used to provide annual income for the CMS Mathematical Olympiad program in Canada, including, but not necessarily limited to, the Canadian Mathematical Olympiad, Canada's participation in the Asian Pacific Mathematical Olympiad and Canada's team to the International Mathematical Olympiad.

The Society's mathematical Olympiad program is the responsibility of the CMS Mathematical Competitions Committee in accordance with the policies and procedures approved by the CMS Board of Directors. The annual income from the Mathematical Olympiads Fund would be provided as a grant to the Society's Olympiad activities.

Principles for the Preservation of Capital

Gifts and donations to the Endowed Funds shall be invested in accordance with the principle to preserve capital and the investments shall include an asset mix of Canadian fixed income securities and Canadian and foreign equities and shall be invested in securities, other than real estate, as authorized by the current laws in force for the investment of funds of Canadian Life Insurance companies.

The intention is for the annual income for each Endowment Fund to provide for both real return and for inflation. This will be achieved through:

- asset diversification,
- investment in only investment grade assets,
- limiting expenditures to an amount reflecting the rate of real return,
- investment in both fixed income and equity assets, and
- maintaining an appropriate balance between fixed income and growth (equity) assets. As a guideline, and depending on market conditions, an asset mix such as 30% – Canadian Bonds, 10% – Canadian Real Return Bonds, 10% – Canadian Equities, and 50% – Global Equities would be appropriate.

Normally, a portion of the annual income for an Endowment Fund will be added to the capital base for the Fund and a portion of the annual income will be provided as revenue for the Fund. If necessary, the Board may approve that all of the annual income for a Fund shall be added to the capital base for the Fund, but not for more than five years consecutively. The maximum amount allocated to annual income should not exceed 6% of the capital base for any Endowment Fund within the Endowed Funds.

Also, should the situation arise that there is no annual income for an Endowment Fund, the Board may approve a transfer of part of the capital base for the Fund to the annual revenue of the Fund, but not for more than two years consecutively.

As circumstances warrant, part of the surpluses from the annual revenues and expenditures for an Endowment Fund can be transferred to the capital base of the Fund.

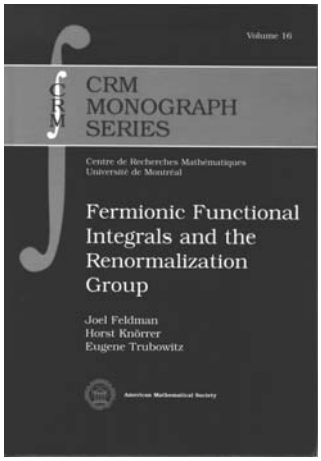
GENERALIZING FROM FREE PARTICLES IN ONE DIMENSION

Book review by Yvan Saint-Aubin, Université de Montréal

FERMIONIC FUNCTIONAL INTEGRALS AND THE RENORMALIZATION GROUP

By Joel Feldman, Horst Knörrer, Eugene Trubowitz

CRM Monograph Series, AMS 2002 vii + 115 pages



The principle of least action states that the classical trajectory of a system of particles is the one minimizing the action S. This quantity S is obtained by integrating the Lagrangian L, that is the difference between the kinetic and potential energies, between two given times. Both the physical and mathematical communities think now about mechanical systems in these terms.

It is one of Feynman's greatest contributions to have recognized that the action is also the physical quantity that drives quantum systems. In his formulation the probability amplitude of a quantum system is not obtained by solving the Schrödinger equation. Instead the probability that a particle starting at a position a at time t_a will be observed at a position b at time t_b is, up to a constant, $|K(a,b)|^2$ where $K(a,b)$ is the sum over all paths from a to b of the phase $e^{iS(x(t))/h}$. Again $S(x(t))$ is the integral of the Lagrangian L along the trajectory $x(t)$. Formally $K(b,a) = \int e^{iS(x(t))/h}\, Dx$. A better definition of Dx, the measure over all trajectories, needs to be given. Feynman proposes to cut the time interval t_a to t_b into $n+1$ subintervals of equal length, measuring the n intermediate positions x_i, $1 \le i \le n$, at times t_i, with $t_a < t_1 < t_2 < \ldots < t_n < t_b$. Then Dx is (simply) obtained by taking a limit as $n \to \infty$ of the resulting integration with measure $\prod dx_i$. For a free particle, the Lagrangian is the kinetic energy $mv^2/2$ with v constant and the action between two times t_a and t_b is $\frac{m}{2}(x_b - x_a)^2/(t_b - t_a)$. The n integrals to be performed are therefore all of the same form, the first being

$$\int_{\mathbb{R}} \exp\{-i \text{ const } [(x_2 - x_1)^2 + (x_1 - x_a)^2]\} dx_1$$

where const is a real (positive) constant and, again, x_1 and x_2 are the positions of the particle at the intermediate times t_1 and t_2. The calculation of the path integral is reduced here to n Gaussian integrals, followed by a limit. The result is

$$K(a,b) = (m/2\pi\hbar\,(t_b - t_a))^{-1/2} \exp(im(x_b - x_a)^2/2\hbar(t_b - t_a)).$$

This answer is somewhat disconcerting. Recall that the probability $P(a,b)$ is given by $|K(a,b)|^2$ up to a normalization constant. The first problem is that this probability cannot be normalized if the particle range is the real axis. To solve this problem one might think of putting the particle in a large but finite box. The second problem is that $P(a,b)$ does not depend on the distance $x_b - x_a$. This surprise is resolved if one remembers the Heisenberg uncertainty principle. We made the hypothesis that the particle was at position x_a at time t_a. Its initial wavefunction was therefore a Dirac distribution with mass centered at x_a. This precision of measurement on the position $(\Delta x = 0)$ must be compensated by an "infinite" lack of precision on the measurement of its momentum (Δp) so that their product satisfies $\Delta x \Delta y \ge \hbar/2$. At time t_a this perfectly localised particle must have had a momentum distribution whose support was not bounded. Notice that, if one observes the particle at a position x_b far from the original x_a, the phase in $K(a,b)$ will be quickly oscillating around this x_b, an indication that the particle carries a large momentum.

We just noted that the calculation of $K(a,b)$ amounted to n Gaussian integrals, followed by a limit. This is typical of path integrals whether the particle is free or submitted to a force: the Gaussian term comes from the kinetic energy. What is peculiar in this example is that the computation can be done explicitly.

The free particle in one dimension is clearly one of the simplest cases possible. The extension to more general physical systems remains a major research program in mathematical physics, one to which Feldman, Knörrer and Trubowitz have contributed significantly. Let us discuss a few of the challenges proposed by this extension that are related with the monograph under review.

(i) The free particle in one dimension is described by a real function of time in classical mechanics and by a square-integrable complex function of time and the spatial coordinate in quantum mechanics. A physical field ϕ, for example the electromagnetic one, can be described classically by real functions of time and space. Feynman's trick of replacing the formal Dx (the measure over paths) by the integration over n time slices is not obvious to extend. What is $D\phi$, the measure over all intermediate field configurations? (The quantum physics of objects whose classical description requires functions of both time and space is at the heart of quantum field theory.)

(ii) A technical difficulty is brought up by fermions. A fermion has the queer property that its wavefunction picks up a -1 factor after a rotation of 2π. (Mathematically they transform under irreducible even-dimensional representations of the infinitesimal rotation algebra $so(3)$.) The physics

is nonetheless invariant under rotation since the probabilities are calculated by taking the absolute value of wavefunctions. This behavior of the wavefunction under rotation is the basis of Pauli's exclusion principle. Electrons, protons and neutrons are fermions. That is to say, fermions are not a rarity in the universe. This behavior has also a consequence for wavefunctions of several fermions. The exchange of positions of two of the fermions also multiplies the wavefunction by a factor -1. If a quantum field theory possesses operators that, acting on the Hilbert space, create fermions at given positions and with given quantum numbers (like spin), these operators will have to anticommute. If they were in finite numbers, these operators would behave like elements of the exterior algebra of antisymmetric tensors over a finite-dimensional vector space V. In this parallel, the fermion creation operators would be like the elements of a basis of V, the (antisymmetric) 1–tensors. (The exterior algebra over a vector space is a prototype of a Grassmann algebra.) How are the Gaussian integrals introduced before to be extended to accomodate the anticommuting variables describing the fermionic degrees of freedom?

(iii) Interactions between fields add a new level difficulty. In the introductory example, we put the potential to zero. The interaction between fields is usually introduced through a two-body potential $u(x_1,x_2)$ that will change the (Grassmann) Gaussian integrals described before. The new integrals are more difficult. Even though most computations are usually made in terms of momentum variables, one can understand the origin of various problems in terms of space coordinates. For example, the electromagnetic potential is unbounded and the phase $e^{iS/h}$ will oscillate wildly around configurations containing charged particles close to one another. In other cases the potential might not decrease sufficiently fast enough at infinity to insure the convergence of the integrals. Are there mathematically sound procedures to control these integrals?

The monograph *Fermionic Functional Integrals and the Renormalization Group* addresses these three challenges, tangentially for (i), extensively for (ii) and (iii).

The first chapter of this monograph covers Grassmann Gaussian integrals. It introduces the mathematical structure required to define Grassmann integrals rigorously and then concentrate on Grassmann integrals containing an exponential whose argument is quadratic in the Grassmann variables. Except for Section 1.5 that ties these integrals to quantum field theories, the chapter is self-contained with a strong algebraic flavor (instead of an analytic one as one might expect). It is quite enjoyable to read.

The second chapter is devoted to one technique, introduced by physicists, to control the divergences described in (iii). Let me quote the first sentence of the Preface:

> The Renormalization Group is the name given to a technique for analyzing the qualitative behavior of a class of physical systems by iterating a map on the vector space of interactions for the class.

This technique (or more precisely this set of techniques) is commonly used in several chapters of physics: high energy physics, condensed matter physics, critical phenomena, etc. A general mathematical description is still lacking, even though encouraging examples are appearing. By introducing various norms on complex-valued functions on Grassmann algebras, the authors compute how the iterated renormalization map makes the interaction terms grow and how this growth is controlled under certain hypotheses. The three first sections are rather dry. Of a more analytic nature, they prove several formal inequalities constraining functionals related to the renormalization map. The fourth (and last) section brings these inequalities to bear. They are applied to two models of physical interest, the Gross-Neveu model and systems with many fermions.

These two chapters are completed by three technical appendices and exercises with solutions. (The second appendix is a short and excellent introduction to Pfaffians.)

The monograph grew out of lectures given in the 2000 Aisenstadt Chair at CRM by Joel Feldman. The pedagogical effort put in the writing is obvious and the exercises complement the text perfectly. (Actually it is hard to avoid reading them, thinking a little bit about them and jumping to the solutions at the end to check whether one's intuition was right.) The first chapter is complete by itself and could be read with profit by a large audience, mathematicians interested in graded structures and physicists working in fields where supersymmetry plays a role. The readership for the second might be more limited; it will appeal to mathematical physicists working (or starting to work) in rigorous quantum field theory.

Perhaps two minor criticisms are in order. The first one is somewhat inconsequential. There is a large number of misprints. Curiously they are not really annoying as none of them lead to scientific confusion. (Maybe this is another comment on the clarity of the exposition.) The second concerns the discussion on the physical origin and use of the techniques presented here. Mathematical physicists must borrow methods of reasoning from two different cultures. The authors chose to put one section in the middle of Chapter 1 and one at the end of Chapter 2 to tie these two ways of thinking. In both sections however the physics is too quickly covered (to my taste!) and I think only a limited group of readers will grasp the physical relevance of the difficult mathematical methods the authors have developed in their research program. This monograph is not an introduction to the physical tool known as the renormalization group.

That said, I need to stress that this is a fine (and very pedagogical) monograph whose two chapters might appeal to mathematicians and physicists of diverse backgrounds.

I would like to thank my colleague Niky Kamran who read an earlier version of this text and made several useful remarks.

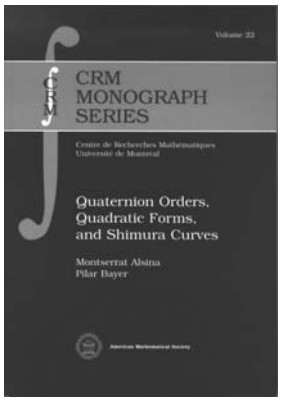
EFFECTIVE COMPUTATION FOR SHIMURA CURVES

Book review by Noriko Yui, Queen's University

QUATERNION ORDERS, QUADRATIC FORMS AND SHIMURA CURVES

by Monserrat Alsina and Pilar Bayer

CRM Monograph series, AMS 2004 xvi + 196 pages



This monograph provides a friendly introduction to Shimura curves from theoretical and algorithmic points of view. In recent years, Shimura curves (and more generally, Shimura varieties) have been getting considerable attention due to their strategic positions. A Shimura curve is a generalization of the classical modular curve, and it is associated to an indefinite quaternion algebra over a totally real number field K over $\boldsymbol{Q}$, and further to an arithmetic Fuchsian group $\Gamma \subseteq SL(2,\boldsymbol{R})$. The group Γ acts on the Poincaré half-plane H, and the quotient H/Γ yields a Riemann surface. The projective non-singular curve attached to this Riemann surface is called the Shiumra curve. It is known that Shimura curves parametrize principally polarized abelian surfaces with quaternion multiplication and level structure.

The monograph focuses on Shimura curves attached to Fuchsian groups defined from Eichler orders $O(D,N)$ of level N in a quaternion $\boldsymbol{Q}$-algebra of discriminant D. The Shimura curve associated to $O(D,N)$ is denoted by $X(D,N)$. One of the highlights of the monograph is the description of a process (an algorithm) for computing fundamental domains for Shimura curves $X(D,N)$ when the quaternion algebras are either non-ramified or small ramified. Explicit examples of fundamental domains when $N = 1$ and $D = 6, 10, 15$, are given. At theoretical level, one of the authors' goals is to compute the CM points on Shimura curves $X(D,N)$ and to classify them, using the results on hyperbolic uniformization and quadratic forms. The CM points are generalizations of Heegner points in the modular case.

The main difficulty in dealing with (non-modular) Shimura curves stems from the absence of cusps and the lack of numerical information (e.g., q-expansions) on abelian surfaces. The authors' approach to the study of Shimura curves is via quadratic forms. Ternary and quaternary quadratic forms attached to quaternion algebras or to their orders are studied in detail. In fact, the major part of the monograph is devoted to the analysis of quadratic forms (in particular, normic forms) associated to non-ramified or small ramified quaternion algebras, and quadratic forms provide foundations for effective computations.

There are a number of existing articles which address algorithmic aspects of Shimura curves, e.g., the determination of fundamental domains and defining equations, computation of CM points, etc. Here are some sample contributions. N. Elkies **Shimura curve computations**, (*Algorithmic number theory* (*Portland, OR, 1998), 1-47, Lecture Notes in Comput.Sci. 1423, Springer, Berlin, 1998*) describes some geometric methods for computing equations using the Schwarzian derivatives, and rational CM points on these curves. D. Kohel and H. Verrill **Fundamental domains for Shimura curves**, (*Les XXIIémes Journées Arithmetiques (Lille, 2001), J. Théor. Nombres Bordeaux 15 (2003), no. 1, 205-222.*) describes an algorithm for defining and computing fundamental domains for the Shimura curves $X(D,N)$.

The present monograph is a nice addition to the existing literature on the algorithmic approach to the theory of Shimura curves, and will serve as a friendly introduction to graduate students as well as to researchers, who wish to learn about the computational aspects of Shimura curves.

NEWS FROM DEPARTMENTS

York University, Toronto, ON

Appointments: Yuejiao Fu (Assistant professor, Statistics, July 2004); Peter Gibson (Assistant professor,Analysis, July 2004); Jorg Grigull (Assistant professor, Bioinformatics, July 2004); Manuel Morales (Assistant professor, Actuarial mathematics, July 2004); Hongmei Zhu (Assistant professor (NSERC UFA), Applied mathematics, July 2004).

Retirements: Morton Abramson (Professor, July 2004);Julia M.N. Brown (Associate Professor, July 2004);James Laframboise (Professor, July 2004); Martin Muldoon (Professor, July 2004);Joan Wick Pelletier (Professor, January 2004);S. David Promislow (Professor, July 2004); Allan D. Stauffer (Professor, July 2004).

Other News: David Tanny returned to full-time status in the department after twelve years on long-term disability, effective September 2004. Joan Wick Pelletier is now the Dean of Arts and Sciences at the State University of New York at Albany.

BRIEF BOOK REVIEWS

Peter Fillmore, Dalhousie University

SYMMETRY IN PHYSICS

P.Winternitz et al, editors

CRM Proceedings and Lecture Notes 34, AMS 2004 xxiv + 227 pages.

The papers in this volume are based on presentations at the workshop "Symmetries in Physics", held at the Centre de recherche mathématiques in September 2002 in honour of Robert T. Sharp.

Robert Sharp, who died in 2001, was Professor of Physics at McGill for many years and a seminal figure in mathematical physics, in particular the use of algebraic and group theoretical methods, in Montréal.

The preface includes reminiscences of Professor Sharp by Philip Wallace and J.Harnad, as well as a bibliography of his publications, 113 in all, running from 1953 to 2000. Other articles in the book represent his diverse interests, including representation theoretic methods for Lie algebras, quantization techniques and foundational considerations, modular group invariants and applications to conformal models, various physical models and equations, geometric calculations with symmetries, and pedagogical methods for developing spatio-temporal intuition.

MATH THROUGH THE AGES: A GENTLE HISTORY FOR TEACHERS AND OTHERS

by William P. Berlinghoff and Fernando Q. Gouvêa

Oxton House Publishers and MAA 2004 xii + 273 pages.

The authors, mathematicians with an interest in the history of mathematics–have written this book with the needs of teachers–at the school or beginning college level, in mind. They pose the question: if you want some historical background as you prepare to teach quadratic equations or negative numbers, or if you are just curious about the history of π or the metric system or zero, where would you look? They have provided, very successfully, a place to begin. For those who want more detail or other topics, the book concludes with an excellent chapter on what to read next. This has sections entitled "The Reference Shelf", "Fifteen Historical Books You Ought to Read", and "The Internet and Other Media", followed by a bibliography of 141 items.

The book opens with a brief essay on the use of history in the classroom, moving next to a 56-page look at the most important people, events and developments that have shaped the progress of mathematics through the ages. The bulk of the book consists of 25 "sketches", averaging 7 pages in length, covering such topics as those mentioned above and including Fermat's Last Theorem, the Platonic solids, non-Euclidean geometry, complex numbers, and electronic computers.

For this "expanded edition" of the original book, each of the sketches comes with two pages of questions and projects, for use in the classroom or just to think about.

NUMBER THEORY AND ALGEBRAIC GEOMETRY

Miles Reid and Alexei Skorobogatov, editors,

LMS Lecture Note Series 303, Cambridge 2003 v + 300 pages

This is a volume of papers in honour of Sir Peter Swinnerton-Dyer's 75th birthday. It opens with four delightful reminiscences, "attempting the impossible task of outlining Peter's many-sided contributions to human culture", by Bryan Birch, Jean-Louis Colliot-Thélène, G.K.Sankaran, and Miles Reid. This is followed by the editor's summary of the 12 papers making up the book and a bibliography of his 88 mathematical papers (to 2002).

From the editor's summary: The papers in this volume offer a representative slice of the delicately intertwined tissue of analytic, geometric and cohomological methods used to attack fundamental questions on rational solutions of Diophantine equations. The topics treated include rational points on algebraic varieties, the Hasse principle, Shafarevich-Tate groups of elliptic curves and motives, Zagier's conjectures, descent and zero-cycles, Diophantine approximation, and Abelian and Fano varieties.

FROBENIUS ALGEBRAS AND 2D TOPOLOGICAL QUANTUM FIELD THEORY

by Joachim Kock

LMS Student Texts 59, Cambridge 2004 xiv + 240 pages

This book is based on notes prepared for a summer school course for advanced undergraduates, given in Brazil in 2002. The prerequisites are some familiarity with the basic notions of of differentiable manifolds and algebraic structures, the latter including groups, rings and algebras, as well as the basics of category theory.

The three chapter titles are: Cobordism and topological quantum field theories, Frobenius algebras, and Monoids and monoidal categories. The author's immediate aim is "simply to expose some delightful and not very well known mathematics where a lot of figures can be drawn: a quite elementary and very nice interaction between topology and algebra." The main result is that 2D topological quantum field theories are the same as commutative Frobenius algebras.

The development is couched in the language of category theory, and indeed the author's main aim is to motivate the use of category theory and, specifically, to introduce monoidal categories.

The book is provided with exercises, diagrams and figures on nearly every page, an appendix on category theory, a reference list of 50 items, and an index.

EDUCATION NOTES

Ed Barbeau, University of Toronto

Les langages en mathématiques et en sciences

Bélanger, M., Piché, M.-C., Riopel, M., Staub, C., & de Grandpré, C., *Intervenir sur les langages en mathématiques et en sciences*, (dir.: Margot De Serres), (2003) Mont-Royal, QC: Modulo

At the college level, statistics confirm that the failure rate in mathematics and science courses is often high. As research indicates that many learning difficulties depend on language weaknesses, the authors of the book (a report on large-scale research) give prominence to the role of language in learning of mathematics and science (biology, chemistry and physics). To tackle this problem, they elaborated strategies based on tracking down students with such weaknesses at the beginning of their college studies, and they developed activities to improve students' abilities in communication. This research won a special prize from the Ministry of Education in Québec for its exceptional contribution to the prevention of dropping out of school.

Le langage est à la base de toute communication et joue un rôle essentiel dans l'apprentissage. En mathématiques et en sciences, il se présente sous des formes différentes : naturel, symbolique et graphique. Cette complexité peut être une cause de difficultés importantes chez plusieurs élèves. Une équipe multidisciplinaire de cinq professeurs à l'ordre collégial a décidé de s'attaquer à ce problème en élaborant un plan d'action basé sur le dépistage d'élèves pouvant éprouver des difficultés langagières dès leur entrée au collège, et en développant des stratégies d'interventions pédagogiques afin d'accroître les compétences langagières de ces élèves dans les disciplines suivantes : mathématiques, biologie, chimie et physique.

Pour chacune des quatre disciplines retenues, les chercheurs ont élaboré des tests de dépistage des élèves à risque, tests qui ont fait l'objet d'une validation auprès d'experts et de personnes (collègues, enseignants, élèves) concernées par l'objet de la recherche. Chaque test était constitué de questions ouvertes et de questions à choix multiples. La durée de chacun des tests de sciences était de 20 minutes, et celle du test de mathématiques, de 35 minutes. Chaque élève passait trois tests (mathématiques, chimie et, selon le cas, biologie ou physique).

L'analyse des tests, l'étude de la corrélation entre le résultat, combiné à ces tests, et les résultats des élèves à la fin de la session dans les disciplines en cause, permettent d'affirmer que : 1° l'ensemble des résultats aux tests de dépistage est un meilleur outil de prédiction de la réussite des élèves que les résultats à un seul test pris isolément; 2° les élèves qui obtiennent un résultat inférieur à la moyenne aux trois tests de dépistage sont véritablement des élèves à risque dans les cours de sciences.

Les principales faiblesses langagières des élèves décelées dans l'ensemble des tests de dépistage sont : une connaissance superficielle des notions de base (les préalables), des faiblesses dans le langage naturel, une absence d'analyse des expressions symboliques et un manque d'habileté à traduire d'un langage à un autre. Pour corriger les faiblesses langagières et améliorer l'habileté de communication des élèves en mathématiques et en sciences, les auteurs ont élaboré 30 activités pédagogiques qui ont été validées et expérimentées. Les activités proposées peuvent toucher un ou plusieurs langages (naturel, symbolique ou graphique) ou d'autres formes d'expressions langagières utilisées en mathématiques ou en sciences (tableaux réseaux, organigrammes ou ordinogrammes). Les activités mettent aussi l'accent sur des aspects langagiers spécifiques comme la sémantique, la syntaxe ou la traduction d'une langue ou d'un mode d'expression à un autre. Il y a deux types d'activités : des activités dites ponctuelles pour atteindre des objectifs spécifiques, par exemple pour corriger une faiblesse langagière précise ou pour amener une prise de conscience chez les élèves; des activités dites progressives conçues pour atteindre des objectifs généraux comme le développement d'habilités langagières chez les élèves ou l'amélioration de la qualité de leur communication écrite ou orale en sciences.

Commentaires

Ce texte de la collection Astroïde est le résumé d'une vaste recherche multidisciplinaire menée à l'ordre collégial et qui a demandé la participation d'un grand nombre de collaborateurs et d'élèves.

La problématique décrite permet de noter chez les chercheurs une excellente connaissance de la documentation concernant le sujet traité. La structure de l'exposé et la clarté de l'écriture facilitent grandement la lecture du rapport des interventions menées et des analyses détaillées et pertinentes qui y sont faites. À noter que la méthodologie, entre autres, est accessible via le site web de l'éditeur.

Mettre en évidence des difficultés d'apprentissage est une étape importante d'une recherche en didactique, mais amener des éléments de solution à ces difficultés est sans doute l'élément le plus marquant de cette recherche-action, et démontre la préoccupation des chercheurs à contribuer de façon tangible à l'amélioration d'une situation problématique réelle en développant des outils appropriés. Comme le mentionnent les auteurs, un aspect original de cette recherche, c'est qu'ils ont eu recours à des stratégies d'enseignement plutôt qu'à des stratégies d'apprentissage. De ce fait, cette recherche s'adresse davantage aux professeurs que directement aux élèves; elle peut en effet produire un effet multiplicateur étant donné que chaque professeur peut intervenir auprès d'un grand nombre d'élèves année après année. Nous ne pouvons qu'être d'accord avec les auteurs qui recommandent de tout mettre en œuvre pour sensibiliser les professeurs de tous les ordres d'enseignement à l'importance du langage dans leur discipline et aux difficultés langagières des élèves. En ce sens, leur texte est une référence indispensable.

Il est important de souligner que cet ouvrage a remporté un Prix spécial du Ministre de l'Éducation du Québec (2004) pour une contribution exceptionnelle à la prévention du décrochage scolaire.

Harry White

Midnight murder

It was 7 minutes after midnight. The dog was lying on the grass in the middle of the lawn in front of Mrs. Shears's house. Its eyes were closed. It looked as if it were running on its side, the way dogs run when they think they are chasing a cat in a dream. But the dog was not running or asleep. The dog was dead. There was a garden fork sticking out of the dog.

These are the opening lines of a remarkable

EDUCATION NOTES *(continued)*

book, in which the tale is told in the first person by an English autistic youth, Christopher Boone, initially aged 15 years, 3 months and 2 days. The title is *The Curious Incident of the Dog in the Night-Time,* by **Mark Haddon**, Anchor (Random House), 2003. 226 pages. ISBN 0-385-65980. ***www.randomhouse.ca***.

The jacket describes it as the "Whitbread Book of the Year" in 2003; it is easy to see why the book would pick up awards. The literalism, penchant for detail, emotional naivety and idiosyncratic knowledge of the narrator seems to be authentically captured, and there is enough suspense, humour and twists to keep the reader engaged until the end.

I note this book here because Christopher has a particular interest in mathematics and science. The short chapters all are numbered with primes. During the course of the story, Christopher pauses to impart some item of interest. In Chapter 19, the Sieve of Eratosthenes is described and we are told that

Prime numbers are useful for writing codes and in America they are classed as Military Material and if you find one over 100 digits you have to tell the CIA and they buy it off you for $10000. But it would not be a very good way of making a living.

The Monty Hall problem of the car and goats concealed behind closed doors in a game show is analyzed in Chapter 101, while the sequential logistic equation $n_{k+1} = \lambda n_k\,(1 - n_k)$ for population density is given an airing in Section 151.

But the most interesting mathematical bit is found in Section 191, In the puzzle, *Conway's soldiers*, you are given an infinite grid of squares partitioned by a horizontal line. Below the line, each square is covered by a coloured tile; above the line, each square is bare. You are permitted to jump one coloured tile over another, vertically or horizontally, into a vacant square. The jumped tile is removed. How far above the horizontal line can you get a coloured tile?

Remarkably, it is impossible to get a tile more than four squares above the horizontal line.

These are examples of mathematics that can be insinuated into the broader culture, and on that account worthy of attention in the schools. The Monty Hall problem has already arrived in this sense. It became notorious through the *Ask Marilyn* column in *Parade*, a widely circulated weekend newspaper insert in the USA, and has now appeared in textbooks. The sieve for isolating primes has long been occasionally used by a few knowledgable teachers. The logistic equation is ripe for classroom study, because of its realistic mirroring of biological populations, its mathematical tractability at the secondary level and its capability of computer analysis.

The Conway problem is surely worthy of becoming part of general mathematical lore. While Haddon does not get into this, establishing the impossibility of moving a tile more than four squares about the horizontal border requires no more than high school mathematics (quadratics and geometric series). However, it uses interesting and important mathematical gambits. The idea is to assign a quantity to each array of coloured tiles that does not increase with any move.

Let x be the real number for which $0 < x < 1$ and $1 = x + x^2$. To the squares along the file just below the horizontal line, assign the values

$$\ldots, x^4, x^3, x^2, x, 1, x, x^2, x^3, x^4, \ldots\ .$$

For the kth horizontal file below this one, multiply the values in the corresponding position of the original file by x^k. For the kth file above, multiply by x^{-k}. Thus, a vertical motion down corresponds to multiplication by x.

The sum of the numbers assigned to the positions of the coloured tiles is

$$s = 1 + 3x + 5x^2 + 7x^3 + \ldots\ .$$

Now

$$\begin{aligned} x^2 s &= (1 - x)\, s = s - xs \\ &= 1 + 2\,(x + x^2 + x^3 + \ldots) \\ &= 1 + 2x\,(1-x)^{-1} = (1+x)(1-x)^{-1} = x^{-1}\cdot x^{-2}\ , \end{aligned}$$

whence $s = x^{-5}$.

Each vertical move up takes a tile from position evaluated at x^{m+1} to one evaluated at x^{m-1} and removes a tile from a position evaluated at x^m. Since $x^{m-1} = x^m + x^{m+1}$, the total value of the squares occupied by the tiles remains the same. A vertical move down decreases the value. Similarly, it can be checked that a horizontal move does not increase the total value of the squares occupied by the tiles.

Suppose that we succeed in getting a tile five squares above the horizontal line. Without loss of generality, we may suppose that the square values are oriented so that it is on a square with value x^{-5}. But this is as much as the value of all the squares originally occupied by the tile, and leaves nothing for the other tiles. (See the reference for a discussion of this problem.)

There are other problems that have made the public rounds. Two from my own schooldays are the problems of the twelve billiard balls and of the three men renting a hotel room.

In the first, one has twelve balls identical in appearance, eleven of which have the same weight. One is required to make three applications of an equal-arms balance to determine the odd ball and whether it is heavier or lighter than the rest.

The second has experienced a recent revival. Three men go into a hotel and pay $10 each for a room that they will share. (This rate surely dates the problem.) After they leave the registration desk, the clerk realizes that he should have charged them only $25 for the three of them. So he sends the bellhop after them with the $5 change. The bellhop, of uncertain morality, figures, "What the heck! Those guys won't know the difference if I return them each one dollar and keep two dollars for myself." -- which is what he does. So the men have paid $9 each for the room for a total of $27; the bellhop gets $2. This adds up to $29. But there was originally $30. What happened to the other dollar?

One of the best riddles was told me many years ago by Claude Gaulin of Laval University, who brought it back from Russia, that fount of comely problems. You have a circular table in which are sunk four deep wells symmetrically at the corners of a square. Inside each well is a tumbler in one of two states, upright or inverted. They are not visible. The table is free to rotate.

Initially, the tumblers are not all in the same state. Your job is to get them all upright or all inverted in finitely many moves under the following conditions. The table rotates and stops at random. You are allowed to thrust your hands into at most two of the wells, determine the state of the tumblers within, and, if desired, to change the state of any number of them. You then withdraw your hand; the table rotates and then stops again at random. This is repeated as often as necessary. A bell sounds automatically when the four tumblers all have the same state.

Is it possible to achieve the task in finitely many

EDUCATION NOTES *(continued)*

moves? It is not clear that the answer is in the affirmative. After all, it is conceivable that at least one tumbler may always escape attention. However, the final uniform state can be either all upright or all inverted. So, it might be possible; if so, provide an algorithm.

As a rider, we can ask for the problem to be solved if you are not allowed to feel the tumblers, but can instruct a robot to go to any two wells and leave the tumblers in a desired state.

There is much to be experienced, learned and enjoyed by students given problems like this, and one important role of schools is to enhance the cultural texture of the world of the pupils. This is mathematics that really schmecks!

Reference

Ross Honsberger, *Mathematical Gems II*. Mathematical Association of America (Dolciani), 1976. ISBN 0-88385-302-7. (*A problem in checker jumping*, pages 23-28.)

Ed Barbeau

Olympiads 2003

USA and International Mathematical Olympiads 2003

Edited by Titu Andreescu & Zuming Feng. Mathematical Association of America (Problems Books), 2004. xv + 85 pages. ISBN 0-88385-817-7 Price: US$26.95

Order information: The Mathematical Association of America, PO Box 91112, Washington, DC 20090-1112, Fax 301-206-9789, Phone 301-617-7800. ***www.maa.org*** Catalog code: US4

This book contains 18 problems from the USAMO, the US Selection test and the IMO, along with hints for solutions and final solutions. Additional chapters list the contributors of the problems, provide a glossary and a bibliography; the appendix provides a list of US Olympiad winners and IMO team members along with the scores of the top 12 IMO teams for each of the years 1999 to 2003 inclusive. A table of cumulative IMO results over the five years for the top 20 teams informs us that, with a maximum possible score of 1260, the top five teams were China (1048), Russia (964), Bulgaria (918), USA (889), Korea (841). Canada stood 19th with a score of 547, just ahead of Australia with a score of 544 and behind Israel with a score of 563. Continentally, there were 2 teams from North America, 7 from the former Soviet bloc, only Germany from Western Europe, 3 from the Near East, 6 from the Far East, and Australia.

While all of the problems are indeed of high calibre, there are some that lend themselves to use with ordinary students. Here are three:

1. (USAMO) Prove that for every positive integer n there exists an n–digit number divisible by $5n$ all of whose digits are odd.
6. (USAMO) At the vertices of a regular hexagon are written six nonnegative integers whose sum is 2003. Bert is allowed to make moves of the following form: he may pick a vertex and replace the number written there by the absolute value of the difference between the numbers written at the two neighbouring vertices. Prove that Bert can make a sequence of moves, after which the number 0 appears at all six vertices.
3. (Team selection test) Find all ordered triples of primes (p, q, r) such that

$$p \mid qr + 1 \ , \quad q \mid rp + 1 \ , \quad r \mid pq + 1 \ .$$

2. (IMO) Determine all pairs of positive integers (a, b) such that

$$\frac{a^2}{2ab^2 - b^3 + 1}$$

is a positive integer.

The difficulty of such problem lies in developing a general strategy and formulating a solution that will cover all cases. While ordinary students will not have the skill to do this, at least on their own, they can deal with examples, and through exploration and assistance from a teacher, begin to come to grips with the underlying mechanisms.

CMS/CSHPM SUMMER 2005 MEETING / RÉUNION D'ÉTÉ 2005 DE LA SMC/SCHPM

June 4 – 6 juin, Waterloo, ON

PRIZES / PRIX

CMS Krieger-Nelson
Barbara Lee Keyfitz (Fields Institute, University of Houston)

CMS Jeffery-Williams
Edward Bierstone, Pierre Milman (University of Toronto)

CSHPM PLENARY SPEAKER / SCHPM CONFÉRENCIER PLÉNIER
Len Berggren (Simon Fraser University)

CMS PLENARY SPEAKERS / SMC CONFÉRENCIERS PLÉNIERS
Keith Devlin (Stanford University)
Dan Freed (University of Texas at Austin)
Robert McCann (University of Toronto)
Andrei Okounkov (Princeton University)
Gilles Pisier (Université Paris 6 and Texas A&M University)
Ken Ribet (University of California at Berkeley)

PUBLIC LECTURE / CONFÉRENCE POPULAIRE
Moshe Milevsky (Schulich School of Business, York University)

SESSIONS

Automatic Sequences and Related Topics
Suites automatiques et sujets reliés
Org: Jeffrey Shallit (Waterloo), Jean-Paul Allouche (Orsay, France)

Combinatorics and Geometry / *Combinatoire et géométrie*
Org: Ian Goulden (Waterloo)

Complex Variables / *Variables complexes*
Org: Thomas Bloom (Toronto), Paul Gauthier (Montreal)

Discrete and Computational Geometry
Géométrie discrète et computationnelle
Org: Therese Biedl, Leroy J Dickey (Waterloo), Asia Ivic Weiss (York)

Dynamical Systems / *Systèmes dynamiques*
Org: Sue Ann Campbell (Waterloo), Yuming Chen (Wilfrid Laurier), Huaiping Zhu (York)

Exploratory Classroom Problems in Calculus
Problèmes d'exploration de salle de classe en calcul
Org: Peter Taylor (Queen's)

Functional Equations and Their Applications
Équations fonctionnelles et leurs applications
Org: Janos Aczel, Che-Tat Ng (Waterloo)

General Topology and Its Applications
Topologie générale et ses applications
Org: E.D. Tymchatyn (Saskatoon), A. Karassev, M. Tuncali, V. Valov (Nipissing)

Geometric Topology / *Topologie géométrique*
Org: Doug Park, Mainak Poddar (Waterloo), Hans Boden (McMaster)

History and Philosophy of Mathematics
Histoire et philosophie des mathématiques (SCHPM Session)
Org: Duncan Melville (St. Lawrence)

History of Mathematics from Medieval Islam to Renaissance Europe / *Histoire des mathématiques de l'Islam médiéval à l'Europe de la Renaissance (SCHPM Session)*
Org: Rob Bradley (Adelphi)

Invariant Theory and Differential Geometry
La théorie des invariants et la géométrie différentielle
Org: Ray MacLenaghan (Waterloo), Roman Smirnov (Dalhousie)

L-Functions and Algebraic Curves
Fonctions L et courbes algébriques
Org: Yu-Ru Liu, David McKinnon, Michael Rubinstein (Waterloo)

Mathematical Aspects of Quantum Information
Aspects mathématiques de l'informatique quantique
Org: Achim Kempf, Mike Mosca (Waterloo), Daniel Gottesman (Perimeter Institute), David Kribs (Guelph)

Mathematics from Ancient to Modern Times
Mathématiques des temps anciens aux temps modernes
Org: Richard O'Lander, Ronald Sklar (St. John's)

Mathematics of Actuarial Finance
Mathématiques financières actuarielles
Org: Tom Salisbury (York, Fields)

Mathematics of Computer Algebra and Analysis
Mathématiques de l'algèbre et de l'analyse computationels
Org.: Keith Geddes, Mark Giesbrecht, George Labahn, Arne Storjohann (Waterloo)

Nonlinear Partial Differential Equations
Equations aux derivées partielles non linéaires
Org: Walter Craig (McMaster), Robert McCann (Toronto), Catherine Sulem (Toronto)

Operator Algebras, Operator Spaces and Harmonic Analysis
Algèbres d'opérateurs, espaces d'opérateurs et analyse harmonique
Org: Ken Davidson, Brian Forrest (Waterloo)

Random Graphs and Their Applications
Les graphes aléatoires et leurs applications
Org: Penny Haxell, Nicholas Wormald (Waterloo), Anthony Bonato (Wilfrid Laurier)

Representation Theory / *La théorie des représentations*
Org: Wentang Kuo (Waterloo)

String Theory and Integrable Systems
Théorie des cordes et systèmes intégrables
Org: Lisa Jeffrey (Toronto), Boris Khesin (Toronto), Rob Myers (Perimeter Institute)

Special Session for Contributed Papers / *Communications libres*
Org: Peter Hoffman (Waterloo)

CALL FOR SESSIONS
CMS WINTER 2005 MEETING

Additional self-supported sessions play an important role in the success of our meetings. The CMS welcomes and invites proposals for self-supported sessions for this meeting (December 10 - 12, 2005) at the Victoria Conference Centre. Proposals should include a brief description of the focus and purpose of the session, the number and expected length of the talks, as well as the organizer's name, complete address, telephone number, e-mail address, etc. These additional sessions will be incorporated with the other sessions in time blocks allocated by the Meeting Director. All sessions will be advertised in the *CMS Notes*, on the web sites and, if possible, in the Notices of the AMS and in publications of other societies. Speakers in these additional sessions will be requested to submit abstracts which will be published on the web site and in the meeting programme. Those wishing to organize a session should send a proposal to the Meeting Director by the deadline below.

Deadline: December 15, 2004

In addition to various plenary and prize lectures, the following sessions will be taking place:

1. **Operator Algebra / *Algèbres d'opérateurs***
   Org: Marcelo Laca, John Phillips (Victoria)
2. **Applied Partial Differential Equations**
   Équations différentielles appliquées
   Org: Anne Bourlioux (Montreal), Reinhard Illner, Boualem Khouider, (Victoria)
3. **Probability / *Probabilité***
   Org: Martin Barlow, Edwin Pekins (UBC)

APPEL DE PROPOSITIONS DE SESSIONS
RÉUNION D'HIVER 2005 DE LA SMC

Les sessions complémentaires autonomes jouent un rôle important dans le succès de nos Réunions. La SMC vous invitent à proposer des sessions autonomes pour son congrès qui se tiendra à Victoria Conference Centre (du 10 au 12 décembre 2005). Toute proposition doit inclure une brève description de l'orientation et des objectifs de la session, le nombre de communications prévues et leur durée ainsi que le nom, l'adresse complète, le numéro de téléphone, le courriel et autres coordonnées de l'organisateur. Ces sessions complémentaires seront intégrées aux autres sessions du programme, dans des cases horaires prévues à cet effet par le directeur de la Réunion. Toutes les sessions seront annoncées dans les *Notes de la SMC*, sur le site web et, si possible, dans le bulletin de l'AMS et les publications d'autres sociétés. Les conférenciers de ces sessions complémentaires devront présenter un résumé qui sera publié sur le site web et dans le programme de la Réunion. Toute personne qui souhaiterait organiser une session est priée de faire parvenir une proposition au directeur de la Réunion avant la date limite ci-dessous.

Date limite : 15 décembre, 2004

Aux différentes conférences plénières et de prix s'ajouteront les sessions suivantes :

4. **Matrix Analysis / *Analyse matricielle***
   Org: Man-Duen Choi (Toronto), Douglas Farenick (Regina)
5. **Variational Analysis and Optimization**
   Analyse variationnelle et optimisation
   Org: Jane Ye (Victoria)
6. **Ergodic Theory / *Théorie ergodique***
   Org: Christopher Bose (Victoria), Andres del Junco (Toronto)

Meeting Director / Directeur de réunion
Ahmed Ramzi Sourour
CMS Winter 2005 Meeting / Réunion d'hiver 2005 de la SMC
Department of Mathematics & Statistics - University of Victoria
PO Box 3045 STN CSC
Victoria, BC, V8W 3P4
sourour@math.uvic.ca

Distinguished Service Award / Prix de la SMC pour service méritoire

In 1995, the Society established this award to recognize individuals who have made sustained and significant contributions to the Canadian mathematical community and, in particular, to the Canadian Mathematical Society.

The 2004 award recipient is Edgar Goodaire (Memorial University of Newfoundland).

Nominations should include a reasonably detailed rationale and be submitted by **March 31, 2005**, to the address below.

En 1995, la Société mathématique du Canada a créé un prix pour récompenser les personnes qui contribuent de façon importante et soutenue à la communauté mathématique canadienne et, notamment, à la SMC.

Le lauréat du prix 2004 est Edgar Goodaire (Memorial University of Newfoundland).

Pour les mises en candidature prière de présenter des dossiers avec une argumentation convaincante et de les faire parvenir, le **31 mars 2005** au plus tard, à l'adresse ci-dessous

Selection Committee / Comité de sélection
Distinguished Service Award / Prix pour service méritoire
Canadian Mathematical Society / Société mathématique du Canada
577 King Edward
Ottawa, Ontario K1N 6N5

APPEL DE MISES EN CANDIDATURE
PRIX DE DOCTORAT 2005 DE LA SMC

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

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

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

Candidatures

Les candidats doivent être nommés par leur université; la personne qui propose un candidat doit se charger de regrouper les documents décrits aux paragraphes suivants et de faire parvenir la candidature à l'adresse ci-dessous. Aucune université ne peut nommer plus d'un candidat. Les candidatures doivent parvenir à la SMC au plus tard le **31 janvier 2005**.

Le dossier sera constitué des documents suivants :

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

Président, Comité de sélection du Prix de doctorat
Bureau administratif de la SMC
577 avenue King Edward
Ottawa, Ontario Canada K1N 6N5

CALL FOR NOMINATIONS
2005 CMS DOCTORAL PRIZE

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

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

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

Nominations

Candidates must be nominated by their university and the nominator is responsible for preparing the documentation described below, and submitting the nomination to the address below. No university may nominate more than one candidate and the deadline for the receipt of nominations is **January 31, 2005**.

The documentation shall consist of:

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

Chair, Doctoral Prize Selection Committee
CMS Executive Office
577 King Edward Avenue
Ottawa, Ontario K1N 6N5 Canada

CANADIAN MATHEMATICAL SOCIETY
MINUTES OF THE ANNUAL GENERAL MEETING

Ondaatje Auditorium, Dalhousie University - Halifax, Nova Scotia - June 13, 2004

The meeting opened at 11:45 a.m. with 49 members in attendance.

1 Adoption of the agenda
Agenda: Wright/Caron The agenda was accepted as circulated.

2 Minutes of the previous meeting
That the minutes of the previous Annual General Meeting, held on June 15, 2003 be accepted.

3 Matters Arising
A proposal was made to the Royal Society of Canada regarding Comptes-Rendus. The Royal Society is currently reviewing some options and we awaiting feedback.

4 President's Report
Rousseau reported that there is interest in holding more joint meetings similar to the Summer 2004 meetings. These joint meetings would involve other mathematics societies and the institutes. Meetings for next few years are already planned but possibilities are being explored for joint meeting with MITACS in 2007 and meeting involving several societies in 2008.

The CMS is working with the National Research Council and the mathematics Institutes to produce a bid to hold the 2010 International Congress of Mathematicians (ICM) in Canada. The bid will be submitted by November.

The applied mathematics societies are placing a similar bid for ICIAM 2011 to be held in Vancouver.

Rousseau noted that the Society is experiencing some difficulties balancing the budget. A significant portion of CMS revenues come through exchange revenues and due to the increase in the value of the Canadian dollar these revenues are decreasing. Some restructuring of the Executive Office has taken place which will reduce some costs and Eddy Campbell is pursuing some fund raising initiatives.

A Math Education Forum was held in 2003 and another will be held in 2005, hosted by the Fields Institute. PIMS is willing to host another forum in 2008 or 2009.

5 Treasurer's Report
Sherk presented the Audited Statement and the Treasurers' Report. He noted the change in accounting policy regarding the way in which revenue from foreign exchange associated with membership and subscription income is reported. The 2003 financial statements have been prepared in accordance with this new policy and the comparative figures for prior years have also been adjusted to reflect this change.

The effect of this change will be most pronounced for the 2004 financial year where a greater than anticipated deficit is expected.

For the 2003 financial year, the Operations Fund surplus was $31,382. The Society's Restricted Investment Funds did not preform well, but since late 2003 returns from these investments have improved to some extent.

5.1 Audited Statement
That the Audited Statement for the period ending December 31, 2003 be accepted.

5.2 Treasurer's Financial Report
That the Treasurer's Report for the period ending December 31, 2003 be accepted.

5.3 Appointment of Auditors
That the firm of Raymond Chabot Grant Thornton be reappointed as auditor of the Canadian Mathematical Society for the period ending December 31, 2004.

6 Executive Director and Secretary's Report
Wright thanked Dalhousie University and particularly the meeting directors and session organizers for their excellent work for the 2004 Summer Meeting. It is expected the number of participants will be close to 450.

Wright commented on the membership situation and emphasized the benefits of CMS memberships and that members should encourage their colleagues to join.

Wright reported on the recent staff changes at the Executive Office. He also noted that the CMS Executive Office may be undertaking contract work for another society that may require changing one position from part-time to full-time.

He also reported on the appointment of Jonathan Borwein as the Associate Publisher for Books and Media Products. This should help the Society generate much needed additional revenues. Thanks were extended to all the editors-in-chiefs, the other editors and staff at the Publications Office in Winnipeg for their help in ensuring our publications are of high quality and are produced on schedule.

He asked all members to do all that they could to encourage their colleagues to join the Society.

On behalf of the Executive Office staff, Wright expressed thanks and appreciation to Christiane Rousseau for her considerable assistance and leadership during her two years as President. It had not been an easy period and her guidance was extremely valuable. He also thanked Thomas Ransford, Susan Cooper and Robert Juricevic for their work as chairs of the Endowment Grants Committee and the Student Committee.

7 2003 Annual Report to the Members
In addition to the reports from the President, the Treasurer, the Executive

MINUTES OF THE ANNUAL GENERAL MEETING
(continued)

Director and the standing committee chairs, the 2003 Annual Report to Members also includes a list of those who have donated to one or more of the Society's activities. The CMS is very grateful to all those who contributed to a very successful year.

That the 2003 Annual Report to the Members be accepted.

8 Reports from Committees

Daryl Tingley (Math Camps Coordinator) reported that there are currently 13 math camps across the country supported through the CMS and that there is at least one camp in each province. These camps have been very successful, and are particularly beneficial to skilled students who appreciate the challenge and depth of the camps. He encouraged members to consider running a math camp and to contact him for further information.

Advancement of Mathematics: Rousseau reported that the Math In Moscow programme is continuing. To-date, four students have returned from the Moscow Independent University. NSERC has renewed funding for the Math in Moscow program for 2004-2005.
It is hoped to send a poster on Careers in Mathematics to all schools and libraries across Canada in the fall of 2004.

In preparation for the Society's fund raising drive, a number of supporting materials are being developed.

Education: Richard Caron reported on the upcoming education sessions at CMS meetings. The committee also provided judges for the 2004 Canada Wide Science Fair which took place at Memorial University. A math project won the best junior project award. Caron also reported that Leo Jonker (Queen's university) was the first recipient of the Excellence in Teaching Award and that he will receive his award at this meeting.

Electronic Services: David Rodgers noted that MathSciNet now contains links to papers from the Canadian Journal of Mathematics and the Canadian Mathematical Bulletin.

Endowment Grants: On behalf of Thomas Randsford, Karl Dilcher reported that the Board had voted to make $25,000 available for the 2004 Endowment Grants Competition. For 2003 Endowment Grants Competition, four out of seven proposals were awarded a total of $17,000.

Finance: Akbar Rhemtulla reported that the current financial situation is somewhat tight. He noted that plans are underway to create a true endowment fund and a separate "contingency fund". Having an Endowment Fund with specific terms of reference should facilitate fund raising.

International Affairs: On behalf of Jonathan Borwein, Rousseau commented that the committee is focussing on the bid for ICM 2010, and is also looking at ways to ensure that Canadians are represented in international bodies and congresses.

Mathematical Competitions: On behalf of Peter Cass, Wright reported on the 2003 Canadian Open Mathematics Challenge, the 2004 Canadian Mathematical Olympiad and the 2004 Canadian IMO team to Greece. Canada's IMO teams have done particularly well in recent years, in part due to the excellent training seminars. The National Camp hosted by the University of Western Ontario has been very beneficial, thanks mainly to main organizers (Tom and Marlene Griffiths) and Richard Hoshino. In 2005, it is anticipated the National Camp will be hosted by UQAM.
Bill Sands reported on the Asian Pacific Mathematics Olympiad which Canada has hosted for the last three years. He also mentioned that the 2004 Canadian IMO team is particularly young, with three grade 10 students and no students beyond grade 11.

The IMO team members will be attending the Summer IMO Training Camp, hosted by UQAM, before departing for Greece. Good press coverage has been obtained.

Nominating: On behalf of Line Baribeau, Rousseau reported that all vacant positions have been filled.

Publications: On behalf of Dana Scholmiuk, Wright reported that the Publications Committee has recommended or approved a number of members for some of the editorial vacancies and is currently determining the recipient(s) for the 2004 G. de B. Robinson Award. Wright also reported that the CMS Book Series is doing very well, and that Jonathan Borwein has been appointed as the CMS Associate Publisher for Books and New Media.

Research: On behalf of Ragnar-Olaf Buchweitz, Rousseau reported on the committee's activities which including deciding on the funded research sessions for our semi-annual meetings and choosing the winners for the various research prizes. Wright commented that deadline for prize nominations has been moved to June 30.

The Committee was pleased by the number of nominations for Society's research prizes. The Committee considers that all Ph.D. granting departments should nominate their best doctoral thesis. The confirmed sites for future CMS meetings are:

- Winter 2004 - Montreal
- Summer 2005 - Waterloo
- Winter 2005 - Victoria
- Summer 2006 - Calgary

Students: Susan Cooper reported that the Student Committee held a graduate student social at this meeting with 20 to 30 students in attendance. The committee has also approved support for four regional graduate student conferences at $125 each. Student email contact lists are being prepared, and faculty or students contacts are being sought. The 2004 Canadian Undergraduate Mathematics Conference is being held at Dalhousie University June 16-20. Cooper also noted that an Operations Manual for the Committee has been written.

MINUTES OF THE ANNUAL GENERAL MEETING
(continued)

Women in Mathematics: Judith McDonald reported that a survey of department chairs is being undertaken to determine department demographics. The CWiMAC Meeting in Edmonton has resulted in a number of participants continuing to come to CMS meetings. A follow-up conference will be held at BIRS in 2005. The Winter meeting of the Women in Mathematics Committee will be an open meeting for all women members.

9 Other Business

The CMS has received a request to have a joint meeting between the CMS and the New Zealand Mathematical Society in Wellington, possibly in February, 2007. A joint meeting with the Australian Mathematical Society has also been proposed. Rousseau noted that such joint meetings will be considered after evaluating the success of the Toulouse 2004 meeting.

Rousseau reflected on the promising situation of mathematics in Canada. Eddy Campbell thanked Christiane Rouseau for her enormous contributions as CMS President.

Campbell/Wright That the Society expresses its thanks to Christiane Rousseau for her services as President for the past two years.

10 Adjournment

The meeting adjourned at 12:45 p.m.

ÉDITORIAL
S. Swaminathan

Est-ce une évidence?

On raconte que G. H. Hardy a déjà affirmé, dans un cours, qu'un certain énoncé était évident. Après un moment d'hésitation, il demande : « Au fait, est-ce vraiment évident? » Puis après une autre pause, il déclare : « Oui, c'est évident. »

Quiconque donne des cours de mathématiques se retrouvera dans pareille situation un jour ou l'autre. Dans certains cas, l'énoncé sera évident et facile à expliquer. Mais la plupart du temps, l'explication n'est pas si facile à donner. Il faudra parfois des arguments fastidieux ou des calculs interminables pour valider de l'énoncé. Dans les manuels et les articles scientifiques, des auteurs utilisent des tournures comme « il est clair que », « il est évident que », etc. Il se peut qu'à force d'accepter un énoncé comme vrai, on finit par y voir clair. Mais souvent, il est désagréable de ne pouvoir arriver à l'assertion, par déduction, à partir de ce qui est supposé.

Dans l'un de ses articles, Martin Gardner pose le problème suivant : Tracez trois cercles non confondus et de rayons différents dans le plan et soit P, Q et R les points d'intersection des trois paires des tangentes communes à chaque pair des trois cercles. Le problème est de montrer que les points P, Q et R sont colinéaires. On peut y arriver en traçant des lignes supplémentaires. Lorsque ce problème a été présenté à un professeur de génie, il s'est exclamé, après quelques minutes : « Oui, c'est tout à fait clair ! ». Le professeur a ensuite expliqué qu'il a imaginé la figure comme l'intersection dans le plan d'une configuration à trois dimensions dans laquelle il y avait trois sphéres non confondus et de rayons différents et leurs trois cônes tangents à chaque pair des cercles et dont les sommets sont les points P, Q et R. Voilà un cas où l'évidence découle de l'intuition. Cela montre qu'il pourrait être utile d'étudier le problème en trois dimensions.

Dans un livre paru récemment et intitulé *Euclid in the Rainforest*, Joseph Mazur, frère de Barry Mazur de l'Université Harvard, raconte que Camille Jordan avait déclaré en 1886 dans un de ses cours d'analyse à l'École Polytechnique de Paris, qu'« une courbe qui ne se recoupe pas et qui commence et finit au même point, sépare le plan en deux parties ». Un étudiant vigilant a alors remis son énoncé en question, et Jordan a passé le plus clair du reste de sa vie à essayer, en vain, de prouver son assertion. Après un certain temps et croyant être arrivé à une preuve après de longs travaux, il a découvert que Giuseppe Peano avait conçu une « courbe de remplissage de l'espace » qui défaisait ses preuves. Il a fallu attendre 1905 pour qu'Oswald Veblen formule la preuve correcte de l'assertion de Camille Jordan, désormais connue sous le nom de Théorème de la courbe de Jordan.

Prenons les énoncés suivants :

(A) Le produit d'un nombre infini d'ensembles de deux éléments est non vide.

(B) Une sphère pleine peut être divisée en cinq ensembles que l'on peut réassembler en deux sphères, chacune ayant la taille de la sphère originale.

Pour bien des gens, l'énoncé (A) est évident et l'énoncé (B) est évidemment faux; pourtant, de (A), qui correspond à l'axiome de choix, on peut déduire (B).

Pourquoi un fait évident pour une personne ne l'est-il pas pour une autre? Quand on travaille sur un sujet pendant longtemps, on finit par le connaître en profondeur à force de l'avoir analysé sous toutes sortes d'angles. Les interrelations entre les faits menant à une assertion paraissent parfois si claires pour l'auteur que celui-ci a peine à croire qu'elles pourraient échapper au lecteur.

Mais laissons aux psychologues le soin de se pencher plus à fond sur cette question.

MESSAGE DU DIRECTEUR ADMINISTRATIF

Graham Wright

La création de fonds de dotation

Préambule

En ce moment, la Société mathématique du Canada (SMC) a un budget de fonctionnement qui comprend quatre divisions (général, éducation, recherche et publications) et trois fonds (d'investissement) affectés (le fonds de dotation, le fonds pour les olympiades mathématiques et le fonds pour activités réservées). Les recettes et les dépenses pour les activités correspondant aux quatre divisions et aux trois fonds affectés sont inscrits et comptabilisés séparément.

Les fonds d'investissement affectés sont gérés par Gestion de placements TD, et le Comité des finances est chargé d'en surveiller le rendement et de faire des recommandations quant à la répartition de l'actif et les objectifs, au besoin. Même si les fonds d'investissement affectés sont distincts du budget de fonctionnement, ils ne sont pas des fonds de dotation en bonne et due forme assortis de conditions. Le Comité des finances de la SMC a recommandé à la Société de définir les conditions propres aux **Fonds de dotation de la SMC**.

Il est proposé de transférer la majorité des fonds d'investissement affectés dans deux fonds, soit le fonds de la SMC et le fonds des olympiades mathématiques. Ces deux fonds, ainsi que tout autre fonds de dotation ultérieurement créé et approuvé par le Conseil, constitueront l'ensemble des **Fonds de dotation de la SMC**. Le reste des fonds d'investissement affectés non transférés dans les Fonds de dotation de la SMC iront dans un « fonds de prévoyance », qui fera partie du budget de fonctionnement. Même si nous ferons de notre mieux pour ne pas que le budget de fonctionnement enregistre un déficit, le fonds de prévoyance rétablira l'équilibre advenant une telle situation. À l'opposé, si le budget de fonctionnement devait enregistrer des surplus inattendus, ceux-ci seraient transférés dans le fonds de prévoyance.

Vous trouverez ci-dessous la description des Fonds de dotation de la SMC et des conditions associées au Fonds de la SMC et au Fonds des olympiades mathématiques, ainsi que les Principes de conservation du capital. On s'attend à ce qu'un Comité des Fonds de dotation soit créé pour surveiller les Fonds de dotation de la SMC.

Le Comité des finances et le Comité exécutif ont approuvé, en principe, les conditions et les principes de conservation du capital décrits ci-dessous. Nous sollicitons donc les commentaires des membres de la SMC à ce sujet. Veuillez me faire parvenir vos commentaires par courriel (***directeur@smc.math.ca***) **au plus tard le 15 février 2005**. En fonction des commentaires reçus, nous rédigerons un document final que nous soumettrons au Conseil d'administration de la SMC en juin 2005.

Description

Les Fonds de dotation de la Société mathématique du Canada (SMC) produiront des revenus qui permettront le financement, de façon générale ou particulière, d'activités visant à promouvoir et à favoriser la découverte et l'apprentissage des mathématiques, et les applications qui en découlent.

Initialement, les Fonds de dotation de la SMC se composeront de deux fonds, soit le Fonds de la SMC et le Fonds des olympiades mathématiques, créés à partir des fonds affectés de la SMC. Les Fonds de dotation comprendront aussi d'autres fonds qui pourraient être créés avec de l'argent et des biens provenant d'autres sources, par exemple des dons dirigés vers les Fonds de dotation ou la SMC, moyennant l'approbation par le Conseil d'administration de la SMC.

Les conditions approuvées pour un fonds de dotation particulier par le Conseil d'administration de la SMC et le donateur original (s'il y a lieu) régiront tous les dons qui seront versés dans ces fonds.

Les dons affectés aux Fonds de dotation seront investis conformément aux Principes de conservation du capital de la SMC.

La SMC s'efforcera, avec l'appui des donateurs d'origine (dans la mesure du possible), d'augmenter le capital de chaque fonds par l'entremise d'autres dons, de promesses de dons, de legs, etc.

Le Comité des fonds de dotation de la SMC, ou tout autre comité que précisera le Conseil d'administration de la SMC, sera imputable, envers le Conseil, de l'administration des Fonds de dotation de la SMC. La composition du Comité des fonds de dotation, ou de tout autre comité précisé par le Conseil, sera modifiable au besoin.

Fonds de la SMC

Conditions

Le Fonds de la SMC produira des revenus qui permettront le financement, de façon générale ou particulière, d'activités visant à promouvoir et à favoriser la découverte et l'apprentissage des mathématiques, et les applications qui en découlent, notamment :

- Des prix et bourses de mathématiques décernés par voie de concours à des élèves, étudiants et enseignants des écoles, universités et collèges du Canada;
- La recherche mathématique, au moyen de la diffusion de recherches actuelles et pertinentes à la fois pour les spécialistes et les non-spécialistes, de la reconnaissance publique des réalisations scientifiques et de la collaboration avec les instituts de recherche, les organismes subventionnaires et les utilisateurs de mathématiques;
- L'enseignement des mathématiques par l'entremise de projets conjoints avec des enseignants de mathématiques de tous les ordres d'enseignement, de la promotion de réalisations éducatives et de partenariats avec les ministères provinciaux de l'Éducation et les organismes au service de l'éducation mathématique;
- Des concours mathématiques et autres activités visant à promouvoir et à favoriser la découverte et l'apprentissage des mathématiques, et les applications qui en découlent dans les provinces et territoires du Canada;
- Des subventions qui permettraient de donner aux étudiants et enseignants de pays en développement l'accès aux publications des sociétés mathématiques et instituts de recherche en mathématiques du Canada, et qui pourraient servir à d'autres fins;
- Des initiatives qui expliquent, favorisent et intensifient la compréhension générale des mathématiques, permettent l'organisation activités parascolaires pour les élèves et les étudiants, et favorisent les partenariats avec les sociétés privées, gouvernementales et sans but lucratif.

MESSAGE DU DIRECTEUR ADMINISTRATIF *(suite)*

Fonds des olympiades mathématiques

Conditions

Le Fonds des olympiades mathématiques fournira un revenu annuel au programme des olympiades mathématiques de la SMC au Canada, qui comprend notamment l'Olympiade mathématique du Canada, la participation du Canada à l'Olympiade mathématique Asie-Pacifique et la participation de l'équipe canadienne à l'Olympiade internationale de mathématiques.

Le programme des olympiades mathématiques de la SMC relève du Comité des concours mathématiques de la SMC, conformément aux politiques et procédures approuvées par le Conseil d'administration de la SMC. Le revenu annuel tiré du Fonds des olympiades mathématiques serait versé sous forme de subvention aux programme des olympiades de la Société.

Principes de conservation du capital

Les dons affectés aux Fonds de dotation de la SMC seront investis conformément aux principes de conservation du capital, et les investissements comprendront un portefeuille d'actifs composé de valeurs à revenu fixe canadiennes et de capitaux propres étrangers et canadiens. Ils seront investis dans des titres autres qu'immobiliers, tel que prescrit par les lois en vigueur sur l'investissement de fonds des sociétés d'assurance-vie du Canada.

L'objectif : que le revenu annuel de chaque fonds de dotation procure à la fois un rendement réel et couvre la coût de l'inflation. Pour y parvenir, il faudra :

- diversifier les actifs;
- investir dans des titres de bonne qualité seulement;
- limiter les dépenses à un montant correspondant à la valeur réelle du rendement;
- investir dans des titres à revenu fixe et des actions;
- maintenir un équilibre entre le revenu fixe et la croissance; à titre indicatif, et selon les conditions du marché, un portefeuille d'environ 30 % d'obligations canadiennes, 10 % d'obligations canadiennes à rendement réel, 10 % d'actions canadiennes et 50 % d'actions mondiales, serait approprié.

Généralement, une partie des revenus fixes d'un fonds de dotation est ajouté au capital du fonds, et l'autre partie sert de revenu annuel. Si nécessaire, le Conseil peut approuver que tout le revenu annuel d'un fonds s'ajoute au capital initial du fonds, mais pas plus de cinq années consécutives. Le montant maximal de revenu annuel ne dépassera pas 6 % du capital de base de tout fonds des Fonds de dotation de la SMC.

En outre, s'il devait arriver qu'un fonds ne génère aucun revenu, le Conseil pourrait approuver le transfert d'une partie du capital de base du fonds aux revenus annuels, mais pas plus de deux années consécutives.

Selon les circonstances, une partie des surplus du revenu annuel et des dépenses d'un fonds pourrait être transférée au capital de base du fonds.

CALENDAR OF EVENTS / CALENDRIER DES ÉVÉNEMENTS

DECEMBER 2004 DÉCEMBRE

6-10 III Joint Meeting Japan-Mexico in Topology and its Applications (Oaxaca, Mexico) *jamex@matmor.unam.mx*

6-10 Compact Moduli Spaces and Birational Geometry (AIM Research Conference Center, Palo Alto, CA) *http://aimath.org/ARCC/workshop/birational/*

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

16-19 International Conference on History and Heritage of Mathematical Sciences (Holkar Science College, Indore, India) *bsyadav@indiashm.com*

JANUARY 2005 JANVIER

5-8 Annual Meeting of American Mathematical Society (Atlanta,GA) *www.ams.org/meetings/*

10-14 Workshop on Topological Strings (Fields Institute, Toronto, ON) *abrand@fields.utoronto.ca*

26-30 Front Propagation and Nonlinear Stochastic PDEs for Combustion and other applications (CRM, Montreal, Quebec) *crm@ere.umontreal.ca*

FEBRUARY 2005 FÉVRIER

7-9 IMA Tutorial/Workshop: Where Mathematics Meets Industry (University of Minnesota, Minneapolis, MN) *visit@ima.umn.edu; www.ima.umn.edu/matter/*

MARCH 2005 MARS

2-5 Representing Unresolved Degrees of Freedom for the Atmosphere and Ocean (CRM, Montreal, Qc) *crm@ere.umontreal.ca*

6-12 International Congress on Algebras, in memory of Kostia Beidar (National Cheng Kung University, Tainan, Taiwan) *http://www.moonstone.math.ncku.edu.tw/AlgebraConference/*

19-20 28th Annual Texas PDE Conference (University of Texas, Pan American, Edinburgh, TX) *http://www.math.panam.edu/txpde05/*

21-25 Workshop on $N = 1$ Compactifications (Fields Institute, Toronto, ON) *abrand@fields.utoronto.ca*

21-25 Extensions of Hilbert's Tenth Problem, AIM Research Conference Center, Palo Alto, CA) *www.aimath.org/ARCC/workshops/Hilberts10th/*

22-26 Conference on Algebra and its Applications, Ring Theory and its Applications (Ohio University, Athens, OH) *algebraconference@math.ohiou.edu*

28-Apr 1 Workshop on String Phenomenology (The Perimeter Institute, Waterloo, ON) *abrand@fields.utoronto.ca*

APRIL 2005 AVRIL

6-10 Extracting Macroscopic Information from Molecular Dynamics (CRM, Montreal, Quebec) *crm@ere.umontreal.ca*

27-May 1 Multiscale Modelling in Solids (CRM, Montreal, Quebec) *crm@ere.umontreal.ca*

CALENDAR OF EVENTS / CALENDRIER DES ÉVÉNEMENTS

MAY 2005 MAI

2-6 Workshop on Gravitational Aspects of String Theory (Fields Institute, Toronto, ON) *abrand@fields.utoronto.ca*

13-14 6th Mississippi State-UAB Conference on Differential Equations & Computational Simulations; Dedicated to Louis Nirenberg's 80th birthday and Klaus Schmitt's 65th birthday (Mississippi State University, Mississippi State, MS) *http://www.msstate.edu/dept/math/de2005/*

14-15 Conference in honor of Heydar Radjavi's 70th Birthday (Hotel Golf, Bled, Slovenia) *Damjana.Kokol@FMF.Uni-Lj.SI, www.law05.si/hrc/*

15-18 HPCS 2005: New HPC Culture in Canada, The 19th Annual Symposium on High Performance Computing Systems and Applications *(University of Guelph, Guelph, ON) http://www.scharcnet.ca/events/hpcs2005/*

15-21 ICMI Study15; The Professional Education and Development of Teachers of Mathematics (Aguas de Lindoia, Sao Paulo, Brazil) *dball@umich.edu*

15-21 43rd International Symposium on Functional Equations (Batz-sur-Mer, France) *ISFE42@math.slu.cz Nicole.Belluot@ec-nantes.fr, romanger@us.edu.pl*

22-25 ICCS 2005: International Conference on Computational Science, Advancing Science through Computation (Atlanta, GA) *Iccs2005@mathcs.emory.edu*

JUNE 2005 JUIN

1-5 Stochastic Modelling in Financial Mathematics (CRM, Montreal, Quebec) *crm@ere.umontreal.ca*

4-6 **CMS 2005 Summer Meeting / Réunion d'été 2005 de la SMC** (University of Waterloo) *meetings@cms.math.ca*

7-17 Fields Institute Summer School on Operator Algebras (University of Ottawa, Ottawa, ON) *http://www.fields.utoronto.ca/programs/scientific/04-05/opalg_school/*

19-24 Canadian Operator Symposium(COSy) dedicated to George Elliott's 60th birthday (University of Ottawa, Ottawa, ON) *http://www.fields.utoronto.ca/programs/scientific/04-05/COSy)/*

19-July 8 Random Processes, random matrices and integrable systems (CRM short program) Centre de recherches mathematiques, Universite de Montreal, Montreal, Quebec) *crm@ere.umontreal.ca*

16-19 Second Joint Meeting of American Math. Soc with the Deutsche Math.-Vereinigung and the Osterreichische Math.Gesellschft (Mainz, Germany) *www.ams.org/meetings/*

26-29 12th International Linear Algebra Society Conference (Regina, SK) *www.math.uregina.ca/~ilas2005/*

RATES AND DEADLINES 2004 / TARIFS ET ÉCHÉANCES 2004

Net rates Tarifs nets	Institutional Members Membres institutionels	Corporate Members Membres organisationnels	Others Autres
Full page	$ 245	$ 460	$ 615
3/4 page	$ 225	$ 425	$ 565
1/2 page	$ 150	$ 280	$ 375
1/4 page	$ 90	$ 170	$ 225
Back cover/plat verso	$ 310	$ 580	$ 775
Inserts: max. 4 pages*	$ 185	$ 345	$ 460

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Des suppléments sont applicables pour des places de choix - communiquer avec *notes-ads@smc.math.ca*
* Pour plus de 4 pages ou pour l'inclusion d'une copie prête-pour-l'impression, veuillez envoyer un échantillon aux bureau administratif de la SMC afin d'obtenir un estimé.

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

Maximum page size / taille maximum des pages:
Back cover/plat verso: 7.5 x 8.5 in/pouces
Inside page/page intérieure: 7.5 x 10 in/pouces

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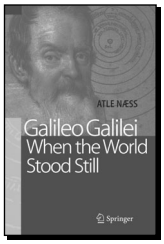
NEW AND NOTEWORTHY



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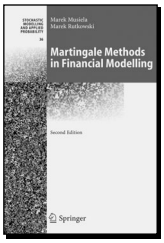

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