

CMS

NOTES

de la SMC

Volume 33

No. 8

December / décembre 2001

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Banff International Research Station Launched

On September 24, 2001 the governments of Alberta, Canada and the United States announced the establishment of a new international mathematical research facility in Banff, Alberta. The Banff International Research Station for Mathematical Innovation and Discovery (BIRS) will annually host thousands of top international scientists and researchers for intense workshops, collaborative research efforts, and training sessions across the entire spectrum of pure and applied mathematical sciences.

The joint venture is spearheaded in Canada by the Pacific Institute for the Mathematical Sciences (PIMS) and in the US by the Berkeley based Mathematical Sciences Research Institute (MSRI). The facility will also profit from the active participation of the Mathematics of Information Technology and Complex Systems Network of Centres of Excellence (MITACS).

At a ceremony held simultaneously in Washington DC and Banff, Rita Colwell, Director of the National Science Foundation of the United States, announced an award of \$1.95 million, Robert Church, Chair of the Alberta

Science Research Authority, committed \$1.7 million and Tom Brzustowski, President of the Natural Sciences and Engineering Research Council of Canada, announced an award of \$1.5 million towards the operation of BIRS from 2003 to 2005. The station will also be supported by the British Columbia Ministry of Competition, Science and Enterprise through its sponsorship of PIMS.

The facility will be housed at the well-known Banff Centre, which has already won acclaim for its programs in music, mountain culture, writing and publishing, visual arts, and its centre for management. BIRS is the first of its kind in North America. Modelled on two similar European facilities, BIRS is expected to enhance research capacity and help develop the careers of young researchers both in North America and around the world. This is the first time that Canada and the US have collaborated on this type of facility.

PIMS was commended by the funding agencies for seizing the opportunity to bring the facility here and for securing wide support for it. NSERC received almost 400 letters of support from researchers in Canada, the US and around the world.

(see page 22 for more coverage)

CMS NOTES
NOTES DE LA SMC

The *CMS Notes* is published by the Canadian Mathematical Society (CMS) eight times a year (February, March, April, May, September, October, November, and December).

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No responsibility for views expressed by authors is assumed by the *Notes*, the editors or the CMS. The style files used in the production of this volume are a modified version of the style files produced by Waterloo Maple Software, ©1994, 1995.

ISSN: 1193-9273 (Print);
1496-4295 (Online)

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EDITORIAL



Peter Fillmore

The funding of BIRS, the Banff International Research Station, reported in this issue, represents another giant step forward for Canadian mathematics. It provides an important new dimension to the existing infrastructure of the CMS (and the other mathematical science societies) and the three research institutes. We have indeed come a long way since the founding of the CMS in 1945 and the CRM in 1968. Particularly in the past ten years, our community has displayed exceptional energy and creativity. Everyone involved is to be congratulated and can take pride in these achievements. But such feelings “don’t butter many parsnips”. It is crucial now not to rest on our oars, but to consolidate and build on this excellent foundation.

In this issue we are pleased to reprint a book review which originally appeared in the Newsletter of the AWM, the Association for Women in Mathematics. *Galileo’s Daughter*, which is based on 124 surviving letters to Galileo from his eldest daughter at her convent, provides a fascinating glimpse of the times of the great mathematician and astronomer.

The AWM was founded, in 1971, “to encourage women to study and to have active careers in the mathematical sciences”. In support of this goal it supports numerous activities and awards, including workshops, conferences and the annual Emmy Noether Lecture, which honours women

who have made “fundamental and sustained contributions to the mathematical sciences”. For more information, go to www.awm-math.org.

La création de la station de recherche internationale de Banff (Banff International Research Station, BIRS), annoncée dans ce numéro, constitue un pas de géant pour les mathématiques au Canada. La station procure une toute nouvelle dimension à la SMC (et aux autres sociétés de sciences mathématiques) ainsi qu’aux trois instituts de recherche. Nous en avons fait du chemin depuis la création de la SMC en 1945 et du CRM en 1968. Au cours des dix dernières années, en particulier, notre communauté a fait preuve d’une énergie et d’une créativité sans bornes. Toutes les personnes qui ont contribué à cette réussite méritent nos félicitations et peuvent être fières de leurs réalisations. De telles félicitations, toutefois, ne <mettent pas beaucoup de beurre sur nos épinards>. Autrement dit, il est très important de ne pas nous asseoir sur nos lauriers, mais plutôt de renforcer nos acquis et de bâtir sur ces fondements solides.

Dans ce numéro, nous avons le plaisir de réimprimer une critique de livre parue à l’origine dans le bulletin de l’Association for Women in Mathematics (AWM). Intitulé *Galileo’s Daughter*, cet article est fondé sur 124 lettres que Galilée a écrites à sa fille aînée qui était au couvent et offre un aperçu fascinant de l’époque de ce grand mathématicien et astronome.

Fondée en 1971, l’AWM a pour mandat initial <d’encourager les femmes à étudier et à poursuivre des carrières actives en sciences mathématiques>. Dans cet objectif, l’association appuie de nombreuses activités et prix, y compris des ateliers, des colloques et le prix de conférence annuel Emmy-Noether, remis à des femmes qui ont fait une <contribution fondamentale et soutenue aux sciences mathématiques>. Pour de plus amples renseignements, rendez-vous au www.awm-math.org.

FROM THE VICE PRESIDENTS

by Bernard Hodgson (Laval)



Bernard Hodgson

Activités récentes de la CIEM/ICMI

(This paper presents the International Commission on Mathematical Instruction and reports on its activities during the last two years. Extended English versions of the 1999 and 2000 Annual Reports on ICMI Activities are available on the ICMI website at the address <http://www.mathunion.org/ICMI/>.)

J'occupe depuis janvier 1999 le poste de Secrétaire de la Commission internationale de l'enseignement mathématique (CIEM) — *alias* International Commission on Mathematical Instruction (ICMI). J'aimerais profiter de l'invitation qui m'a été faite de m'adresser aux membres de la SMC à titre de Vice-président pour présenter brièvement la Commission ainsi que ses principales activités des deux dernières années. Le présent texte reprend en partie le rapport sur les années 1999 et 2000 paru dans la revue *L'Enseignement Mathématique*, 47 (2001) 173–179.

À propos de la CIEM

Fondée lors du quatrième Congrès international des mathématiciens tenu à Rome en 1908 avec le mandat initial d'effectuer une étude comparative de l'enseignement des mathématiques dans les écoles secondaires, la CIEM a tôt fait d'élargir le champ et la portée de ses activités. Le premier Président en fut Felix Klein et

le premier Secrétaire général, Henri Fehr, l'un des fondateurs de la revue *L'Enseignement Mathématique* (qui fut d'ailleurs adoptée dès le départ comme organe officiel de la CIEM). Après une période d'inactivité durant la deuxième Guerre mondiale, la CIEM fut reconstituée en 1952, alors que la communauté mathématique internationale était en réorganisation, en tant que commission de l'Union mathématique internationale (UMI), nouvellement créée. Les membres de la Commission sont des pays, au nombre de 80, à savoir les membres de l'UMI et d'autres pays spécifiquement cooptés à la CIEM.

La CIEM vise à offrir à tous ceux intéressés par l'enseignement et l'apprentissage des mathématiques (chercheurs, praticiens, concepteurs de programmes, etc.) un forum facilitant la réflexion, la collaboration, l'échange et la dissémination d'idées et d'information sur tous les aspects de l'éducation mathématique à tous les niveaux et telle que vue selon une perspective internationale.

Depuis une vingtaine d'années, les activités de la Commission sont articulées autour de quelques pôles principaux: Congrès internationaux sur l'enseignement des mathématiques (tel le congrès ICME-7 qui a attiré en 1992 à Québec plus de 3400 participants), Études de la CIEM, conférences régionales, activités des Groupes d'étude affiliés. Le présent rapport présente un survol de ces activités pour les années 1999 et 2000.

Congrès ICME

Depuis le premier Congrès international sur l'enseignement des mathématiques (International Congress on Mathematical Education — ICME), tenu à Lyon en 1969, les congrès ICME, organisés sous les auspices de la CIEM, se sont déroulés à tous les quatre ans et constituent l'une des activités principales de la Commis-

sion. Le dernier congrès, ICME-9, a eu lieu à Makuhari/Tokyo (Japon) à l'été 2000 et tant l'infrastructure organisationnelle que le support logistique offerts par les organisateurs furent d'une qualité exceptionnelle. Fidèle en cela à la tradition des récents congrès ICME, le Comité organisateur d'ICME-9 a mis en place un programme de soutien financier pour les participants de pays économiquement faibles. Les fonds de ce programme provenaient d'une "taxe de solidarité" prélevée sur les frais d'inscription de même que de dons de particuliers du Japon. Le Congrès ICME-10 se tiendra à Copenhague du 4 au 11 juillet 2004, à l'invitation des pays nordiques (Danemark, Finlande, Islande, Norvège et Suède).

Études de la CIEM

Le programme d'Études de la CIEM a démarré en 1985 et s'est poursuivi régulièrement au fil des ans. Construite autour d'une conférence internationale, chaque Étude vise l'exploration d'un thème ou d'une question d'intérêt en éducation mathématique contemporaine et est articulée en vue de la publication d'un volume cherchant à faciliter la discussion et l'action au plan tant international que national, régional ou institutionnel. Les volumes émanant des Études de la CIEM sont publiés chez Kluwer Academic Publishers dans la série "New ICMI Study Series" (NISS), sous la direction du Président et du Secrétaire de la CIEM. (Les particuliers se procurant un volume de la série NISS pour usage personnel ont droit à un rabais de 60% sur le prix de détail. La liste des volumes de la série NISS est accessible à l'adresse <http://www.wknap.nl/series.htm/NISS>.)

Cinq Études différentes étaient en chantier à divers stades au cours des années 1999 et 2000. L'Étude 10, portant sur *Le rôle de l'histoire des mathématiques dans l'étude et*

l'apprentissage des mathématiques, en était au stade final, le volume de la série NISS étant paru en 2000 sous le titre *History in Mathematics Education: The ICMI Study* (NISS 6). Il en était de même pour l'Étude 11 (*L'enseignement et l'apprentissage des mathématiques au niveau universitaire*), qui a d'abord donné lieu à la publication d'un numéro spécial de la revue *International Journal of Mathematical Education in Science and Technology* (iJMEST), 31(1) (2000) 1–160, puis au volume de la série NISS paru tout récemment (*The Teaching and Learning of Mathematics at University Level: An ICMI Study* — NISS 7).

Trois nouvelles Études sont présentement en cours. L'Étude 12 porte sur *L'avenir de l'enseignement et de l'apprentissage de l'algèbre* et la rencontre internationale aura lieu à Melbourne en décembre 2001. L'Étude 13 est consacrée à une étude comparative de l'éducation mathématique dans des traditions culturelles différentes (en l'occurrence l'Asie Orientale et l'Occident). Le document de discussion de cette Étude est paru dans *L'Enseignement Mathématique*, 47 (2001) 185–201, et la rencontre se tiendra à Hong Kong en octobre 2002. Une quatorzième Étude vient d'être lancée sur le thème des applications et de la modélisation. Le document de discussion paraîtra sous peu et mènera à une conférence organisée au cours de 2003 en Allemagne. Eric Muller (Brock) est membre du Comité de programme international de cette Étude.

Conférences régionales

Malgré le caractère international de sa nature et de son rôle, la CIEM parraine régulièrement des activités de type régional reliées à l'éducation mathématique, le plus souvent dans des régions en émergence. Le support fourni est davantage moral que financier, et même dans ce dernier cas — il s'agit alors forcément de pays dont les ressources économiques sont limitées —, de nature essentiellement symbolique.

Trois rencontres reconnues par le Comité exécutif à titre de conférences régionales de la CIEM ont eu lieu au cours des deux dernières années. La 8e Conférence du Sud-est asiatique sur l'enseignement des mathématiques (SEACME-8) s'est tenue aux Philippines en juin 1999 et a attiré plus de 500 participants sur le thème "Mathématiques pour le 21^e siècle". Le symposium EM 2000 (Espace mathématique 2000), organisé par la Commission française de l'enseignement mathématique (Sous-commission nationale de la CIEM), a regroupé à Grenoble, en juillet 2000, 178 participants en provenance de 18 pays autour du thème "L'enseignement des mathématiques dans les pays francophones au XX^e siècle et ses perspectives pour le début du XXI^e siècle". Il s'agissait d'une première rencontre régionale où le concept de "région" était de nature linguistique plutôt que géographique, la rencontre étant axée sur une langue commune. La conférence RCME (All-Russian Conference on Mathematical Education) s'est tenue à Dubna, Russie, en septembre 2000; le thème en était "Mathématiques et société. Éducation mathématique dans le nouveau millénaire" et plus de 300 personnes y ont pris part.

Une conférence régionale de la CIEM est présentement en préparation: la seconde rencontre ICMI-EARCOME (East Asia Regional Conference on Mathematics Education) — aussi désignée comme SEACME-9, la 9e Conférence du Sud-Est asiatique sur l'enseignement des mathématiques —, aura lieu à Singapour en mai 2002. Le thème de la rencontre est "Éducation mathématique à l'ère des connaissances".

Autre activité

À l'occasion du centenaire de la revue *L'Enseignement Mathématique*, organe officiel de la CIEM, un symposium organisé conjointement par l'Université de Genève et la CIEM

s'est tenu à Genève du 20 au 22 octobre 2000 sur le thème "Cent ans de *L'Enseignement Mathématique*: moments de l'enseignement des mathématiques au 20^e siècle". Cette activité, une contribution à l'Année Mathématique Mondiale 2000, a attiré 55 participants en provenance de 18 pays et les Actes du symposium paraîtront en 2002 sous la responsabilité du Comité éditorial des *Monographies de l'Enseignement Mathématique* en collaboration avec le Comité du programme du symposium.

skip

Groupes d'étude affiliés

Les Groupes d'étude affiliés à la CIEM, qui s'intéressent à certains aspects spécifiques de la problématique de l'éducation mathématique, sont au nombre de quatre: HPM (The International Study Group on the Relations Between the History and Pedagogy of Mathematics), PME (The International Group for the Psychology of Mathematics Education), IOWME (The International Organization of Women and Mathematics Education) et WFNMC (The World Federation of National Mathematics Competitions). Tous les Groupes d'étude affiliés ont pris part au programme d'ICME-9, mais ils ont aussi des activités régulières qui leur sont propres.

Le Programme de solidarité

Lancé lors du congrès ICME-7 tenu à Québec en 1992, le Programme de solidarité de la CIEM vise à favoriser le développement de l'enseignement des mathématiques dans des régions où le contexte économique ou socio-politique présente des obstacles. L'accent est mis sur des projets permettant la mise en place d'une infrastructure autonome dans la région ou pays en cause. Le Programme de solidarité est présentement en réévaluation, un Comité *ad hoc* ayant été chargé d'examiner le fonctionnement et l'impact et de formuler des recommandations au Comité exécutif.

Organisation de la Commission

Un nouveau Comité exécutif de la CIEM a été élu lors de l'Assemblée générale de l'Union mathématique internationale tenue à Dresde (Allemagne) en août 1998. Entré en fonction le 1er janvier 1999, cet Exécutif est composé de

Président: Hyman Bass (États-Unis);
Vice-présidents: Néstor Aguilera (Argentine) et Michèle Artigue (France);
Secrétaire: Bernard R. Hodgson (Canada);

Membres: Gilah Leder (Australie), Yukihiro Namikawa (Japon), Igor Sharygin (Russie) et Jian Pan Wang (Chine);

Membres *ex officio*: Miguel de Guzmán (Espagne), Président sortant; Jacob Palis (Brésil), Président de l'UMI; et Phillip Griffiths (États-Unis), Secrétaire de l'UMI.

Lors de sa première réunion an-

nuelle, tenue à Paris en juillet 1999, le Comité exécutif a longuement discuté un document d'information (sorte de "testament") préparé par l'Exécutif sortant.

La CIEM continue à encourager la création de Sous-commissions nationales et une quatorzième Sous-commission a vu le jour en 1999 en Espagne. (Malgré diverses tentatives au cours des deux dernières décennies, le Canada ne possède toujours pas de Sous-commission nationale pour la CIEM.) Une quinzaine de pays (sur un total de 80 pays membres de la CIEM) n'ont pas de Représentant national. De façon générale, le besoin se fait sentir de renforcer le rôle des Représentants nationaux au sein de la CIEM ainsi que les liens avec ceux-ci, en particulier par courriel. On souhaite également rendre plus actuelle la Résolution 5 adoptée par l'Assemblée générale de l'UMI tenue en 1990 à Kobe (Japon)

et ayant pour effet de limiter à deux le nombre de mandats consécutifs d'un Représentant national. Depuis 1999, le Canada est représenté à la CIEM par Eric Muller (Brock).

Informations sur la CIEM

Le *Bulletin de la CIEM* continue à paraître régulièrement deux fois par année. Afin de faciliter la recherche d'informations dans le *Bulletin*, les tables des matières des 45 premiers numéros ont été reproduites dans le numéro 47 du *Bulletin*, décembre 1999 (tables des matières des numéros 1–29, 1972–1990), ainsi que dans le numéro 46, juin 1999 (tables des matières des numéros 30–45, 1991–1998).

Le site de la CIEM sur la Toile (<http://www.mathunion.org/ICMI/>) rend disponibles diverses informations sur la Commission, ainsi que le contenu intégral du *Bulletin de la CIEM* depuis le numéro 39 (décembre 1995).

FROM THE INSTITUTES

Fields Update

Thematic Program Postdoctoral Fellowships

Thematic Program on Set Theory and Analysis (September–December 2002) and Automorphic Forms (January – May 2003)

Applications are invited for postdoctoral fellowship positions at the Fields Institute for Research in Mathematical Sciences, for the 2002–2003 academic year. These fellowships provide an opportunity to spend a period of at least one year engaged in research and participating in the research activities of the Institute. One or more positions may involve teaching or carrying out collaborative research with business or industrial partners.

For information about the Thematic Year Program please see web page at Program on Set Theory and Analysis www.fields.utoronto.ca/programs/scientific/02-03/set_theory/ or Program on Automorphic Forms www.fields.utoronto.ca/programs/scientific/02-03/automorphic_forms/

Applications are encouraged from all qualified candidates who have recently completed a PhD in the mathematical sciences. Applicants seeking postdoctoral fellowships funded by other agencies (such as NSERC and international fellowships) are encouraged to request the Fields Institute as their proposed location of tenure, and should apply to the address below for a letter of invitation.

Applications should be received **by January 2, 2002**. Consideration will also be given to applications received after this date, funds allowing. Applicants should submit a curriculum vitae and a statement of research interests and achievements and should arrange for three (3) letters of reference to be sent to

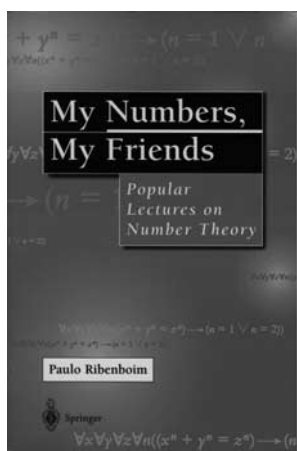
The Director
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222 College Street, 2nd Floor
Toronto, Ontario
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Fax: (416) 348-9714
indicating the relevant thematic program.

This Book Is For You

Book Review by Cameron Stewart, University of Waterloo

My Numbers, My Friends, Popular Lectures on Number Theory

by Paulo Ribenboim Springer-Verlag
New York 2000
ix + 375pp



Number theory is a subject with a rich history and Paulo Ribenboim is a gifted expositor. In this collection of essays Paulo explores a number of appealing topics with his characteristic flair. Chapter titles such as “The Fibonacci numbers and the Arctic Ocean”, “Powerless facing powers”, “What kind of number is $\sqrt{2}\sqrt{2}$?” and “Galimatias Arithmeticae” give some sense of the light touch with which he writes.

Each of the 11 chapters or essays stands on its own and is accompanied by a collection of references. Paulo starts off the book with an extensive discussion of the divisibility properties of Lucas sequences. Let P and Q be non-zero integers and suppose

that $P^2 - 4Q$ is non-zero. Put $U_0 = 0, U_1 = 1$ and $U_n = PU_{n-1} - QU_{n-2}$ for $n \geq 2$. The sequence $(U_n)_{n=0}^{\infty}$ is known as a Lucas sequence and $U_n = (\alpha^n - \beta^n)/(\alpha - \beta)$ where α and β are roots of the characteristic polynomial $x^2 - Px + Q$. The sequence of Fibonacci numbers, introduced by Pisano in 1202, is the Lucas sequence obtained by taking $P = 1$ and $Q = -1$. In the second chapter Paulo discusses the representation of real numbers as sums of Fibonacci numbers and Landau’s result relating the sum of the inverses of the Fibonacci numbers with values of theta series.

There are many open questions about the distribution of prime numbers and Paulo explores these questions and reports on the best theoretical and computational results obtained so far. This section is a very abbreviated version of his book “The book of prime number records”. He also explains some algorithms used to test primality. Further he devotes a chapter to Euler’s polynomial $f(x) = x^2 + x + 41$ which has the property that $f(j)$ is prime for $j = 0, \dots, 39$ and explains how this remarkable property is connected with the fact that $Q(\sqrt{-163})$ has class number 1.

Paulo gives a short history of the life of Gauss and discusses his development of the theory of binary quadratic forms. He mentions Gauss’ conjecture that there are only nine imaginary quadratic fields of class number one and the subsequent proof of this result. He also explains what is known about the distribution of the ideal class groups of quadratic extensions of the rationals.

In 1844 Catalan asked for a proof that the only consecutive powers of positive integers are 8 and 9. In particular, he conjectured that the equation

$$x^m - y^n = 1, \quad (1)$$

in integers x, y, m and n , all larger than 1, has only the solution $x = n = 3, m = y = 2$. In 1976 Tijdeman proved that (1) has only finitely many solutions. Paulo discusses the history of the conjecture and a multitude of related questions about numbers which are powers. He also introduces the celebrated *abc* conjecture in a section entitled “Dream mathematics” and explains some of its consequences.

Paulo takes us on a tour of Diophantine approximation and transcendence theory. He explains the continued fraction development of real numbers, measures of irrationality, the Markoff chain, Roth’s theorem, Schmidt’s theorem on simultaneous approximation of real algebraic numbers by rationals and the transcendence of e and π . He also mentions Gelfond and Schneider’s solution of Hilbert’s seventh problem, Baker’s estimates for linear forms in the logarithms of algebraic numbers, Schanuel’s conjecture and the recent work of Nesterenko who proved that π, e^π and $\Gamma(\frac{1}{4})$ are algebraically independent over the rationals.

I have only skimmed the surface of the topics covered in this book. It is accessible to undergraduates and is a pleasure to read. I completely agree with the first line of the preface:

“Dear Friends of Numbers: This little book is for you.”

RESEARCH NOTES

Ian Putnam, Column Editor

Canada Research Chairs Program

The Government of Canada recently developed the Canada Research Chairs program. It is an ambitious idea aimed at improving research in Canada, especially at universities. More information can be obtained from www.gc.chairs.ca.

Here appointments to date in Applied Mathematics, along with a brief description of their research. In the October 2001 issue, we described the chairs appointed in Pure Mathematics.

Jonathan Borwein Simon Fraser University

Some of the most exciting areas of mathematics being developed today are those which involve emerging information technology systems. According to Jonathan Borwein, smart computing, data-mining and modern telecommunications networks have reinvigorated many branches of mathematical research in a 'democratic' way, so that it has become a defining feature of almost every type of scientific inquiry.



Jonathan Borwein

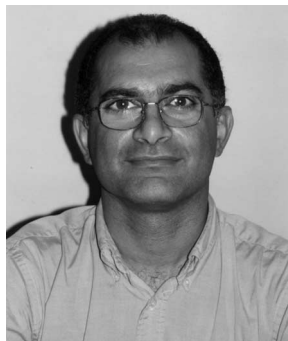
As holder of the Canada Research Chair in Information Technology, Dr. Borwein will continue this democratizing trend in several key areas of mathematics, which could greatly assist researchers in other fields. Those fields

range from distance learning, data encryption and electronic commerce to medical imaging, genome research and combinatorial chemistry. In each case, his work on topics such as the analysis of complex, multidimensional systems, computational number theory or optimization programs will be of interest to other scientists who can use these techniques to open up new avenues in their own fields.

Dr. Borwein has established an award-winning reputation for this kind of activity, as Director of Simon Fraser University's Centre for Experimental and Constructive Mathematics (CECM). The centre even acquired a significant public profile several years ago, when algorithms were developed in CECM to set new records for the calculation of the value of pi.

Hadi Dowlatabadi University of British Columbia

Hadi Dowlatabadi is coming to the University of British Columbia after teaching at Carnegie Mellon University. Scientists collaborate regularly, sharing findings within each discipline, but time and resources seldom permit much interaction outside of their circles. What are the connection points between energy research and climatology? Where do economics and environmental studies intersect? The recipient of a new Canada Research Chair at UBC will soon be showing the way.



Hadi Dowlatabadi

Hadi Dowlatabadi is viewed as something of a luminary in integrated research systems. He's been credited with almost single-handedly bringing broad-scale assessment models into popular use. Because of his work, climate and energy research can now be observed in an integrated way. Fellow theorists around the globe have in turn built upon the research models Dowlatabadi has developed.

UBC and other institutions have long recognized the value of developing so-called "research clusters." The clusters are made up of differing but complimentary circles of research, which are designed to overlap each other. One goal of Dowlatabadi's work at UBC will be to integrate four of these clusters more closely (human health and development, cognition and computer science, society and culture, sustainability/environment). It's hoped this novel integration of disparate but complimentary research fields will speed up and enhance the progress of them all, in effect creating a whole that is greater than the sum of its parts.

Brigitte Jaumard École Polytechnique de Montréal

Brigitte Jaumard is a specialist in communication networks. Applications of her work allowed Bell Mobility's urban network to expand its call handling capacity by 30 % between 1995 and 1998, without having to erect a single new antenna.

In a society with an insatiable appetite for information, networks play an vital economic role, and a wealth of industrial applications may result from Professor Jaumard's research. The primary objective of the chair she will supervise will be to develop new techniques and improve existing techniques for managing and operating large digital communication networks. Today's network planning and management programs are among the largest,

most powerful and most complex of all software. She is respected for her work on algorithms. She provided the first proof of convergence for the classic Tuy algorithm, a 20-year-old problem.



Brigitte Jaumard

Professor Jaumard's chair will play a key role in the multimedia, information technology and telecommunications industries in the Montréal area. So it is no coincidence that the chair is located in Montréal, the city with North America's highest per capita employment in high technology.

Mark Lewis
University of Alberta

Mark Lewis has come to the University of Alberta from the University of Utah. Scientists in various disciplines have often shied away from trying to analyze complex and sometimes chaotic biological phenomena. Mark Lewis, on the other hand, is attempting to introduce the rigour of mathematical inquiry into this field, offering biologists a new and practical array of tools for their work.

The dramatic progress of information technology over the last few years has made it possible to model biological systems in unprecedented quantitative detail. Unfortunately, if the researchers responsible for creating such models do not interact regularly with biologists, the results may have little genuine scientific value. As the holder

of the Canada Research Chair in Mathematical Biology, Dr. Lewis will address this challenge directly, meshing his activities with those of the University of Alberta's well established departments of Biological Science and Mathematical Science. He will found a Centre for Theoretical Biology, which will foster links within the biological and mathematical research communities, exploring the difficulties of analyzing issues ranging from the spread of disease across a region, to the response of ecosystems, to large scale effects such as global warming.



Mark Lewis

Dr. Lewis' arrival in Canada continues his successful career in mathematical biology, in which he has distinguished himself in professional organizations and on the editorial boards of three leading journals.

Even more significantly, he has been praised for moving this area of mathematics squarely into the realm of scientific inquiry. In this respect, he has often met with outstanding success, such as his design for a model of the movements of coyotes through parts of Washington State - a model that provided a highly accurate fit with data taken from actual observations of the coyotes themselves.

Jianhong Wu
York University

Dr. Wu is an internationally recognized mathematical authority in de-

lay differential equations, infinite dimensional dynamical systems, nonlinear analysis, mathematical biology and neural dynamics. His award-winning contributions continue to play a key role in advancing scientific research and development, and in assisting industry through "real-world" applications. Dr. Wu has published four major books and over 140 research papers in peer-reviewed journals, which are highly valued among scientific and industrial communities. Dr. Wu is now using Canada Research Chair funding to conduct comprehensive, multidisciplinary research in industrial and applied mathematics. He and his expert team are interacting and collaborating with university researchers in related fields, and with industrial data mining experts. Together, they are analyzing the information processing capabilities of neural networks modelled by differential equations to develop effective mathematical formulas and software for pattern recognition, classification and prediction. The team will also work with industrial partners to assess the effectiveness of their research discoveries in solving actual data analysis tasks.



Jianhong Wu

Dr. Wu's work will advance theoretical research in mathematical modelling and analysis for neural networks and should lead to novel applications that improve the global competitiveness of Canada's data mining industry.

EDUCATION NOTES

Ed Barbeau and Harry White, Column Editors

Groupe de didactique des mathématiques (Québec)

The group called *GDM* (*Groupe de Didactique des Mathématiques*) is similar to the *CMESG* (*Canadian Mathematics Education Study Group*), but operates at the provincial level. In this note, we give some information about its history, objectives, activities and publications.

Le *GDM* débuta ses activités au début des années 70 en organisant des stages où les personnes intéressés pouvaient se perfectionner dans ce “champ disciplinaire”. La fondation remonte à juin 1970 lors de son premier colloque tenu à St-Agathe qui a réuni une quarantaine de personnes. Le principal responsable du *GDM* de 1970 à 1973 fut le professeur Claude Gaulin (université Laval). Voici les principaux sujets traités lors des premières réunions (1970-1972): le théorie des jeux, la théorie de la décision et les catégories; la géométrie au secondaire et les formation des maîtres; les applications mathématiques; la didactique des mathématiques et les utilisations pédagogique de l’histoire des mathématiques; les jeux de simulation pour la classe de mathématique ou dans la formation des maîtres. Ces réunions annuelles ont continué jusqu’en 1975. Après une interruption d’un peu plus de deux ans, les activités ont repris en janvier 1978 et le *GDM* tient depuis ce temps au mains une rencontre annuelle qui réunit chaque année des professeurs universitaires, des enseignants du milieu scolaire, des étudiants aux études de cycles supérieurs qui s’intéressent à la didactique des mathématiques. Lors du dernier colloque tenu à l’université de Montréal au mois de mai 2001, le sujet abordé concernait la notion de “compétences”.

L’objectif premier de ces colloques est de s’informer mutuellement de nos recherches menées dans le domaine de la didactique des mathématiques et d’assurer une critique constructive des divers projets lors des discussions ou échanges entre les participants.

Le *GDM* a fondé deux collections en didactique des mathématiques qui sont éditées par la maison *Modulo*: la collection *La Spirale* (maintenant fermé) et la collection *Astroïde*. Voici les titres et les noms des auteurs de ces publications:

Louise Lafortune (1992), *Dimension affective en mathématiques*.

Richard Pallascio (1992). *Mathématiques instrumentales et projets d’enfants*.

John Masson (1994). *L’esprit mathématique*.

Anna Sierpinska (1995). *La compréhension en mathématiques*.

Alain Taurisson (1999). *Le sens de mathématiques au*

primaire – L’ordinateur et la gestion mentale pour penser les opérations.

Pascale Blouin et Linda Gattuso (2000). *Didactique des mathématiques et formation des maîtres*.

Richard Pallascio et Gilbert Labelle (Éditeurs) (2000). *Mathématiques d’hier et d’aujourd’hui*.

Margot De Serres, et coll. (à paraître). *Intervenir sur les langages en mathématiques et en sciences*.

Nadine Bednarz, Louis Poirier, et coll. (à paraître). *Jeux et apprentissage des mathématiques au primaire – Banque de jeux à exploiter avec les enfants*.

Symposium About Mathematical Understanding

On June 1, the University of Saskatchewan College of Education hosted a Symposium About Mathematical Understanding, held one day prior to the beginning of the CMS Summer Meeting. Each of the speakers at the Symposium also shared their papers for the Mathematics Education Sessions during the Summer Meeting.

About 60 people, including teachers of all grade levels, curriculum consultants, school trustees, school administrators, and university researchers joined in the conversation about mathematical understanding.

The Symposium investigated different ways of thinking about the phenomenon of mathematical understanding. This is a very exciting time for all aspects of mathematics education and the Symposium was a wonderful opportunity for researchers from the fields of developmental and cognitive psychology, mathematics education, and mathematics to share their thinking. The Symposium also provided time for each participant to reflect on the thoughts of the speakers and consider the implications for provincial curricula and for instructional practises.

Anna Sierpinska from Concordia University led the first session. Anna is a mathematics education researcher who has published many articles and books about mathematical understanding. Anna’s talk titled, “Understanding in Mathematics: Memories of Research Gone By and Some Eternal Questions” opened the discussion. Jamie Campbell, a cognitive psychologist from the University of Saskatchewan, shared his thinking and research with his talk titled “An Encoding-Complex Approach to Numerical Cognition in Chinese-English Bilinguals.” Jamie’s talk investigated the mental processes that people might exhibit when performing computation. Morris Orzech and Grace Orzech, two mathematicians from Queen’s University, shared what they’ve learned about their students’ understandings of mathematics. They shared particular ex-

amples of students thinking at the university level through their talk "A Definition of Mathematical Understanding, and Some Related Principles." Sherry May (a mathematician at Memorial University), Michael Rabinowitz (a developmental psychologist at Memorial University), and Don Mantanyka (a retired teacher from Saskatoon), shared specific examples and thinking about automaticity in understanding mathematics. Their talk, "Teaching the Rules of Exponents - A Resource Based Approach," considered skills that students need to master before learning a new concept and described the work that they have been doing with students at Memorial University.

The proceedings of the Symposium About Mathematical Understanding, "Mathematical Understanding: Four Perspectives" was recently published. You may purchase copies of the Proceedings for a cost of \$10. Cheques should be made payable to the "University of Saskatchewan." Orders for copies of the Proceedings should be sent to Florence Glanfield (florence.glanfield@usask.ca).

ICMI and Teaching at the University Level

In December of 1998, the *International Commission on Mathematical Instruction* sponsored a conference in Singapore on the Teaching and Learning of Mathematics at the University Level. This consisted of plenary sessions, topic panels, working groups and individual presentations; a study volume arising out of these will be published shortly. Participants in the conference were also invited to submit papers related to their presentations to a special issue of the *International Journal of Mathematical Education in Science and Technology*.

We are grateful to Bernard Hodgson of Laval University for sending me a copy of this special issue. It is Volume 31, Number 1, for January-February 2000 (ISSN 0020-739X), and we found it an extraordinarily good read. As the editors say, "papers were selected on their merits rather than on the topics they were discussing". Most papers are fairly short and give only a brief account of extended research referred to in the bibliographies. we will look at some of these papers in this column, and may return to others in a later column.

Factors influencing first-year students' success in mathematics, Glenda Anthony, New Zealand. Sixty-five students and 22 lecturers at the first-year level were asked to complete a questionnaire in which they were asked to list five factors that were most important contributors to student success and five to student failures; students and lectures, respectively, identified 63 and 53 factors for success and 60 and 54 factors for failure. In a second questionnaire, respondents were asked to rank on a five-point scale the importance of factors identified, and finally a subset of the group were interviewed. The paper

contains a tabulation of the results along with comments by individual subjects in the study. For example, both teachers and lecturers ranked self-motivation at the top of the list; students ranked completion of assignments and availability of help much higher, whereas lecturers were more keen on desire to understand the material rather than rote learn and on regular practice of examples. There seemed to be a tendency for lecturers to regard lectures as one of several avenues to student learning, whereas for the student they were important for conveying key information about the course (including notes taken) and perhaps for overall motivation. The author asks this provocative question: "In the questionnaires, lecturers in the current study placed less importance than students on active-learning and note-taking. Does this mean that lecturers see their role as information providers, rather than providing opportunities for students to be actively engaged in analysing and processing information?"

MATLAB in first-year engineering mathematics, Len Colgan, Australia. In response to criteria of the Institute of Engineers and its own desiderata for graduating students, the faculty of engineering at the University of South Australia redesigned its program to involve more extensive use of information technology, problem-based group work, opportunities for independent learning and other sorts of learning experiences. It was decided to incorporate *MATLAB* into the calculus, and in the absence of suitable text material, a 160-page *Focused Introduction to MATLAB* was produced. The authors provide a number of examples of the treatment of topics: Snell's Law, computation of limits, the Whitworth Quick-Return Mechanism. The author warns about the need to maintain a balance between the mastery of concepts and the use of software, but it appears in this case that, without a visible increase in the time and effort invested by the students, "the degree of acquisition of mathematical knowledge and skills has at least been maintained whereas their ability to program in *MATLAB* has increased significantly."

The history of mathematics as a coupling link between secondary and university teaching, Fulvia Furinghetti, Italy. Many students entering the teaching profession in Italy have a strong background in mathematics, but feel that they have been inadequately prepared to teach it. Alienated from mathematics, they may regard their university years as a waste of time, and adopt the conservative style of their own school teachers. This phenomenon was noted over a century ago, not only by Felix Klein, but by the mathematical historian Gino Loria, who in 1899, published a paper with the same title as this one. The author analyzes the epistemological and didactic outcomes of an historical approach, describes how students were required to understand the role of definition by studying how that of a line was handled in the past, and shows how history can be used to connect the mathematics at the secondary and tertiary levels.

On a research program concerning the teaching and learning of linear algebra in the first year of a French science university, Jean-Luc Dorier, et al, France. For ten years, the authors have been pursuing a research program on the learning and teaching of freshmen linear algebra, and devised a strategic approach to teaching that has been tested over the past six years. This involves initial activities that force students to reflect on key mathematical concepts, a preliminary look at problems before introducing the linear algebra formalism which will allow a simplification, presenting different mathematical points of view for the ideas and focussing on the concept of rank. There is a brief discussion on the difficulty of evaluating student progress.

The value of mathematics clubs

The following excerpts from a reflective log of a University of Toronto undergraduate are used with permission. It is a testimony to the positive effect of challenging activity for high school students. It is also a tribute to the teachers who take the time and effort to organize such activity.

“For three years, I attended regular after-school meetings of this math club, mainly with a group of students, who experienced the same boredom as myself with regular math classes and wished for a challenge. Mr. T. was a very blunt older teacher, who had a great belief in problem solving skills being a fundamental tool of knowledge. As such, he ordered series of mathematical contests from the University of Waterloo. . . . The contests ranged from grade four to grade twelve level, though the difficulty level surprised even us. . . . The first week, it astounded us to realize that though we were in middle school, the simplest grade four and five problems ‘stumped’ us. Within weeks, we had all become fanatics, discussing problems in the hallways, arguing over various solutions during lunch hours and spending hours after school

discussing various interpretations. For three years, I regularly met with a group of people and the math club gave us all a sense of self and helped us to develop in those crucial adolescent years.

“The use of math contests as methods of learning further developed both my interest and appreciation of mathematics, but more importantly, it helped me develop both mentally and socially. The difficulty of the contests forced us to work in groups, using our own knowledge and sometimes doing additional research in order to solve the problems. By working together in groups, the interactions helped us to develop and greatly helped us in expressing ourselves, our opinions and how we worked with each other. The level of knowledge varied from person to person, as some were older and others more experienced; by this, we also learned patience and understanding, working with people of different abilities.

“I feel that the math contests themselves provided a wide basis in which to learn. The difficulty level ranged from simple calculations, to thought provoking word problems and these helped develop the students’ abilities for reasoning and logic. With continued practice, students began to realize patterns and similarities between questions over time, resulting in our improving both our test scores and via this, our confidence in our own abilities.

“I appreciate the effort Mr. T. put into our math club. By initiating such a group, he helped many of us who otherwise perhaps felt out of place in regular classroom situations. . . . One of my primary goals, if I do succeed in becoming a teacher, would be to establish such a math club, because I sincerely believe that such organizations are beneficial to the academic, emotional and mental development of students, and would provide a broad and varying challenge to the teachers involved.”

LETTERS TO THE EDITORS

My essentially light-hearted comments in my letter to the editors in the September issue of the NOTES contains an unfortunate error that was pointed out to me by the people in the know. I stand corrected: the strange “right” answers to elementary arithmetic problems that I poked fun at were not generated by the WEBWORK system itself. This system enables authors to generate their own problems and answers for their own courses. For my misunderstanding, I apologize to everyone concerned.

Heydar Radjavi (Dalhousie and UNH)

Last November, I learned about the WebWork system developed at University of Rochester. It was clear to me that it would help us deal with the difficulties involved in home-

work grading and instant feedback. A most appealing feature of WebWork is that it is an open source system and that many departments are working on increasing its sophistication.

A small group of us at University of New Hampshire began to work on developing WebWork problems for our courses. Heydar Radjavi, who is a visiting professor at UNH, saw some examples of these, and, partly due to my failure to present the entire context to all of my colleagues, thought that he was seeing a finished product. Without the context of continuing development, Radjavi’s comments [see his letter above] may have caused concern to some very dedicated developers of WebWork.

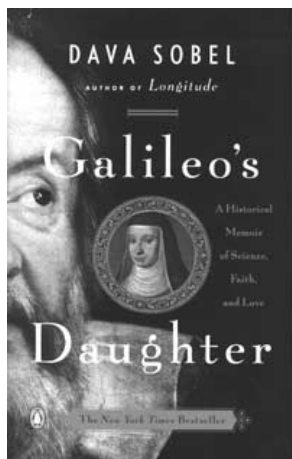
Kenneth Appel (Chair Math, UNH)

Daughter's Letters Tell of Mutual Devotion and Support

Book Review by Marge Murray, Virginia Tech

Galileo's Daughter

by Dava Sobel
Penguin, New York, 2000.
420+ix (paper)



In the year 1633, the astronomer Galileo was tried and convicted by the Inquisition of the Roman Catholic Church for the crime of having defended the idea that the sun is the center of the universe around which the earth and planets revolve. As punishment he was placed under house arrest, ordered to publicly affirm his belief in the earth-centered universe, and effectively barred from scholarly teaching and publication for the rest of his life.

In the four centuries since Galileo first promulgated his heresies, his story has become the stuff of legend, immortalized in histories and philosophies of science, plays, and — most recently — in a popular song by the Indigo Girls. Yet none of these popular renderings makes reference to the woman who, during his time of greatest trial, stood as his greatest supporter, rock, refuge, and friend: Suor Maria Celeste, a member of the order of Poor Clares in the Convent of San Matteo in Arcetri. The eldest of Galileo's three illegitimate children, Maria Celeste —born Virginia

Galilei — lived in abject poverty and isolation within the cloistered walls of San Matteo from the age of thirteen until her untimely death just twenty years later. Her years of seclusion stand in striking counterpoint to Galileo's very public life of teaching, research, and invention.

In *Galileo's Daughter*, Dava Sobel skillfully interweaves the saga of Galileo with the even more fascinating tale of his eldest daughter, as revealed in her own startlingly literary letters to her father. From what was almost certainly a lively two-way correspondence, only Maria Celeste's letters remain, preserved among the profusion of Galileo's personal papers. Galileo's letters to Maria Celeste were probably destroyed upon her death, as it would have been far too dangerous for a Roman Catholic convent to preserve them. Thus, says Sobel, "the correspondence between father and daughter was long ago reduced to a monologue" (p. 10).

In these pages, Maria Celeste is revealed as lively, insightful, ingenious. In the convent, she served as an apothecary, having learned the trade from "the nuns and visiting doctors who staffed the convent's infirmary" (p. 325). Sobel speculates, however, that she learned to read and write in Latin and Italian under her father's tutelage. Indeed, "no one at San Matteo surpassed her in language skills. Even the abbesses sought her out to write important letters of official business" (p. 325). In Sobel's view, it is Suor Maria Celeste — far more than her cloistered younger sister or her wayward, undisciplined brother — who met Galileo's match in intelligence, insight, devotion, and wit.

Sobel's book emphasizes the deep affection between father and daughter. From the seclusion of the cloister, Suor Maria Celeste served as helpmeet and sounding board to Galileo, who never married. For his many physical ills, she

prepared pills and potions; she took in his mending and sewing, and at times cooked and baked for him behind the convent walls. In return Galileo was a most generous benefactor of the convent, providing alms, food, and supplies.

In reading about the warmth and intimacy of their relationship, it is easy to forget the tremendous physical barriers that separated them:

The Convent of San Matteo...maintained a separate parlor where a sister's family members might properly be received. They could bring their own food, too, and share it with her. Thus the dishes themselves, whether cooked in the convent or carried in by the guests, could be eaten with impunity, so long as everyone ate in his or her proper place. A black iron grate, or grille, separated the parlor from the nun's quarters, and all exchanges passed through the lattice of its bars. (p. 116)

Moreover, conditions of life in the convent stand in stark contrast to Galileo's comparatively opulent lifestyle. In November of 1623, immediately following the publication of Galileo's book *The Assayer*, Maria Celeste writes to her father — in a letter apparently accompanied by newly-sewn linens and freshly baked cakes — about the circumstances of life at the convent:

Since I do not have a room where I can sleep through the night, Suor Diamanta, by her kindness, lets me stay in hers, depriving her

own sister of that hospitality in order to take me in; but the room is terribly cold now, and with my head so infected, I cannot see how I will be able to stand it there, Sire, unless you help me by lending me one of your bed hangings, one of the white ones that you will not need to use now while you are away.

Yet, despite her desperate pleas, she is quick to add: “And another thing I ask of you, please, is to send me your book, the one that has just been published, so that I may read it, as I am longing to see what it says.” And finally, in a postscript, she directs him: “If you have collars to be bleached, Sire, you may send them to us” (pp. 120-121).

When we think of monastic or cloistered life nowadays, we tend to think of it as a noble calling, a life of poverty and prayer entered into willingly by a spiritual disciple. While Sobel makes clear that Maria Celeste entered cloistered life involuntarily, she tends to gloss over the circumstances under which Galileo’s daughter came to live at the Convent of San Matteo.

In seventeenth century Italy, women were still largely viewed as commodities to be bought and sold in marriage — in the case of Suor Maria Celeste and her younger sister, Suor Arcangela, as Brides of Christ, with a dowry to be paid to the convent. Sobel makes clear that his daughters, being illegitimate, were considered by him to be unmarriedable. Viewed in this context, sending his daughters to a convent seems a reasonable way for Galileo to have secured their future, though one wonders why they could not simply have continued to live with him. As it happens, there is a far darker side to the story, which Sobel fails to fully reveal.

In the year 1611, while visiting in Rome, Galileo was invited to join the prestigious Lyncean Academy by one of its founders, Federico Cesi. Sobel describes the academy in admiring terms as one of the first serious scientific societies, devoted to open and unfettered inquiry into philosophy, science, and literature, and describes Galileo as one “who embodied the Lynceans’ organizing principles” (p. 42). For a different perspective, however, one may turn to the work of David F. Noble, as recorded in his remarkable book, *A World Without Women: The Christian Clerical Culture of Western Science* (Oxford, 1992). Noble describes the Lyncean Academy as a scientific community modelled on monastic life and in direct competition with the culture of the Jesuits. The Lynceans, more than simply an all-male club, regarded women as an encumbrance, a danger to the scientific life. Quoting the Italian historian Ada Alessandrini, Noble writes, “Marriage was for [the Lynceans] a ‘trap,’ a ‘feminine bond’ which deterred scientific activity and limited the liberty of the studious,” and adds, in his own words,

the indelible imprint of a world without women, having been passed outward from the monasteries to the church, and then later from the cathedral schools to the universities, now manifested itself yet again in the nascent institutions of modern science (Noble, p. 215).

Just two years after Galileo’s initiation into the Lyncean Academy, Galileo placed his daughters at San Matteo. He sought and obtained a special dispensation which made it possible for Livia (Maria Arcangela) and Virginia (Maria Celeste) to enter the cloister at the ages of twelve and thirteen, respectively — well before they turned six-

teen, the ‘canonical age’ for admission. In contrast to Sobel, Noble is outraged by Galileo’s behavior and asserts baldly that “Virginia [Galilei] had been imprisoned for life by an ambition” — Galileo’s scientific career — “that excluded the presence of women.” Indeed, he characterizes the daughters as “innocent little victims of science” (Noble, p. 218).

It is therefore not surprising that, at times, Maria Celeste’s letters include images of incarceration. Poignantly, in one of her last letters to her father, then in detention in Siena, Suor Maria Celeste writes: “had I been able to substitute myself in the rest of your punishment, most willingly would I elect a prison even straiter than this one in which I dwell, if by so doing I could set you at liberty” (p. 313). In reality, Galileo, even under detention by the Inquisition, never suffered the privation that Maria Celeste endured at San Matteo. The story of Galileo’s daughter is, sadly, the tale of a repression still greater than the one that Galileo himself faced.

While Sobel is to be commended for her compassionate understanding of the Roman Catholic culture of Renaissance Italy, one comes away from her book with a sense of horror at the appalling sacrifice made by Suor Maria Celeste, not merely at the altar of religion, but at the altar of science as well. Furthermore, despite the promise of its title, Sobel’s book leaves Maria Celeste in her father’s shadow, as it is the life of Galileo which gives shape and substance to the narrative. Perhaps appropriately, the book concludes with the revelation that, although it has been known for over three centuries that the body of Suor Maria Celeste is buried with that of her father in his tomb, there is as yet no inscription which reveals that simple fact.

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IN MEMORIAM



**George F. Duff
(1926-2001)**

Professor Emeritus of Mathematics in the University of Toronto, George F. Duff died March 2, 2001. He was born in Toronto, July 28, 1926, the son of George Henry Duff and Laura Duff, nee Denton. George's father was a distinguished botanist, becoming Professor of Botany in the University of Toronto and a Fellow of the Royal Society of Canada; his mother was an attorney. He was also a great-nephew of Sir Lyman Duff, onetime Chief Justice of the Supreme Court of Canada.

George received his high school education at University of Toronto Schools graduating in 1944. Medically unfit for military service because of asthma, which plagued him for the rest of his life, George entered the University of Toronto in 1944, enrolling in the Mathematics, Physics and Chemistry Program. He proceeded through this program, specializing in Mathematics, and graduated in 1948. In his final year he was on the university's Putnam team, which stood second, George being among the first five. He remained at the University of Toronto to take a master's degree in 1949, writing a thesis on quantum mechanics under the direction of Leopold Infeld, which resulted in his first publication, in volume one of the Canadian Journal of Mathematics. During most of the summers

of his stay at the University of Toronto he worked at the David Dunlap Observatory of the university, which resulted in a lifelong interest in Astronomy and in two publications in that area, jointly with a member of the Astronomy Department.

In 1949 George went to Princeton University to study for the doctorate, which he achieved in 1951, writing a thesis on ordinary differential equations under the direction of Solomon Lefschetz. While there he also collaborated with D.C.Spencer which shortly resulted in several papers on harmonic forms in *Annals of Mathematics*. At much the same time he also wrote two papers on Truesdell's theory of special functions.

While he was a master's student at Toronto, George met Elaine Wood, an undergraduate there, and they were married in 1951, upon George's completion of his doctor's degree and Elaine's completion of her bachelor's degree. This marriage eventually brought them five children, two sons and three daughters. George and Elaine spent the next year in Cambridge, Massachusetts, where George was a Moore instructor at MIT. While there, George shared an office with Walter Rudin, who became a good friend, and also became friends with John Nash.

In 1952, George returned to University of Toronto as an Assistant Professor and, except for sabbaticals, remained there for the remainder of his career. George was promoted to Associate Professor in 1957 and to Professor in 1961. During this period, George was very active in research, publishing many papers in the area of partial differential equations, in teaching and he wrote his first book, a graduate level text on partial differential equations. He also had his first Ph.D. students. In 1959 George was elected to fellowship in the Royal Society of Canada. Also, during these years George was active

in the Canadian Mathematical Society, then called "Congress", being on the Society's council almost all this time and attending the Summer Research Institute in Kingston several times. He also took on the editorship of the Canadian Journal of Mathematics from 1957 to 1961.

In the following years, in addition to remaining active in all the areas mentioned above, and writing a second book, an undergraduate text on the partial differential equations of mathematical physics jointly with D. Naylor, George became interested in the high school curriculum. This resulted in the writing, jointly with several other authors, of a complete set of mathematics texts for the Ontario high school mathematics program. In addition, George served one term on the council of the American Mathematical Society.

In the summer of 1965, George taught a summer course at Dalhousie University, and became interested in the phenomenon of the tides in the Bay of Fundy. He started then to develop a mathematical theory of these tides, which he considered to be a standing wave phenomenon, and became further interested in whether power production from these tides was a possibility. This continued to be an interest during the rest of his life, and he gave a number of public lectures on the subject, including an invited lecture at the International Mathematical Congress in Vancouver in 1984. His work on these tides was widely recognized, particularly in Nova Scotia, and resulted in 1994 in his being awarded an honorary doctorate by Dalhousie University.

In 1968, George became chairman of the mathematics department of the University of Toronto, for a five year term. During this term, George was elected president of the Canadian Mathematical Society, 1971-73. When his first term as chairman was over

he was selected for a second five year term. Unfortunately, this was a time of some turbulence in the department, which resulted in his term being abbreviated and his ceasing to be chairman in 1975. George spent the next year on sabbatical at Stanford University.

On his return to Toronto, George once again became editor of the Canadian Journal of Mathematics, 1978 - 81, while maintaining a teaching load in the department, and continuing to supervise graduate students. In addition, he took on the editorship of the Mathematical Reports/Comptes Rendus of the Royal Society of Canada. His research interests during this period turned to the Navier-Stokes equations and he published a number of papers on these equations, culminating in a major paper on them in Acta Mathematica in 1990.

However, George had several severe crises during this time. The first of these was his ceasing to be chairman of the mathematics department in 1975, as already related. The second of these was his divorce from Elaine in 1981. The final one of these was the death of his eldest daughter, from asthma, in 1984.

George retired from the department in 1992, on reaching the age of sixty-five. However, he remained active for some years after that, continuing his editorship of the Mathematical Reports/Comptes Rendus for many years and continuing to publish, including, in 1995, a history of the Canadian Mathematical Society in the fiftieth anniversary volume of that society. In toto, George published some sixty papers in refereed journals, and several in non-refereed ones, nearly twenty books or chapters in books, and he supervised the Ph.D. theses of twelve graduate students. During his last few years he was the motivating force behind the creation of the Coxeter Scholarships at

the University of Toronto, and finally he personally donated the funds for an undergraduate scholarship, named after his great-uncle.

In 1983, George met Patricia Sauerbrei, music editor for the Frederick Harris Music Company, and in 1991 they were married.

George had several life-long interests or hobbies. We have already mentioned his interest in astronomy. This led him, after retirement to twice take trips on which he could see a total eclipse of the sun. Another interest was music; he was an accomplished pianist. Yet another interest was in travel, and he took every opportunity to travel, often combining these travels with mathematical lectures, and writing up several of his trips for the interest of family and friends. His final trip was one to Europe in 1999, and on his way home, after a stop in Iceland, he became ill. He never fully recovered and died about a year and a half later.

George is survived by his wife, Patricia, and his former wife Elaine, by four children and the spouses of three of them, seven grandchildren and a sister, Rosemary Duff.

P. G. Rooney

Conference and Memorial Service

The CMS, the University of Toronto Department of Mathematics, the Fields Institute, and the family of Professor Duff hosted a conference and memorial service on Friday, September 21, 2001, at the Fields Institute for Research in Mathematical Sciences

PROGRAM

Professor I. Michael Sigal
(Norman Stuart Robertson Chair in Applied Mathematics)

Title: Effective Dynamics of Magnetic Vortices

Abstract: Since coming to Toronto, George Duff worked on the mathematical theory of fluids. In this talk I will describe the recent joint work

with Stephen Gustafson on dynamics of a quantum fluid - superconductor. In mathematical terms this involves constructing a rigorous theory of the time-dependent Ginzburg-Landau equations. The theory also covers the related equations of the Abelian gauge Higgs model of elementary particle physics. Cast in geometrical terms these are nonlinear equations giving a flow of a connection of a $U(1)$ -principal bundle.

Professor George A. Elliott
(CRC in Mathematics, University of Toronto Senior Distinguished Member, The Fields Institute)

Title: A brief survey of structure and classification theory for amenable C^* -algebras

Abstract: An attempt will be made to describe the subject in question—the beginnings of which go back to Murray and von Neumann, Gelfand and Naimark, Glimm, and Bratteli—in elementary terms.

Professor Emeritus Louis Nirenberg
(Courant Institute)

Title: Remarks on the distance-to-the-boundary-function, and cut locus.

Abstract: We consider a smooth bounded domain on a Riemannian manifold and we look at the distance from any boundary point along the interior normal to the cut locus. In particular, we show that it is Lipschitz continuous.

Edward P. Mason: Remembrances of a friend of the family

Tim Rooney: Remembrances of a colleague of long-standing

Arthur Sherk: Remembrances of a colleague and a tribute to his contributions to the Canadian mathematical community through the Canadian Mathematical Society

Nick Derzko: Remembrances of a colleague and a tribute to his vision in applied mathematics

Patricia Sauerbrei: no title

In Memoriam - David H. Wheeler (1925-2000)

The obituary and following reflections are reprinted from the ICMI Bulletin No 49, December 2000.

Professor David Harry Wheeler died in Vancouver (Canada) on October 7th, 2000, at the age of 75, after a long and determined fight against throat cancer. He was born in UK on February 16, 1925. Through a career extending over 50 years and spent in three different countries (UK, USA, Canada), David Wheeler has made many important contributions to mathematical education at large. But he was also closely related for many years to various activities of ICMI (International Commission on Mathematical Instruction): he was a member of the International Programme Committee for ICME-6 (Budapest, 1988), he chaired the IPC for ICME-7 (Québec, 1992), and he was also a key contributor to the report resulting from the second ICMI Study, *School mathematics in the 1990s*. From 1982 to 1996, he was the Canadian National Representative to ICMI.

A tribute was previously paid to him in the ICMI Bulletin No. 42 (June 1997), pp. 20-28, on the double occasion of his retirement as the editor of the journal he had founded two decades earlier, *For the Learning of Mathematics*, and of the 50th anniversary of the beginning of his remarkable career as a mathematics teacher.

(Further reflections on David Wheeler can be found in the editorial of *For the Learning of Mathematics*, 20(3) (2000), p. 2. The second issue of FLM in 2001, 21(2), will be dedicated to remembering this exceptional scholar and his work.)

Bernard R. Hodgson

Reflections on the “Canadian Years” of David Wheeler

David Wheeler was in his mid forties and his career in mathematics education was in full flight when he landed in Canada at Concordia University in the early seventies. Well known and respected in the UK before his arrival in Canada, he ascended to even greater heights in the maths education world once settled in Montréal. It didn't take him long before he prodded and poked the Canadian mathematics education community into action, something he continued to do even after he retired and moved to Vancouver in 1990.

During the intervening twenty years, Wheeler was instrumental in the creation of CMESG/GCEDM (Canadian Mathematics Education Study Group / Groupe canadien d'étude en didactique des mathématiques), serving as its President for the first eight years of its almost twenty-five existence. His long time friend and colleague at Concordia, Joel Hillel, writing at the time of Wheeler's elevation in 1990 to Professor Emeritus status at Concordia, said this about Wheeler's role in the formation of the Study Group:

“This organization (...) created the environment for the development of a strong intellectual community with representation from all parts of Canada. David Wheeler played the major role in the Study Group's development; he provided the initiative, the imagination, the drive and the leadership critical to the organization's growth. Without him, there would be no such community in Canada. When he stepped down (...) he left a tradition which enabled the Group to continue to flourish. For this endeavour alone, mathematics education in Canada owes him a great debt.”

CMESG/GCEDM is indeed a great legacy that David Wheeler has left to the mathematics education community of Canada. Part of that legacy manifests itself in large part from Wheeler's personality. David 'pushed' us: the

us being mathematics educators in Canada, but others in the remainder of the mathematics education world were not immune to his 'gentle' influence. He cajoled us. He harangued us. All of this was done with love - though he might not appreciate having that word attached to this description - because he cared deeply and sincerely and passionately about the teaching and learning of mathematics. He was a man of deeds and action, and when he felt that others could do more, or do better, or could stretch themselves, then he was not loath to tell them so - but he did so with love.

In the years after his retirement and move to Vancouver, Wheeler still attended the Annual Meetings of CMESG/GCEDM. Wheeler kept his 'hand in', as the saying goes, challenging the Group to respond to the times and changing demands on mathematics educators, to not be wedded to the way things were done in the past, but to move forward. Yet when changes were made, Wheeler was not always comfortable with them. As CMESG/GCEDM moved into the nineties, 'sharing' and 'reflecting' became a significant part of many sessions of the Group. I can vividly recall him muttering under his breathe - an action performed by whispering out the side of his mouth all the while rolling his eyes and screwing up his face - "If I have to 'share' one more thing, if I have to 'reflect' one more time, I think I shall scream!" Yet reflection was something highly valued by Wheeler. Reflection and the sharing of ideas was the foundation on which Wheeler based perhaps his greatest legacy to the mathematics education community world-wide, his journal.

In the late seventies, after he got CMESG/GCEDM up and running, Wheeler decided that the mathematics education world needed a new journal, one with a different focus and voice than those already in existence. So he gave birth to *For the Learning of Mathematics*. The inside cover of the

first issue in July 1980 states that the Journal "...aims to stimulate reflection on and study of the practices and theories of mathematics education at all levels...". Wheeler lovingly brought the Journal through some difficult early years, guided it over a tumultuous adolescence, and then as it reached its seventeenth year (and fiftieth issue) he let it go on its own into the world. Just as he had done with CMESG/GCEDM, he stayed with his creations until he felt they could survive on their own. Then he stepped away satisfied with the job he had done. Never did I hear him say that he wished that he had done things differently, either for CMESG/GCEDM or for FLM. He did what he did; he did it as best as he could; and then he moved on.

One of the things that Wheeler moved onto after launching CMESG/GCEDM and FLM was work that carried him beyond Canadian borders. He was instrumental in leading Canada onto the international mathematics education stage. He was central to the Canadian bid to host the Seventh International Congress of Mathematics Education (ICME-7), held in 1992 at Université Laval in Québec. Moreover, he was selected to chair the International Programme Committee for this Congress, a great honour and huge responsibility. As Joel Hillel notes, being selected for this post was "...a fitting reflection of the highest confidence bestowed on Professor Wheeler by his international

colleagues." The Congress actually occurred after Wheeler had retired. It was not until 1994, however, with the release of the *Congress Proceedings* that Wheeler finally began to withdraw from the mathematics education scene. Then in 1997 he passed ownership of FLM to CMESG/GCEDM. His offspring had joined forces. And Wheeler moved on.

He moved onto reading even more 'whodunits' than he had previously. He moved onto going to even more concerts than before retirement. He mastered, but not without a struggle, the computer and then moved into the world of e-mail. And he had lunches and dinners with anyone who would care to join him. Indeed, during the decade of the nineties sharing biweekly or tri-weekly lunches became a routine thing with Wheeler and me. We sampled many of the best places for beer and hamburgers or fish-n-chips in the lower mainland in and around Vancouver. He would also say that I managed to find a few of the worse ones as well. One pub in particular stood out for both of us as having the worse fish-n-chips we'd ever eaten. But we always laughed about our culinary noon time adventures that often included, as the years wore on, a leisurely drive around the Vancouver area. David loved to drive around and see the sights, something he didn't do any longer on his own. He very much liked to sit high in the front seat of my Toyota van from where he surveyed and commented on

the passing tableau.

And then he moved on. After an eighteen month struggle with cancer, he died quietly in his sleep on October 7th. A month later, in Vancouver, we held a memorial service for him in the chapel of St. Paul's Hospital. Afterwards, a dozen or so of us headed off for a meal at one of his favourite fish-n-chips places. He would have smiled as we ate the greasy fish and a mountain of chips, but would have been chagrined by the lack of beer. Later that evening we walked to English Bay, the beach close to his apartment in the heart of west-end Vancouver, an area Wheeler dearly loved. There we spread his ashes on the waves of the Pacific ocean, perhaps to drift to you wherever you reside in the world.

Two pictures of Wheeler smile at me from the bulletin board above the desk in my Honolulu office. In one photo (taken by Marty Hoffman) Wheeler is sitting at a table during ICME-7 in Québec with Tom Kieren, Arthur Powell, Sandra (my wife) and me, a glass of beer and an empty plate are in front of him, and he is waving a fork about, no doubt 'sharing some thought' or 'reflecting on some event' from the Congress. That picture says so much about two passions in Wheeler's life, good food and good conversation. I am so pleased to have shared many a meal and many a conversation with him.

I miss him a lot.

Sandy Dawson

AWARDS / PRIX

CAIMS Doctoral Dissertation Award

The Award is meant to recognize an outstanding PhD thesis in Applied Mathematics that is defended at a Canadian university during the calendar year 2001. The award consists of a certificate, monetary prize, and a free society membership. The winner will also be invited to present a plenary talk at

the 2002 Annual Meeting of the Society to be held in Calgary (see <http://www.math.ucalgary.ca/ware/caims/index.html>).

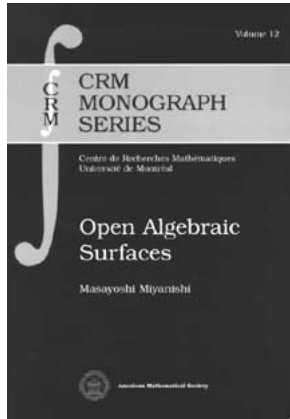
Details of the award competition, judging, and nomination requirements are available on the CAIMS web page at <http://www.math.uwaterloo.ca/caims/>

The deadline for completed applications is **January 31, 2002**.

Open Algebraic Surfaces

Book Review by Peter Russell, McGill University

Open Algebraic Surfaces
by Masayoshi Miyanishi
American Mathematical Society,
Providence



To put the subject matter of “Open Algebraic Surfaces” in perspective, let me begin with a very classical **question**: If $k \subset L$ are fields and $L \subset k(x_1, \dots, x_n) = k^{(n)}$ (field of rational functions), is L purely transcendental over k ? (Then $L = k^{(d)}$, $d =$ transcendence degree of L over k . This is the “right” measure for the dimension of the problem, one can easily reduce it to the case $n = d$.) The answer is *yes* if $d = 1$ by **Lüroth’s Theorem**. For $d = 2$ already we have to be more circumspect. The answer is *yes* for k algebraically closed of characteristic 0 by **Castelnuovo’s Theorem**. (If $\text{char } k > 0$, separability of $k^{(n)}/L$ is required.) The answer is *no* for $d \geq 3$. This is a celebrated result of the 1970’s [CG]. Lüroth’s theorem can be settled by an elementary algebraic argument. For $d \geq 2$, though, our question appears to require a determined plunge into algebraic geometry.

It is tempting, but was done in a systematic way only fairly recently, to pose an **affine** version of our **question**: If A is a k -algebra and $A \subset k[x_1, \dots, x_n] = k^{[n]}$ (polynomial

ring), is A a polynomial ring over k ? Then $A \simeq k^{[d]}$, where d is the Krull dimension of A . Again we may assume $n = d$. To avoid obvious counterexamples additional conditions are now required. What comes to mind readily is: A is *affine* (finitely generated over k), *regular* ($\text{Spec } A$ is non-singular, so this is inspired by geometry), and *factorial* (A is a UFD). It is a remarkable fact that we have now identified the obstructions, at least for $d = 2$: the **Affine Castelnuovo Theorem** states that for k algebraically closed of characteristic 0 the above conditions imply $A \simeq k^{[2]}$. An immediate consequence is the **Cancellation Theorem** (in dimension 2, the name comes from geometry): If A is k -algebra such that $A^{[1]} \simeq k^{[3]}$, then $A \simeq k^{[2]}$. These results are due to Miyanishi and Sugie [MS], with a crucial contribution by Fujita [F]. Behind them is a formidable machinery of algebraic geometry based on fundamental work of Itaka [I]. An exposition of this theory, which needless to say has taken on a vigorous life of its own and has found numerous other applications, is a main objective of the book.

There is, of course, an (again elementary) **Affine Lüroth Theorem** for $d = 1$ (we only have to assume that A is normal), but no good conditions are known giving $A \simeq k^{[d]}$ if $d \geq 3$. In particular, the cancellation question is wide open for $d \geq 3$. (The answer is negative for the original Zariski cancellation problem for fields [BC-TSS-D].)

In the geometric reformulation of the question (we restrict ourselves to algebraically closed k and $d = 2$) we find a non-singular and complete (compact if $k = \mathbb{C}$) algebraic surface X with function field $k(X) = L$. “ $L \subset k^{(n)}$ ” translates into: “ X is birationally dominated by projective space P^n ,” and we ask: “Is X birationally equivalent to P^2 ?” The power of algebraic geometry now derives from the study of linear systems of curves (effective divisors) on

X . If D is a divisor (linear combination of irreducible curves on X , with integer coefficients, all non-negative if D is effective), the complete linear system $|D|$ of effective divisors linearly equivalent to D is a finite dimensional projective space $P^{\ell(D)}$. (D' is linearly equivalent to D if $D' - D$ is the divisor of a rational function on X .) Differential calculus gives us the canonical divisor class, the divisors K_X of rational 2-differentials on X . The powerful Riemann-Roch theorem allows to compute, or at least efficiently estimate, $\ell(D)$. (This involves K_X and the intersection product defined on $\text{Pic } X$, the group of divisors modulo linear equivalence.)

To D there is associated a rational map $\varphi_D : X \rightarrow P^{\ell(D)}$. Put $\kappa(D) = \sup\{\dim \varphi_{nD}(X) | n > 0\}$. (Formally, $\kappa(D) = -\infty$ if $|nD| = \emptyset$ for $n > 0$, and $0 \leq \kappa(D) \leq 2$ otherwise.) The Kodaira dimension of X now is

$$\kappa(X) = \kappa(K_X).$$

It depends on X only up to birational equivalence and $\kappa(X) \leq \kappa(Y)$ if Y dominates X (separably). A fundamental result gives: $\kappa(X) = -\infty$ if and only if X is birationally ruled, i.e., birationally equivalent to $C \times P^1$, C a curve. This **Ruledness Theorem** (the if part is easy, the other not) is the beginning of the Enriques-Kodaira classification of surfaces. The Castelnuovo Theorem is an easy consequence.

In the situation of the Affine Castelnuovo Theorem we are geometrically dealing with an open (non-complete) non-singular surface X . ($X = \text{Spec } A$, and X is dominated by affine space A^n .) It is possible to embed X as an open subset in a complete, non-singular surface \bar{X} so that the boundary

$$\bar{X} \setminus X = D = \sum C_i$$

is a divisor with simple normal crossing (SNC-divisor, meaning that the C_i

are non-singular, at most two meeting at a point, and if so normally). This statement requires resolution of singularities for surfaces and embedded resolution for curves in a surface. A key insight of Itaka [I] gives: $\kappa(K_{\bar{X}} + D)$ depends on X only, as long as SNC holds for D . (This is an instance of a more general phenomenon, even in higher dimensions. One introduces the sheaf $\Omega_{\bar{X}}(D)$ of rational differential one-forms with simple poles along D . Performing standard linear algebra constructions on $\Omega_{\bar{X}}(D)$ and taking global sections one obtains finite dimensional vectorspaces that are invariants of X .) We are thus justified to introduce

$$\bar{\kappa}(X) = \kappa(K_{\bar{X}} + D)$$

as the (logarithmic) Kodaira dimension of X .

With the exception of $\bar{X} = P^2$, a complete, non-singular surface is birationally ruled if and only if \bar{X} contains an open subset of the form $C' \times P^1$, C' a curve. We define: a non-singular surface X is *affine-ruled* if X contains an open subset of the form $C' \times \mathbf{A}^1$, C' a curve. That this concept, introduced in [MS], gives a good notion of ruledness in the open context is attested to by the **Affine-Ruledness Theorem** [MS] [F], one of the major results of the book: *Let X be a non-singular surface over k . Suppose X is connected at infinity and $\bar{\kappa}(X) = -\infty$. Then X is affine-ruled. (X is connected at infinity if $\bar{X} \setminus X$ is connected. This is the case if X is affine.) An important consequence is the **Characterization Theorem** (for the affine plane) [MS] [F]: *Let $X = \text{Spec } A$ be an affine non-singular surface over k with A factorial, $A^* = k^*$ and $\bar{\kappa}(X) = -\infty$. Then $X \simeq \mathbf{A}^2$. ($A^* = \text{group of units of } A$). The Affine Castelnuovo Theorem and the Cancellation Theorem are immediate consequences. In case $k = \mathbf{C}$ the condition “ A is factorial and $A^* = k^*$ ” could be replaced by “ $H_i(X, Z) = 0$ for $i > 0$ ”. Finding conditions that characterize \mathbf{A}^d , $d \geq 3$, on the other**

hand, is an outstanding (in every sense) challenge.

Here is a brief rundown of the contents of the book.

Chapter 1 gives a rapid introduction to complete algebraic surfaces, culminating in the Enriques-Kodaira classification. Many of the basic results are not proven but precise references are given for most. Among not so standard topics there is an exposé of Mori’s theory (of extremal rays in the effective cone) in the case of surfaces, and a description of rational, in particular quotient, surface singularities and their resolutions.

Chapter 2 turns to open surfaces. Their Kodaira dimension is introduced. The Zariski-Fujita decomposition of a pseudo-effective divisor into its numerically effective (nef) and negative parts is presented in detail. This generalization by Fujita [F] of a result of Zariski is a crucial technical tool in the “open” context. A proof of the Affine-Ruledness Theorem then follows.

As for complete surfaces, there is a notion of *relatively minimal model* in the open case. The *theory of peeling*, described next, is a concrete way to construct such a model. The negative part of $K_{\bar{X}} + D$ is computed. It is supported, it turns out, on certain pieces of D that are resolution graphs of quotient singularities. Contracting these to normal points, we land in the realm of *log projective surfaces*, which are treated next. The tools are then at hand to establish structure theorems for open surfaces according to Kodaira dimension (due to Itaka, Fujita, Kawamata, Miyanishi, Tsunoda,.....). Let me mention specifically the large effort put into generalizing the Affine-Ruledness Theorem. (This includes a section on *log del Pezzo surfaces*. Mori theory is appealed to.) Here is a somewhat condensed version [MT] (with $k = \mathbf{C}$): *If $\bar{\kappa}(X) = -\infty$ and at least one connected component of D is not contractible to a normal point, then X is*

affine-ruled or X contains an open subset (with good control over the complement) of the form $\mathbf{C}^2/G \setminus \{0\}$, G a non-abelian small finite subgroup of $GL_2(\mathbf{C})$. This theorem applies to the smooth locus of a normal affine surface and is a fundamental structural result in that context. It is, for instance, an essential ingredient in the linearization of \mathbf{C}^ -actions on \mathbf{C}^3 [KKM-LR].*

Chapter 3 reaps rewards for previous hard work with applications to affine surfaces, among them: \mathbf{A}_*^1 -fibrations (the open analogue of elliptic fibrations), the Characterization and Cancellation Theorems, normal surfaces X with a finite map $\mathbf{A}^2 \rightarrow X$, proofs of the theorems of Abhyankar-Moh-Suzuki (*a curve in \mathbf{C}^2 isomorphic to \mathbf{C} is a straight line up to automorphism*) and Lin-Zaidenberg (*a topologically contractible curve in \mathbf{C}^2 is the zero locus of $x^p - y^q$ in suitable coordinates*) with open surface techniques. The book closes with the classification theory of *homology* and *Q-homology planes* (surfaces with $H_i(X, Z) = 0$, resp. $H_i(X, Q) = 0$, for $i > 0$).

In a way, the concept *open variety = completion + extra baggage of the (made nice) boundary divisor* fits seamlessly into the framework of classical algebraic geometry. The baggage can be heavy, but carrying it along brings dividends. In dimension 2, a mature theory of open surfaces has developed in parallel to the classical case. Fascinating on its own, it also has powerful applications to what is emerging as “affine algebraic geometry”, the study of affine spaces and closely related varieties. The book under review is an authoritative and comprehensive account of this theory (by one of its creators). It does not make for an easy read, but this may well be inherent in the subject. (Some familiarity with algebraic geometry is recommended to the reader.) It will be an indispensable reference work for experts in the field. I expect it will do a lot to open this exciting area of mathematics to newcomers.

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MINUTES OF THE ANNUAL GENERAL MEETING

Marquis Hall, University of Saskatchewan
Saskatoon, Saskatchewan – June 3, 2001

DRAFT

Pending approval

The meeting opened at 12:30 p.m. with 44 members in attendance.

1. Adoption of the agenda

The agenda was adopted, as circulated.

2. Minutes of the previous meeting

G-01-1 MOTION (McDonald/Williams)

That the minutes of the Annual General Meeting, held at McMaster University, be accepted. *Carried Unanimously*

3. Matters Arising

There were no matters.

4. President's Report

Borwein expressed his thanks to the outgoing Board members and Executive, with a special note of thanks to Richard Kane, who is coming to the end of a very long period of service to the Society.

He announced that *Scientific America's* recent issue had identified the Kabol part of the CMS website as one of the top websites in North America. Thanks are due to Robert Rosebrugh, Nathalie Sinclair and Fred Tessier for creating this fine resource, and keeping it updated every week for the last five years.

Borwein announced that the grant money from NSERC's PromoScience programme had been received and applied to Math Camps and the Canadian Virtual Math Trail.

The strategic planning process, begun four years ago by Katherine Heinrich, was brought to near completion by Richard Kane. After receiving reports from the other task forces and special committees, Task Force #9 on Governance

and Administration has considered the vast number of recommendations, and submitted its final report to the Board of Directors. The Society owes its thanks to the many individuals who worked tirelessly throughout the process.

The exercise of examining the CMS structure and activities proved very beneficial as many recommendations have already been instituted. The newest change has been the establishment of a Advancement of Mathematics Committee, which will include the current Fund Raising Committee as a sub-committee.

There remain two main issues needing closer examination. First, the organization of CMS educational activities needs to be better defined. The second issue is the way in which our publications are administered.

An ad-hoc Committee on Publishing submitted an interim report and we are looking at consolidating the publishing activities, either in conjunction with one of the institutes, at a university math department (like the University of Manitoba) or perhaps at the Executive Office. All of these options would involve the development of a business plan. Whichever direction is chosen, the new structure would need to be in place by the end of 2002.

A national forum in education has been proposed for next fall, which would be a follow-up to a similar event held in 1995. Once again, the CMS could play a role as an aggregator to let people from the diverse interested communities to express their opinions on the development of the education systems over the last five years and how best to address present challenges.

Borwein ended his report by noting that the annual cycle of competitions leading to the selection of the IMO was complete. The majority of the team members this year come from Vancouver schools, with three members coming from a single

school board, an outstanding achievement. The entire team has been invited to dinner at the New Brunswick Lieutenant Governor's residence before leaving for Washington, D.C. on July 3.

5. Nominating Committee Report

5.1 Tellers' Report - 2001 Election

Baker thanked all the candidates for agreeing to stand for election.

G-01-2 MOTION (Baker/Nowakowski)

That the Teller's Report on the 2001 Election be accepted.
Carried Unanimously

6. Treasurer's Report

G-01-3 MOTION (Board of Directors)

That the Treasurer's Report for the period ended December 31, 2000 be accepted.
Carried Unanimously

6.1 2000 Audited Statement

G-01-4 MOTION (Board of Directors)

That the Audited Statement for the period ended December 31, 2000 be accepted.
Carried Unanimously

6.2 Appointment of the auditor for 2001

G-01-5 MOTION (Board of Directors)

That the firm of Raymond Chabot Grant Thornton be appointed as auditors for the financial year ending December 31, 2001.
Carried Unanimously

7. 2000 Annual Report to the Members

G-01-6 MOTION (Wright/Sherk)

That the 2000 Annual Report to the Members be accepted.
Carried Unanimously

8. Executive Director and Secretary's Report

Wright began by expressing his thanks to Keith Taylor, Christine Soteros, and all the local Saskatoon staff for a superb meeting.

He reported that new ISSN numbers had been assigned for the online versions of all CMS subscription publications.

Finally he reported that the CMS has agreed to join the AMS Membership Directory. If all details are worked out, the list of members may appear beginning 2002.

9. Reports from Committees

Education: Barbeau reported that the Committee would soon announce the recipient of the 2001 Adrien Pouliot Award. The Committee is also working on an Education page for the CMS website, where we could share advice to students and teachers preparing students for university and general information on careers in mathematics. They are also considering publishing some articles in the Notes regarding teacher preparation.

Lastly, the Committee has considered the possible effects of merging the Education and Competitions Committees. It felt that this wasn't really appropriate, as the Competitions Committee is well defined and has a larger mandate.

Electronic Services: Brown announced that Alan Kelm would be taking on the role of Camel Manager on a full-time basis beginning July 1, 2001. He will be focusing on establishing a new look and structure for Camel, completion of the migration from Camel West to Camel East. We are also attempting to obtain sponsorship for some pages.

Endowment Grants: The second year of the original three-year mandate has now taken place. Borwein noted that not all applications need to be members, so he encouraged members to spread the word to all who might take advantage of these available funds.

Finance: There was no report given.

Fund Raising: The Committee has experienced some roadblocks due to other events, but there has been some success with contacts in Vancouver, where a few proposals are in development. The Committee is working to regionalize activities, to help sustain present level of activities without increasing expenses. All ideas are welcome.

Human Rights: There was no report given.

International Affairs: Borwein noted that the Executive had approved a donation to the IMU Development Fund. Also, the Canadian Ambassador to China has accepted to host a reception in Beijing at the beginning of the ICM'02.

Mathematical Competitions: Tingley reviewed the competitions over the last year. Over 5,000 wrote the last COMC. The contest is running very well and a new multi-year contract has been signed with the University of Waterloo.

This year's CMO, hosted at Simon Fraser University, was written by 85 students.

He announced that Canada would be the Chief Coordinating Country for the 2002 Asian Pacific Mathematics Olympiad. Bill Sands will be chair of a sub-committee to handle the event.

The 2001 IMO will be held in Washington, D.C. from July 1 - 14. The team will be announced on Wednesday.

Tingley reported on the training camps programme. The January training camp was organized by Tom Salisbury at York University and involved 15 participants. The Summer training camp was organized by himself at the University of New Brunswick. Thanks was extended to both host departments.

Nominating: The Election results have been posted. Some Committee and Editorial Board positions will become vacant and all interested persons were invited to approach any member of the Committee.

Publications: Mingo reported that the Committee had taken a very close look at all the Task Force recommendations and is continuing to look at possible future structures for CMS publications.

Research: There was no report given.

Students: Charbonneau reported on the regional events supported by the Committee and the release of the first issue of the Student Newsletter. The next issue will appear in October. Comments are welcome.

The 2001 CUMC will be held June 12-17 at Laval University. He invited all departments to send their students. They currently have 60 students registered.

Regarding other Committee activity, they are currently looking for a webmaster and new students for the Committee.

Women in Mathematics: Dubiel reported on the release of the Women in Math poster. She extended her thanks to Jonathan and Judi Borwein, along with Graham Wright. With the help of some provincial ministers of education, the CMS Executive Office was able to distribute the poster to all school boards in Canada.

The Committee continues to encourage women in mathematics to register with the Directory of Women in Mathematics.

10. Other Business

Katherine Heinrich, member of the NSERC Reallocation Committee, noted that the community must build a case for investing in mathematics. She invited members to visit the website at the University of Alberta. She also noted that a brief questionnaire had been sent to mathematics department heads. She urged chairs to provide this important feedback.

There was no other business.

11. Adjournment

The meeting adjourned at 3:25 p.m.

Joint Press Conference for Banff International Research Station Arlington, Virginia and Banff, Alberta – September 24, 2001

Remarks of Dr. Rita Colwell, NSF

Good afternoon, everyone. I am Rita Colwell, director of the U.S. National Science Foundation, and it is a great pleasure to take part in this ceremony – really a “virtual ribbon-cutting” – today.

Our event connects two nations, the United States and Canada, exemplary neighbors who have always cherished peace between each other. In that tradition, today we inaugurate an enterprise that represents the best of the human spirit.

Following the tragic attacks on the United States two weeks ago, this event today lifts our spirits as it symbolizes our joint endeavor to push back the frontiers of knowledge. We have called today’s event “Close Parallels”—a mathematical metaphor evoking the steadfast closeness of our nations.

The National Science Foundation supports cutting-edge science and engineering across the range of disciplines. We always strive to integrate research and education, really two faces of the same coin.

We invest in the very best of the future, the fundamental research whose ultimate outcome no one can foresee. Mathematical research is an ideal example of such fertile ground for far-reaching investment.

Today NSF is very pleased to announce an award to the Mathematical Sciences Research Institute—MSRI. The award of \$1.27 million over four years will support United States’ participation at the Banff International Research Station for Mathematical Innovation and Discovery.

The research station in the Canadian Rockies in Banff will provide a spectacular setting for intensive mathematical research, when it opens in 2003.

The station is a project of both our nations, led by the Pacific Institute for the Mathematical Sciences in Vancouver, British Columbia, and MSRI, which I’ve already mentioned, located in Berkeley, California.

I cannot resist quoting the director of the Pacific Institute, Nassif Ghoussoub; he said that the Banff center will enable visitors to “live, eat and breathe mathematics.” (I have to say that sounds like a very nourishing diet—talk about “brain food!”)

Our NSF contribution joins Canadian support that will be described by our Canadian partners today. The NSF award will help support the travel and living expenses of participants in the research station’s programs, especially those from the U.S.

I should emphasize that our Canadian colleagues and funding agencies have taken the lead in bringing the Banff center into being. This activity underscores how international cooperation adds up to more than what any nation could accomplish alone.

Every important question of science and engineering is under study by researchers in nations around the world. The mathematical and statistical communities of the United States are at the forefront in engaging their counterparts abroad.

International connections in mathematics are important throughout a career in science. In June of this year, NSF helped to support the International Mathematical Olympiad, a competition that brought talented young people from more than eighty countries to Washington, D.C. for the annual event that was first held in Romania in 1959.

It was a rare privilege for us to host the Olympiad in the U.S. However, every year, NSF hosts the U.S. Olympiad team

in Washington to honor their achievements.

Our investment in the Banff Center is tangible proof of the vital and growing role of the mathematical sciences in all of science and engineering. I would like to show a few slides now, to illustrate this fundamental importance of mathematics.

E.O. Wilson writes that "...mathematics seems to point arrowlike toward the ultimate goal of objective truth." Indeed, mathematics is the ultimate cross-cutting discipline, the springboard for advances across the board.

Mathematics is both a powerful tool for insight and a common language for science. A good example, pictured here, is the fractal, a famous illustration of how inner principles of mathematics enable us to model many natural structures.

Cosmologists are beginning to draw an awesome portrait of the structure of the universe—using mathematics as the medium.

On the other end of the scale, particle physicists sketch quantum phenomena, again with mathematics as their brush and palette.

In the realm of climate, our ability to predict El Niño—the irregular shifts in ocean and atmospheric conditions—is a superb example of where mathematics and computing have brought us.

The meeting of mathematics and medicine augurs well for discovery on many fronts. Mathematics and complexity theory, for instance, give insight into the human heart.

The top pictures are computer simulations of the electrical activity in a normal heart. Below are abnormal patterns, or fibrillation. Mathematicians are investigating why some patterns of electrical stimulus are better at eliminating fibrillation.

Mathematics and biology transform each other. The information science of life edges ever closer to electronic information science. Advances in understanding life may lead to new modes of computing, notably biological computing.

To strengthen the mathematical foundations of science and society, the National Science Foundation has proposed a new priority area.

We seek to advance frontiers in three interlinked areas: fundamental mathematical and statistical sciences, interdisciplinary research involving the mathematical sciences, and mathematical sciences education.

I show this final slide as a mathematical metaphor. Fractal sets like we see here can be used to build computer models of clouds, plants, the surface of the sea, even networks of blood vessels.

Yet, mathematics also transports us beyond the practical, into the realm of the imagination and art. A coming together of brilliant imaginations for a higher purpose will be a hallmark of the Banff Center.

We look forward to an inspiring and long-lasting engagement among our mathematical scientists, our Canadian col-

leagues, and others from around the world, in a superb environment for communication and collaboration.

Remarks of Dr. Tom Brzustowski, NSERC

If I may begin, Rita may I address a personal request to you. I would ask you on behalf of the entire staff of NSERC and that's the National Sciences and Engineering Research Council of Canada to convey to our colleagues at the NSF, to the American Mathematical Community and to the people of the United States, our heart felt regret and our profound outrage at the event of September 11.

I am very very glad, as Nassif has indicated that he is, that the event today was not postponed and was not cancelled because to postpone it or to have cancelled it would have given the victory to the terrorist. They might never have known, but we would have known. Let me then move on to the most important thing that I have to do.

I have to read the magic words which makes it official and here they are. The National Sciences and Engineering Research Council of Canada is contributing \$ 1.5 Million towards the operation of BIRS from the year 2002 to the year 2005. Now we are here to celebrate a hugely important event. One that is hugely important not just for the participating organizations although it is important for them but is important for our nation, and it is important for mathematics in the world.

Let me begin by congratulating PIMS, MSRI, and MITACS. I'll stick with the acronyms as life is too short to spell them up. Let me congratulate these 3 organizations for their intellectual involvement and their promise to deliver. The fruits of this superb international collaboration. Let me also congratulate the funding partners. Let me congratulate the National Science Foundation of the United States. You have heard in the remarks Dr. Colwell the extensive understanding of the importance of mathematics which has driven their decision and let me congratulate the Province of Alberta where BIRS is located. This is a province which, in my opinion, really does have its act together when it comes to science and engineering and this is yet another example of it.

The hallmark of a good idea is that so many people find it obvious once it has been mentioned, obviously! Why not! You know. Oberwolfach has succeeded for so many years. Why not in the sense of developing partnership in research and mathematics now in North America. Why not set up something which would be at least as good as, and maybe far better, and so it was done. A fast track, quick decisions. Something that could not have happened, could not have had happened without the vision, the energy, the tenacity and the leadership of one person and that of course is Nassif Ghousoub. And I think that of the many contributions, Nassif has made including some quiet decent papers on partial differential equations. I do look at "Nature," Nassif. I've seen your stuff.

Quite a part from that, his contribution as a leader in organizing mathematical activity in Canada has been extraordinarily

important and now we see the leadership stretching to international collaboration and we welcome that.

Now, I should mention perhaps for the benefit of our American colleagues rather more than the Canadian colleagues, who are already totally convinced of this, but this is a very important event. It is the next step in the emergence of Canadian mathematics into the prominence that it deserves. Canadian mathematicians have been good for a long time, they have been very good. We have many outstanding individuals but Canadian mathematics in the corporate sense, has been achieving the prominence which I believe it deserves only very recently.

The three institutes which are now active, the Network of Centres of Excellence, MITACS, International Partnerships and today BIRS and in another way, is very important as well because it puts the seal on the recognition by the funding community, of the way that mathematicians do research: the face to face contact, the debate of ideas, the closing of dead ends and the presence of those who might have contributed to a solution in the first instance. The ability of people to change their minds and the ability of people to recognize new developments on the spot and then go off and talk about them some more. Hugely important. Mathematicians in an environment conducive to intellectual creativity will produce a great deal.

Let me finally come to something that I have been saying for a little while and I say it however weekly, because it is a matter for the generalist not for the mathematicians, but I really do believe that mathematics has been the language of high technology. I really do believe that mathematics is becoming the eyes of science, helping scientists from all fields drink from that firehose of data which is coming up from many directions. But to function in these ways as the language and as the eyes and as the many other things that mathematics is yet to become, needs the continued effort to expand and strengthen the foundations of mathematics, the work of basic research in mathematics. So let me conclude by congratulating one more person as the focus now shifts from Nassif to Bob Moody.

Let me congratulate Bob Moody on becoming the research director of BIRS. I think BIRS is very lucky to have Bob Moody. I think Bob Moody is very lucky to have BIRS. This is a hugely important international effort which will be important I believe for Canadian mathematics, for mathematics in the United States and ultimately for mathematics in the world. I congratulate all who participated. I thank our funding partners and I wish everybody every success in the years to come.

SIMON FRASER UNIVERSITY – VANCOUVER, BRITISH COLUMBIA
DEPARTMENT OF MATHEMATICS
Faculty Appointment in Mathematics

The Department of Mathematics of Simon Fraser University has two positions in mathematics to be filled over the next two years. One position will start September 1, 2002, the second a year later. Applicants will be expected to have completed a Ph.D. degree at the time of appointment and to have demonstrated a strong teaching and research potential. The appointments will be made at the level of Assistant Professor. The department seeks to enhance its current strengths in combinatorics, computer algebra, modern analysis and number theory.

The first hiring priority is combinatorial optimization. The second priority is a candidate with expertise in algebra or algebraic geometry. Candidates who can support the department's strengths will be preferred. Exceptional applicants in all areas of pure mathematics will be considered.

Applications, including a curriculum vitae and descriptive statements on research plans and teaching activities, should be sent **by 10 January, 2002** to:

Search Committee
Department of Mathematics
Simon Fraser University
Burnaby, BC V5A 1S6 Canada
e-mail: mcs@sfu.ca

Please arrange for letters of reference to be sent, in confidence, from three referees.

We thank all applicants in advance; only those short-listed will be contacted. Further information on the department and the university can be found on the http://www.math.sfu.ca/mast_home.html These positions are subject to final budgetary approval. Simon Fraser University is committed to the principle of equity in employment and offers equal employment opportunities to all qualified applicants. In accordance with Canadian immigration requirements, this advertisement is directed to Canadian citizens and permanent residents.

UPCOMING CONFERENCES

The 5th Americas Conference in Differential Equations and Nonlinear Dynamics

July 7 - 12, 2002 / University of Alberta, Edmonton, Canada

Scientific Committees:

Jorge Cossio (Colombia)
 Gilberto Flores (Mexico)
 Bill Langford (Canada)
 Hugo Leiva (Venezuela)
 Raul Manasevich (Chile)
 Konstantin Mischaikow (US)
 Hildbrando Rodrigues (Brazil)
 O. Rubio (Peru)

Plenary Speakers:

Jack Hale (USA)
 Hildebrando Rodrigues (Brazil)
 Mark Lewis (Canada)
 Jianhong Wu (Canada)
 Raul Manasevich (Chile)
 Alfonso Castro (Colombia, USA)
 Antonmaria Minzoni (Mexico)

Tomas Gedeon (USA)
 Robert Gardner (USA)
 Kening Lu (USA)
 J. Mallet-Paret (USA)
 Peter Polacik (USA)
 Yingfei Yi (USA)
 Hugo Leiva (Venezuela)

Organizing Committees:

Michael Li (Alberta) Co-Chair
 Kening Lu (Brigham Young)
 Konstantin Mischaikow (Georgia Tech.)
 James Muldowney (Alberta) Co-Chair
 Jianhong Wu (York)

Further Information, contact

website: <http://www.math.ualberta.ca/mli/americas.htm>
 email: mli@math.ualberta.ca

SÉMINAIRE DE MATHÉMATIQUES SUPÉRIEURES

NATO ADVANCED STUDY INSTITUTE

Université de Montréal, July 8 - 19, 2002

Normal Forms, Bifurcations, and Finiteness Problems in Differential Equations

LECTURERS:

A. BOLIBRUKH (Steklov, Moscow) – The Riemann-Hilbert type problems for linear differential equations in the complex domain
 F. DUMORTIER (Limburg) – Topics on singularities and bifurcations of vector fields
 J. ÉCALLE (Paris-Sud XI, Orsay) – Recent advances in the analysis of divergence and singularities
 V. GELFREICH (Freie Univ. Berlin) – Hamiltonian bifurcations and local analytic classification
 A. GLUTSUK (É.N.S. Lyon) – Confluence of singular points and Stokes phenomena
 J. GUCKENHEIMER (Cornell) – Bifurcations of relaxation oscillations
 Y. ILYASHENKO (Independent and Moscow State / Cornell) – Dynamical systems with real and complex time: problems and results
 V. KALOSHIN (Courant Inst.) – Rate of growth of the number of periodic points for generic dynamical systems
 A. KHOVANSKII (Toronto / Moscow State) – Fewnomials
 J.-P. RAMIS (Toulouse) – Gevrey classification of pairs of analytic involutions and geometric applications
 R. ROUSSARIE (Dijon) – Methods for the cyclicity problem
 C. ROUSSEAU (Montréal) – Finiteness problems for limit cycles of planar vector fields and related problems
 D. SCHLOMIUK (Montréal) – Aspects of planar polynomial vector fields: global versus local, real versus complex, analytic versus algebraic and geometric
 S. YAKOVENKO (Weizmann) – Quantitative theory of differential equations
 APPLICATION DEADLINE: FEBRUARY 28, 2002
 INFORMATION - APPLICATION FORM: www.dms.umontreal.ca/sms

CALL FOR NOMINATIONS / APPEL DE CANDIDATURES

CMS 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 first awards were presented at the 1995 Winter Meeting in Vancouver to Donald Coxeter, Nathan Mendelsohn, John Coleman, Maurice L'Abbé and George Duff. Awards were presented at the 1996 Winter Meeting in London, Ontario to David Borwein and P.G. (Tim) Rooney, at the 1999 Summer Meeting in St. John's, Newfoundland to Michael Doob and S. Swaminathan, and at the 2000 the Winter Meeting in Vancouver, British Columbia to Arthur Sherk. The 2001 award will be presented to James Timourian at the Winter Meeting in Toronto, Ontario.

Nominations should include a reasonably detailed rationale and be submitted by **March 31, 2002**, to the address below.

Selection Committee / Comité de sélection
Distinguished Service Award / Prix pour service méritoire
577 King Edward, Suite 109
C.P./P.O. 450, Succursale / Station A
Ottawa, Ontario K1N 6N5 Canada

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

Les premiers lauréats, Donald Coxeter, Nathan Mendelsohn, John Coleman, Maurice L'Abbé et George Duff, furent honorés lors de la réunion d'hiver 1995 à Vancouver. Les lauréats, David Borwein et P.G. (Tim) Rooney, furent honorés lors de la réunion d'hiver 1996 à London, Ontario. Les lauréats, Michael Doob et S. Swaminathan, furent honorés lors de la réunion d'été 1999 à St. John's, Terre-Neuve. Arthur Sherk fut honoré à la réunion d'hiver 2000 au Vancouver, Colombie-britannique. Le prochain lauréat, James Timourian sera honoré à la réunion d'hiver 2001 à Toronto, Ontario.

Pour les mises en candidature prière de présenter des dossiers suffisamment détaillés et de les faire parvenir, le **31 mars 2002** au plus tard, à l'adresse ci-dessous.

CONCORDIA UNIVERSITY – MONTREAL, QUEBEC

FACULTY OF ARTS AND SCIENCES

Tenure-Track Positions in Statistics

Concordia University's Department of Mathematics and Statistics invites applications for up to two tenure-track positions in Statistics. We are particularly interested in candidates with expertise in Computational Statistics, Multivariate Analysis, Time Series Analysis or Survival Analysis. Applicants should be familiar with computational techniques and have a proven record of research as well as a demonstrated interest in teaching, both at the undergraduate and graduate levels.

Please forward a letter of intent, a curriculum vitae, a list of publications, a statement of teaching and research interests, and three letters of reference to:

Dr. Hershy Kisilevsky
Chair, Department of Mathematics and Statistics
Concordia University,
1455 de Maisonneuve Blvd. West, HB-200
Montreal, Quebec, H3G 1M8

Review of applications will begin on January 15, 2002 and continue until the position is filled.

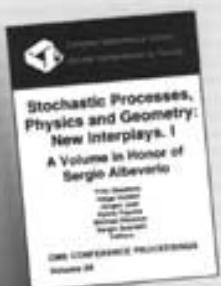
Subject to budgetary approval, we anticipate filling this position, normally at the rank of Assistant Professor, for July 1, 2002.

In accordance with Canadian immigration requirements, priority will be given to Canadian citizens and permanent residents of Canada. However, all applicants are welcome to apply. Concordia University is committed to employment equity and encourages applications from women, aboriginal peoples, visible minorities and disabled persons.

AMERICAN MATHEMATICAL SOCIETY

Conference Proceedings, Canadian Mathematical Society

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



Stochastic Processes, Physics and Geometry: New Interplays. I and II

A Volume in Honor of Sergio Albeverio

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

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

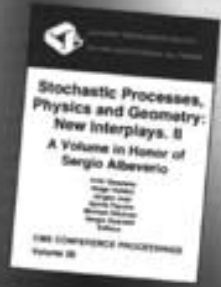
The contributions are written by internationally recognized experts in the fields of stochastic analysis, linear and nonlinear (deterministic and stochastic) PDEs, infinite dimensional analysis, functional analysis, commutative and noncommutative probability theory, integrable systems, quantum and statistical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

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

Members of the Canadian Mathematical Society may order at the AMS member price.

Conference Proceedings, Canadian Mathematical Society, Volume 26, 2000; 333 pages; Softcover; ISBN 0-8218-1959-3; List \$75; Individual member \$45; Order code CMSAMS26CMS01

Conference Proceedings, Canadian Mathematical Society, Volume 29, 2000; 647 pages; Softcover; ISBN 0-8218-1960-7; List \$125; Individual member \$75; Order code CMSAMS29CMS01



Constructive, Experimental, and Nonlinear Analysis

Michel Théra, *University of Limoges, France*, Editor

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

Conference Proceedings, Canadian Mathematical Society, Volume 27, 2000; 289 pages; Softcover; ISBN 0-8218-2167-9; List \$70; Individual member \$42; Order code CMSAMS27CMS01

Stochastic Models

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

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

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

This comprehensive work offers a wide assortment of articles on Markov processes, branching processes, mathematical finance, filtering, queueing networks, time series, and statistics. It should be of interest to a broad mathematical audience.

Members of the Canadian Mathematical Society may order at the AMS member price.

Conference Proceedings, Canadian Mathematical Society, Volume 26, 2000; 450 pages; Softcover; ISBN 0-8218-1063-4; List \$90; Individual member \$59; Order code CMSAMS26CMS01



All prices subject to change. Charges for delivery are \$3.00 per order. For optional air delivery outside of the continental U. S., please include \$6.50 per item. Prepayment required. Order from: **American Mathematical Society**, P. O. Box 5904, Boston, MA 02206-5904, USA. For credit card orders, fax 1-401-455-4046 or call toll free 1-800-321-4AMS (4267) in the U. S. and Canada, 1-401-455-4000 worldwide. Or place your order through the AMS bookstore at www.ams.org/bookstore/. Residents of Canada, please include 7% GST.

Visit the AMS bookstore at www.ams.org/bookstore/.

CMS Summer Meeting 2002 June 15-17, 2002

Laval University
Quebec City, Quebec

We are happy to announce the provisional outline for the Canadian Mathematical Society Summer Meeting 2002. Look for the First Announcement in the February 2002 issue of the *CMS Notes* or at <http://www.cms.math.ca/Events/summer02/>

HOST : Department of Mathematics & Statistics, Laval University.

PLENARY SPEAKERS : **David Henderson** (Cornell University), **Nikolai Nikolski** (University of Bordeaux), **Paul D. Seymour** (Princeton University), **I.M. Singer** (MIT), **Christophe Retenauer** (University du Québec à Montréal).

PRIZES : Jeffery-Williams Lecture, **Edwin Perkins** (UBC), Krieger-Nelson Lecture, **Priscilla Greenwood** (UBC, Arizona State).

SYMPOSIA : **Analysis**, Org: Thomas Ransford (Laval) ; **Arithmetic Algebraic Geometry**, Org: Kumar Murty (Toronto); **Category Theory**, Org: Robert Pare (Dalhousie) ; **Combinatorics**, Org: Pierre Leroux (UQAM) ; **Cryptography**, Org: Hugh Williams (Calgary) and Douglas Stinson (Waterloo) ; **Differential Geometry**, Org: Jingyi Chen (UBC) ; **Graph Theory**, Org: Brian Alspach (SFU) ; **Mathematical Education**, Org: Frédéric Gourdeau (Laval) and Bernard Hodgson (Laval); **Mathematics of Finance**, Org: Hassan Manouzi (Laval); **Number Theory**, Org: Amir Akbary (Lethbridge) and Omar Kihel (Lethbridge) ; **Probability Theory**, Org: Donald Dawson (Carleton) ; **Universal Algebra**, Org: Jennifer Hyndman (UNBC) and Shelly Wismath (Lethbridge); **Contributed Papers**, Org: Norbert Lacroix (Laval) and Hugh Edgar (San Jose/SFU).

MEETING DIRECTOR : Claude Levesque (Laval).

LOCAL ARRANGEMENTS : Jean-Pierre Carmichael (Laval).

Réunion d'été 2002 de la SMC du 15 au 17 juin

Université Laval
Québec (Québec)

Voici le programme provisoire de la Réunion d'été 2002 de la Société mathématique du Canada. La première annonce paraîtra dans le numéro de février 2002 des *Notes de la SMC* et sur notre site Web: <http://www.cms.math.ca/Events/summer02/>.

HÔTE : Département de mathématiques et statistiques, Université Laval.

CONFÉRENCIERS PRINCIPAUX : **David Henderson** (Université Cornell), **Nikolai Nikolski** (Université Bordeaux), **Paul D. Seymour** (Université Princeton), **I.M. Singer** (MIT), **Christophe Retenauer** (University du Québec à Montréal).

PRIX : Conférence Jeffery-Williams, **Edwin Perkins** (UBC), Conférence Krieger-Nelson, **Priscilla Greenwood** (UBC, Arizona State).

SYMPOSIUMS : **Analyse**, Org: Thomas Ransford (Laval) ; **Géométrie algébrique arithmétique**, Org: Kumar Murty (Toronto); **Théorie des catégories**, Org: Robert Pare (Dalhousie) ; **Combinatoire**, Org: Pierre Leroux (UQAM) ; **Cryptographie**, Org: Hugh Williams (Calgary) et Douglas Stinson (Waterloo) ; **Géométrie différentielle**, Org: Jingyi Chen (UBC) ; **Théorie des graphes**, Org: Brian Alspach (SFU) ; **Enseignement des mathématiques**, Org: Frédéric Gourdeau (Laval) et Bernard Hodgson (Laval); **Mathématiques financières**, Org: Hassan Manouzi (Laval); **Théorie des nombres**, Org: Amir Akbary (Lethbridge) et Omar Kihel (Lethbridge) ; **Théorie des probabilités**, Org: Donald Dawson (Carleton) ; **Algèbre universelle**, Org: Jennifer Hyndman (UNBC) et Shelly Wismath (Lethbridge); **Communications libres**, Org: Norbert Lacroix (Laval) et Hugh Edgar (San Jose/SFU).

DIRECTEUR DE RÉUNION : Claude Levesque (Laval).

LOGISTIQUE LOCALE : Jean-Pierre Carmichael (Laval).

**McMASTER UNIVERSITY – HAMILTON, ONTARIO
DEPARTMENT OF MATHEMATICS & STATISTICS
Post-Doctoral Instructorships**

Applications are invited for post-doctoral fellowship positions in the Department of Mathematics & Statistics. These fellowships provide an opportunity to spend up to two years engaged in research, with a limited amount of teaching, and are particularly suitable for talented young mathematicians who have recently completed the Ph.D. degree.

The Fellowships are open to candidates of any nationality and selection will be based upon the candidate's research potential. McMaster is committed to Employment Equity and encourages applications from all qualified candidates, including aboriginal peoples, persons with disabilities, members of visible minorities and women.

Starting July 1, 2002, the stipend will be \$37,600 plus a \$2,000 grant for research expenses. Applications and three letters of reference should be sent **by January 15, 2002** to:

**Dr. M. Valeriote
Chair
Mathematics & Statistics
McMaster University
Hamilton, ON L8S 4K1
CANADA**

We appreciate all replies to this advertisement, but only those applicants selected for our short list will be contacted.

**McMASTER UNIVERSITY – HAMILTON, ONTARIO
DEPARTMENT OF MATHEMATICS & STATISTICS
Canada Research Chair Post-Doctoral Fellowship**

Applications are invited for the Canada Research Chair Post-Doctoral Fellowship in Mathematics at McMaster University. These fellowships provide an opportunity to spend up to two years engaged in research, with a limited amount of teaching, and are particularly suitable for talented young mathematicians who have recently completed the Ph.D. degree. Fellowship holders will work under the supervision of Dr. Walter Craig, a holder of a Canada Research Chair in Mathematics at McMaster University.

The Canada Research Chair Fellowship is open to candidates of any nationality and selection will be based upon the candidate's research potential. Research areas of particular interest include analysis, partial differential equations, Hamiltonian dynamical systems and applied mathematics.

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

The Canada Research Chair Fellowship is tenable for a period of two years beginning July 1, 2002 at a salary of \$40,000 per year plus a research grant of \$5,000. Duties include research and the teaching of two courses per year.

Applications, including three letters of reference, should be received **before January 15, 2002** by:

**Dr. M. Valeriote
Chair
Mathematics & Statistics
McMaster University
Hamilton, ON L8S 4K1
CANADA**

**Dr. W. Craig
Canada Research Chair in Mathematical
Analysis and its Applications
Mathematics & Statistics
McMaster University
Hamilton, ON L8S 4K1
CANADA**

OR

We appreciate all replies to this advertisement, but only those applicants selected for our short list will be contacted.

McMASTER UNIVERSITY – HAMILTON, ONTARIO
DEPARTMENT OF MATHEMATICS & STATISTICS
Britton Post-Doctoral Fellowship

Applications are invited for the Britton Post-Doctoral Fellowship in Mathematics, named after our former colleague Dr. Ronald F. Britton. These fellowships provide an opportunity to spend up to two years engaged in research, with a limited amount of teaching, and are particularly suitable for talented young mathematicians who have recently completed the Ph.D. degree.

The Britton Fellowship is open to candidates of any nationality and selection will be based upon the candidate's research potential. Research areas of particular interest include Geometry and Topology of Manifolds, Gauge Theory, and Group Actions.

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

The Britton Fellowship is tenable for a period of two years beginning July 1, 2002 at a salary of \$40,000 per year plus a research grant of \$5,000. Duties include research and the teaching of two courses per year.

Applications, including three letters of reference, should be received **before January 15, 2002** by:

Dr. M. Valeriote
Chair
Mathematics & Statistics
McMaster University
Hamilton, ON L8S 4K1
CANADA
OR

Dr. I. Hambleton
Britton Professor of Mathematics
Mathematics & Statistics
McMaster University
Hamilton, ON L8S 4K1
CANADA

We appreciate all replies to this advertisement, but only those applicants selected for our short list will be contacted.

McMASTER UNIVERSITY – HAMILTON, ONTARIO
DEPARTMENT OF MATHEMATICS & STATISTICS
McKay Post-Doctoral Fellowship

Applications are invited for the McKay Post-Doctoral Fellowship in Mathematics, named after Dr. A.C. McKay, a former Dean and Chancellor of McMaster University. These fellowships provide an opportunity to spend up to two years engaged in research, with a limited amount of teaching, and are particularly suitable for talented young mathematicians who have recently completed the Ph.D. degree.

The McKay Fellowship is open to candidates of any nationality and selection will be based upon the candidate's research potential. Research areas of particular interest include Harmonic Analysis, Linear and Nonlinear Partial Differential Equations.

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

The McKay Fellowship is tenable for a period of two years beginning July 1, 2002 at a salary of \$40,000 per year plus a research grant of \$5,000. Duties include research and the teaching of two courses per year.

Applications, including three letters of reference, should be received **before January 15, 2002** by:

Dr. M. Valeriote
Chair
Mathematics & Statistics
McMaster University
Hamilton, ON L8S 4K1
CANADA

Dr. E. Sawyer
McKay Professor of Mathematics
Mathematics & Statistics
McMaster University
Hamilton, ON L8S 4K1
CANADA

OR

We appreciate all replies to this advertisement, but only those applicants selected for our short list will be contacted.

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

The Department of Mathematics & Statistics, McMaster University, invites applications for a tenured faculty position in Mathematics at the rank of Associate Professor or Professor, with anticipated starting date July 1, 2002.

The successful candidate should be internationally recognized for his or her fundamental contributions to research in a major area of Algebraic Geometry or Number Theory, be actively engaged in significant research projects, and have demonstrated excellence in teaching. Research areas of particular interest to the Department include Arithmetic Algebraic Geometry, Algebraic Number Theory and related areas. Information on the Department may be found at the website <http://www.science.mcmaster.ca/MathStat/Dept.html>.

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

The salary and rank will be based on qualifications and experience. McMaster is committed to Employment Equity and encourages applications from all qualified candidates, including aboriginal peoples, persons with disabilities, members of visible minorities and women. In accordance with Canadian Immigration requirements, Canadian citizens and permanent residents of Canada will be considered first for this position.

Applications, including curriculum vitae and three letters of reference, should be received **before January 15, 2002** by:

Dr. M. Valeriote
Chair
Mathematics & Statistics
McMaster University
Hamilton, ON L8S 4K1
CANADA

McMASTER UNIVERSITY – HAMILTON, ONTARIO
DEPARTMENT OF MATHEMATICS & STATISTICS
Canada Research Chair

The Department of Mathematics & Statistics, McMaster University, invites applications for a junior Canada Research Chair starting July 1, 2002. The Canada Research Chair Program is supported by the Government of Canada and was established to enable Canadian Universities to achieve the highest levels of research excellence. Information on the program may be found at <http://www.chairs.gc.ca>.

Candidates should have a Ph.D., be identifiable as having the potential to lead their fields in research, and have demonstrated interest and ability in teaching. Appointments will be made in accordance with the University Strategic Plan. See our web page <http://www.science.mcmaster.ca/MathStat/Dept.html> for further information on the Department.

The salary and rank will be based on qualifications and experience. Normally the appointment will be made at the tenure-track assistant or associate professor level, but tenure may be offered in exceptional circumstances.

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

Applications, including curriculum vitae and three letters of reference, should be received **before January 15, 2002**, by:

Dr. M. Valeriote
Chair
Mathematics & Statistics
McMaster University
Hamilton, ON L8S 4K1
CANADA

**QUEEN'S UNIVERSITY – KINGSTON, ONTARIO
DEPARTMENT OF MATHEMATICS & STATISTICS**

The Department of Mathematics and Statistics invites applications for a renewable tenure-track appointment at the Assistant Professor level to begin July 2002. The successful applicant will be expected to demonstrate potential for outstanding scholarship and research and show evidence of a commitment to excellence in teaching. Salary will be commensurate with qualifications and experience.

Candidates should have a Ph.D. in pure or applied mathematics, statistics, or a related area and will have begun an active research program. Candidates with some teaching experience are preferred.

Interested candidates should arrange for a curriculum vitae, a description of research interests, up to five publications or preprints, a statement on teaching or a teaching dossier, and at least four letters of reference, one of which should comment on the candidate's teaching, to be sent to the address below **by December 31, 2001**. Applications will be considered until the position is filled.

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

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

**QUEEN'S UNIVERSITY – KINGSTON, ONTARIO
DEPARTMENT OF MATHEMATICS & STATISTICS**


The Department of Mathematics and Statistics will be making at least one renewable (tenure-track) appointment in Mathematics and Engineering at the Assistant Professor level to begin July 2002. **Members of the Mathematics and Engineering group are currently active in the areas of communications and information theory, control, and dynamics and mechanics. The Department also has an interest in expanding into other areas including partial or applied differential equations, large scale scientific computation and statistical data analysis.**

Candidates must have a Ph.D. in applied mathematics, electrical, mechanical or chemical engineering, computer science, statistics or a closely related field. Membership or eligibility for membership in a Canadian professional engineering association is required. Normally, this requires an undergraduate engineering degree. Candidates are expected to have a strong research record, develop an independent research programme, and offer evidence of a strong ability and interest in teaching a range of applied mathematics/statistics courses and in supervising graduate students. Salary will be commensurate with qualifications and experience.

Interested candidates should arrange that a curriculum vitae, descriptions of teaching and research interests, at least three letters of recommendation, and copies of their three most significant publications be sent to the address below, preferably **before December 31, 2001**. Applications will be considered until the position is filled. At least one letter should comment on the candidate's teaching.

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

Canadian citizens and permanent residents will be considered first for this position. Queen's University is committed to employment equity and welcomes applications from all qualified women and men, including visible minorities, aboriginal people, persons with disabilities, gay men and lesbians.



University of Alberta
Edmonton

Department of Mathematical and Statistical Sciences

Classical Analysis

The Department of Mathematical and Statistical Sciences, University of Alberta invites applications for a tenure track position in Classical Analysis. The appointment will be at the Assistant Professor level and will commence on or before July 1, 2002. We are looking for a person with a PhD, a strong record/outstanding potential for research, excellent communication and teaching skills and leadership potential. The successful candidate must have a commitment to undergraduate and graduate education. Preferences will be given to an individual whose research interests promote contact with other university researchers and/or industry. We are particularly interested in areas of approximation theory, classical Fourier analysis, applied harmonic analysis, real analysis, and related inequalities and function spaces. Applications should include a curriculum vitae, a research plan and teaching dossier. **Closing date for applications is January 15, 2002.**

Faculty Lecturer

The Department of Mathematical and Statistical Sciences, University of Alberta invites applications for the position of Faculty Lecturer. This is a two-year position, with the possibility of reappointment, and will commence on or before July 1, 2002. The duties normally consist of teaching three undergraduate courses in Statistics and/or Mathematics in each Fall and Winter Term, and two courses in Interession. Preference will be given to applicants with experience in teaching Statistics. Requirements are a PhD or MSc in Statistics, Mathematics, or a related discipline, and experience in teaching undergraduate courses in Statistics and/or Mathematics. Applications should include a curriculum vitae, a teaching profile outlining experience and/or interests, and the names of three references. **Closing date for applications is February 1, 2002.**

Mathematical Finance (MF 2002)

The Department of Mathematical and Statistical Sciences, University of Alberta, invites applications for a tenure track Assistant Professor position in Mathematical Finance, starting in July 2002. We are looking for a person with a strong record/outstanding potential for research, excellent communication and teaching skills and leadership potential. Position level and salary commensurate with the candidate's background and qualifications. This position requires a PhD in Mathematics or Statistics. Applications should include a curriculum vitae, a research plan and teaching dossier. **Closing date for applications is January 15, 2002.**

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

In accordance with Canadian Immigration requirements, this advertisement is directed to Canadian citizens and permanent residents. If suitable Canadian citizens and permanent residents cannot be found, other individuals will be considered.

Candidates should arrange for at least three confidential letters of reference to be sent by the indicated closing date to: Anthony To-Ming Lau, Chair, Department of Mathematical and Statistical Sciences, University of Alberta, Edmonton, Alberta, Canada, T6G 2G1.

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

The University of Alberta hires on the basis of merit. We are committed to the principle of equity in employment. We welcome diversity and encourage applications from all qualified women and men, including persons with disabilities, members of visible minorities, and Aboriginal persons.

Where *world* meets

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

The Department of Mathematics and Statistics of the University of Ottawa invites applications of recent Ph.D.s for a tenure-track position at the Assistant Professor level starting July 1, 2002. Applications in all areas of mathematics and statistics will be considered. Applications received for the two already advertised positions will also be considered for this position.

Applicants should send a curriculum vitae, a research plan, and arrange for four confidential letters of recommendations, with one addressing teaching, to be sent to the address below:

Applicants are also encouraged to include up to three copies of their most significant publications. The closing date for receipt for applications is **January 15, 2002.**

Conditions of employment are set by a collective agreement. Employment equity is University policy and the University strongly encourages applications from women. Canadian citizens and permanent residents will be considered first for these positions. Information about the department can be found at <http://www.science.uottawa.ca/mathstat>.

Le Département de mathématiques et de statistique de l'Université d'Ottawa met en concours un poste de professeur adjoint menant à la permanence. Entrée en fonction: le 1er juillet 2002. Les candidat(e)s doivent avoir obtenu récemment leur doctorat.

Toute demande, dans quelque domaine que ce soit en mathématiques ou en statistiques, sera prise en considération. Les demandes reçues pour les deux postes présentement ouverts seront aussi considérées pour ce concours.

Les candidat(e)s doivent faire parvenir leur dossier de candidature au directeur du département, Erhard Neher, Département de mathématiques et de statistique au plus tard **le 15 janvier 2002**.

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

Les dossiers doivent comprendre le curriculum vitae, le plan de recherche, quatre lettres de recommandation confidentielle dont une sur l'enseignement. Nous encourageons les candidat(e)s à joindre à leur dossier jusqu'à trois tirés à part de leurs contributions les plus importantes.

Les conditions d'emploi suivent les dispositions d'une convention collective. L'Université a une politique d'équité en matière d'emploi. Les femmes sont fortement encouragées à poser leur candidature. On étudiera d'abord les demandes des citoyens canadiens et des résidents permanents. Pour plus de renseignement voir :

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

CALENDAR OF EVENTS / CALENDRIER DES ÉVÉNEMENTS

DECEMBER 2001

3–8 NIPS 2001, Neural Information Processing Systems: Natural and Synthetic (Vancouver, BC)
nipsinfo@salk.edu, <http://www.cs.cmu.edu/Web/Groups/NIPS/>

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

10–14 ICMI Study Conference on the Future of Teaching and Learning of Algebra (University of Melbourne, Australia)
<http://www.edfac.unimelb.edu.au/DSME/icmi-algebra/>

JANUARY 2002

6–9 Joint Mathematics Meetings, San Diego, CA
<http://www.ams.math.org/meetings/>

21–28 Winter School on Computations in Coxeter Groups (CRM, Université de Montreal, Montreal)
activites@crm.umontreal.ca,
<http://www.CRM.UMontreal.CA/geometry/>

FEBRUARY 2002

2–3 9th Southern California Geometric Analysis Seminar (UC at Irvine, CA)
<http://www.math.uci.edu/scgas>

27–March 3 Group Actions on Rational Varieties (CRM, Université de Montreal, Montreal)
activites@crm.umontreal.ca,
<http://www.CRM.UMontreal.CA/geometry/>

MARCH 2002

26–April 4 Instructional Conference on Combinatorial Aspects of Mathematical Analysis (ICMS, Edinburgh, UK)
<http://www.ma.hw.ac.uk/icma/current/>

DÉCEMBRE 2001

JANVIER 2002

FÉVRIER 2002

MARS 2002

APRIL 2002

8–19 Invariant Theory (Queen's University, Kingston, ON)
activites@crm.umontreal.ca,
<http://www.CRM.UMontreal.CA/geometry/>

30–May 17 Concentration Period on the Langlands Programme for Function Fields (CRM, Université de Montreal, Montreal)
activites@crm.umontreal.ca,
<http://www.CRM.UMontreal.CA/geometry/>

MAY 2002

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

19–25 Canadian Number Theory Association Conference (CRM, Université de Montréal, Montréal)
<http://www.math.mcgill.ca/cnta7>

24–26 Annual meeting, Canadian Society for History and Philosophy of Mathematics / Société canadienne d'histoire et de philosophie des mathématiques (University of Toronto)
<http://www.cshpm.org>

27–June 10 Computational Lie Theory (CRM, Université de Montreal, Montreal)
activites@crm.umontreal.ca,
<http://www.CRM.UMontreal.CA/geometry/>

JUNE 2002

4–13 Linear Algebra Workshop (Bled, Slovenia)
luzius@mathstat.dal.ca, <http://www.ijp.si/ftp/pub/stop/law/>

AVRIL 2002

MAI 2002

JUIN 2002

6–8 CAIMS 2002 (University of Calgary)

Samuel Shen: shen@maildrop.srv.ualberta.ca

10–15 Algebraic Transformation Groups (CRM, Université de Montreal, Montreal)

activites@crm.umontreal.ca,

http://www.CRM.UMontreal.CA/geometry/

15– 17 CMS Summer Meeting / Réunion d'été de la SMC (Université Laval, Québec, Québec)

http://www.cms.math.ca/Events/summer02/

17–21 Seventh International Conference on p-adic Functional Analysis, (University of Nijmegen, The Netherlands)

http://www.sci.kun.nl/math/p-adic2002/

17–21 Householder Symposium on Numerical Linear Algebra (Peebles Hydro Hotel, near Edinburgh, Scotland)

p.a.knight@strath.ac.uk, http://www.maths.strath.ac.uk/matrix/

24–28 Special Activity in Analytic Number Theory (Max Planck Institute, Bonn) *moroz@mpim-bonn.mpg.de*

25–28, 8th International Conference on Applications of Computer Algebra (Volos, Greece)

http://www.uth.gr, http://www.volos-m.gr

JULY 2002

JUILLET 2002

7–12 The 5th Americas Conference in Differential Equations and Nonlinear Dynamics (University of Alberta, Edmonton)

http://www.math.ualberta.ca/mli/americas.htm email: mli@math.ualberta.ca

22–30 44th International Mathematical Olympiad (University of Strathclyde, Glasgow, UK)

31–Aug. 3 Novel Kananaskis Symposia on Pressure Distribution

www.wcb2002.com, info@wcb2002.com

AUGUST 2002

AOÛT 2002

2–3 Banff Symposia on Skeletal Muscle

www.wcb2002.com, info@wcb2002.com

3–10 Logic Colloquium 2002, ASL European Summer Meeting (WestfWilhelms-Universität, München, Germany)

http://www.math.uni-muester.de/LC2002

4–9 World Congress of Biomechanics

www.wcb2002.com, info@wcb2002.com

20–28 International Congress of Mathematicians (Beijing, China) *http://icm2002.org.cn/*

DECEMBER 2002

DÉCEMBRE 2002

8–10 CMS Winter Meeting / Réunion d'hiver de la SMC (Marriott Hotel, Ottawa, Ontario)

Monique Bouchard: meetings@cms.math.ca

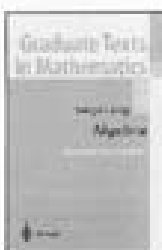
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