News from the Math Institutes

News from the Centre de recherches mathématiques

by Jean LeTourneux

The theme of the 2005-2006 year at the Centre de Recherches Mathématiques (CRM) in Montréal, Canada, is: "Analysis in Number Theory". Its two semesters have different foci. The first one (September - December 2005) concentrates on p-adic analysis and arithmetic geometry, while the second one (January - May 2006) will be devoted to classical analysis and analytic number theory. The year is organized by H. Darmon, C. David and A. Granville. The Aisenstadt Lecturers will be Manjul Bhargava (Princeton) , Kannan Soundararajan (Michigan) and Terence Tao (UCLA).

The first semester was preceded (July 11 - 22) by the SMS-NATO ASI 2005 Summer School on "Equidistribution in Number Theory" , which was organized by Z. Rudnick and A. Granville. Two workshops were scheduled for the first semester: September 12 - 16, "p-adic Representations"; December 12 - 16, "Intersection of Arithmetic Cycles and Automorphic Forms". Beside the CRM-Clay school on "Additive Combinatorics" (March 30 - April 5), the following workshops will take place during the second semester: February 13 - 18, "L-functions and Related Themes"; March 13 - 17, "Anatomy of Integers"; April 6 - 12, "Additive Combinatorics"; May 13-18, "Analytic Methods for Diophantine Equations".

A conference on Homotopy Theory in honor of Joe Neisendorfer's 60th birthday will be held at the CRM, November 18-20, 2005. It is organized by O. Cornea. Peter Shalen's 60th birthday will also be commemorated by a conference (June 12-14, 2006), the organizers being S. Boyer, D. Canary, M. Cullen, N. Dunfield and B. Farb.

The third Montréal Scientific Computing Days, organized by P. Tupper, will take place at the CRM (February 25-26, 2006) and will feature short courses by H. Elmar and D. Higham, A workshop on "Singularities in PDE and the Calculus of Variations" will be organized by P. Sternberg, L. Bronsard and S. Alama at the CRM (July 17-21, 2006).

Starting from the academic year 2006-2007, single theme years will be replaced by two thematic semesters. The semesters will not necessarily be related, but one should be more pure, the other more applied. The Summer/Fall 2006 Semester (June - December) will deal with combinatorial optimization. It will open with the NATO Summer School on "Combinatorial Methods in Operations Research" (June 19 - 30), which will be organized by V. Chvtal and N. Sbihi. The scientific committee responsible for the semester consists of N. Alon, D. Avis, V. Chvtal, W. Cunningham, M. Goemans, P. Hansen, O. Marcotte, P. Seymour and A. Vetta. The programme will include workshops on network design, hybrid methods in integer programming, polyhedral computations, approximation algorithms and, finally, data mining and programming. The Winter/Spring 2007 Semester will be devoted to recent advances in combinatorics.

Support is available for visitors, graduate students and postdoctoral fellows attending the various events. For more information, see http://www.crm.umontreal.ca .

FIELDS

News from the Fields Institute

by Carl Riehm

Centre for Mathematical Medicine

In early September, the *Centre for Mathematical Medicine* "opened its doors" at the Fields Institute. This is a major new initiative at the Institute, directed by Amit M. Oza (Ontario Cancer Institute) and Siv Sivaloganathan (University of Waterloo). It formally consolidates research initiatives that are already underway and is intended to be a nidus for researchers from medicine and mathematics and to provide critical mass for new interdisciplinary research ventures and initiatives. More information, including current and future activities, can be found at *www.fields.utoronto.ca/programs/scientific/CMM/index.htm*

Fields Seminar Series

Continuing seminar series of possible interest to CAIMS members are:

1. The *Industrial Optimization Seminar* meets in the evening of the first Tuesday of each month. Each meeting comprises two related lectures on a topic in optimization – typically one speaker is a university-based researcher and the other is from the private or government sector. Future seminars are on www.fields.utoronto.ca/programs/cim/05-06/optimization_seminar/.

2. The *PRMIA Risk Management Seminar* presents talks on issues of current interest to both professionals and academics in the fields of risk management. See www.fields.utoronto.ca/programs/cim/05-06/PRMIA/ for details and future seminars.

3. The *Quantitative Finance Seminar*. The mandate of this seminar is to present talks on current research in quantitative finance that will be of interest to those who work at the interface of industry and academia. Each seminar consists of two 45-minute talks and a half-hour reception, beginning at 5pm on the last Wednesday of every month throughout the academic year. The first seminar in the winter term will take place on February 22 and will include a talk by David Lando from the Copenhagen Business School. He will analyze a model for treasury bonds, corporate bonds, swap rates and swap spreads. See

www.fields.utoronto.ca/programs/cim/financial_math/finance_seminar/05-06/index.html

for further information on this and future seminars.

4. The *Applied Mathematics Colloquium/Seminar* is a series intended to be a focal point for mathematicians in the areas of applied mathematics and analysis, consisting of talks by internationally recognized experts in the field. See www.fields.utoronto.ca/programs/scientific/05-06/applied_math/ for details and an up-to-date schedule.

Publications

The Fields Institute publishes two book series with the American Mathematical Society – the Monograph Series and the Communications Series. The monograph series features high-quality

research monographs and lecture notes, in mathematics and applications of mathematics in science, engineering and industry, while the communications volumes are conference proceedings of research and survey articles. A complete list of publications in print can be seen at www.ams.org/cgi-bin/bookstore/bookpromo/fimseries and
www.ams.org/cgi-bin/bookstore/bookpromo/ficseries.

A forthcoming publication in the Communication Series of possible interest to CAIMS members is *Topics in Kinetic Theory* by Thiérry Passot (CNRS), Catherine Sulem (U of T) and Pierre-Louis Sulem (Observatoire of the Côte d'Azur). It collects lectures given at the Short Course and Workshop on Kinetic Theory organized at the Institute during the spring of 2004, and covers a variety of topics related to kinetic theory in neutral gases and magnetized plasmas, with extensions to other systems such as quantum plasmas and granular flows. We expect it to appear by the end of 2005.

We would like to ask members of the CAIMS who are writing or planning to write a book to consider publishing with us. Our publishing program with the AMS affords authors the advantages of wide distribution and advertising, high quality and low cost of published material, and a guarantee that all volumes will remain in print indefinitely. We can provide, gratis, expert help in the preparation of a manuscript. Publication in the Fields series can only strengthen Canadian applied mathematics! Details on publication at the Institute can be found at www.fields.utoronto.ca/publications/ .

Thematic Programs This fall's thematic program, *Renormalization and Universality in Mathematics and Mathematical Physics*, has been concentrated in the areas where renormalization and scaling invariance have recently led to important progress, such as one-dimensional dynamics (real and complex), 2D conformal invariance, geometric PDEs, and their connection to the underlying physics ideas. The term began in grand style with three lectures in the Coxeter Lecture Series, delivered by Oded Schramm (Microsoft) on *Scaling limits of two dimensional random systems*. A second series of Coxeter lectures on *A mathematical theory of strange attractors* was delivered by Lai-Sang Young (Courant Institute) November 23-25, and a Clay Mathematics Institute Public Lecture entitled *Making a Splash; Breaking a Neck: The Development of Complexity in Physical Systems* was given by Leo P. Kadanoff (University of Chicago) in late October.

The thematic program for the 2006 winter/spring term, *Holomorphic Dynamics, Laminations, and Hyperbolic Geometry*, will initially concentrate on topics in partially hyperbolic dynamics, Teichmüller flow and laminations, followed by a focus on one- and two-dimensional holomorphic dynamics, and then finally by various topics in hyperbolic geometry including the recent solution of longstanding conjectures in the deformation theory of hyperbolic manifolds and recent advances in Thurston's Geometrization Program. Individual events, including three workshops, the Distinguished Lecture Series by Gregory Margulis (Yale) on January 9 to 11, and the Coxeter Lecture Series by Yair Minsky (Yale) in May, are listed on the Fields website at www.fields.utoronto.ca/programs/scientific/05-06/holodynamics/.

Next fall's thematic program is *Cryptography*, while that of the winter/spring term of 2007 is *Geometric Applications of Homotopy Theory*. Applications for post-doctoral fellowships for these programs are due **December 9, 2005**, although late applications may be considered after this date.

News from the Math Institutes

News from Pacific Institute for the Mathematical Sciences

by Heather Jenkins, PIMS Publications and Communications Manager

This year the University of Regina joined PIMS (Pacific Institute for the Mathematical Sciences) as an affiliated institution. The contact person for PIMS at the University of Regina is Shaun Fallat (Department of Mathematics and Statistics).

PIMS and MSRI organized the Pacific Rim Mathematical Forum at BIRS in Banff, October 13-16. The directors of the leading mathematical institutes of the Pacific Rim region attended the meeting. The main objective of the meeting was to form a cohesive network of mathematical centres in the Pacific Rim, with the goal of laying the groundwork for substantial networking activities. More information is available on the PIMS web site.

Some of the recent PIMS industrial and applied mathematics activities are listed below, followed by some upcoming deadlines.

8th Annual PIMS Graduate Industrial Math Modelling Camp

The 8th Annual PIMS Graduate Industrial Mathematics Modelling Camp (GIMMC) was held May 7–11, 2005, at the University of Lethbridge. This year GIMMC was co-sponsored by Informatics Circle of Research Excellence (iCORE), Alberta Innovation and Science, and the University of Lethbridge. Thirty-four graduate students from across North America came to participate in the camp. The students work together in teams under the supervision of invited mentors. Each mentor poses a problem arising from an industrial or engineering application and guides his or her team of graduate students through a modelling phase to a resolution. This year the mentors and problems were:

- C. Sean Bohun (Pennsylvania State University): *Modelling a Stirling Engine*
- Chris Bose (University of Victoria): *A Dynamical Model of Drill Efficiency*
- Lou Fishman (MDF International): *Phase Space, Path Integral, Invariant Imbedding, and Dirichlet-to-Neumann Operator Methods in Seismo-Acoustic Wave Propagation with Application to Imaging and Inversion*
- Daya Gaur (University of Lethbridge): *Problems in Facility Location Optimization*

9th Annual PIMS Industrial Problem Solving Workshop

The University of Calgary hosted the 9th Annual PIMS Industrial Problem Solving Workshop (IPSW) on May 15-19, 2005. It was co-sponsored by Alberta Innovation and Science, iCORE and the University of Calgary. The graduate students that had attended GIMMC also participated in IPSW and got further experience with math modelling techniques. Approximately twelve professional academics and four industry representatives joined the graduate students.

The five problems and presenters were:

- Donald M. Henderson (Vertebrate Morphology and Palaeontology Research Group, U. Calgary, in collaboration with Royal Tyrrell Museum of Palaeontology, Drumheller): *Models of the mechanics and dynamics of dinosaur tails*
- Gerald K. Cole (Human Performance Laboratory Faculty of Kinesiology, U. Calgary, in collaboration with CEO, Biomechanigg Research Inc. which worked with Adidas): *Designing running shoes*
- Pierre Lemire and Rob Pinnegar (Calgary Scientific): *Identification of seismic layers using classification of pixels' local spectra*
- Brad Bondy (Genus Capital Management, Vancouver): *Adaptive statistical evaluation tools for equity ranking models*
- Brian Russell (Hampson-Russell Software, a Veritas Company, Alberta): *Seismic prediction of reservoir parameters*

The proceeding from GIMMC and IPSW will soon be available on the PIMS web site.
Next year, GIMMC and IPSW will both be held at Simon Fraser University.

Applied Inverse Problems 2007

The 4th Applied Inverse Problems (AIP) conference will be held in Vancouver for one week in July of 2007.

The series of AIP Conferences aim to provide a primary international forum for academic and industrial researchers working on all aspects of inverse problems, such as mathematical modelling, functional analytic methods, computational approaches, numerical algorithms etc.

Each AIP conference will follow the pattern of a number of invited talks from international experts and a set of minisymposia on topical themes. The venues have been chosen to encourage the maximum interaction between all participants. The Vancouver conference will have in excess of 150 participants.

The main organizers are Gary Margrave (U. Calgary), Richard Froese (UBC) and Gunther Uhlmann (U. Washington).

For more information see the web site http://aip.disi.unige.it/.

Call for PIMS PDF Nominations

PIMS invites nominations of outstanding young researchers in the mathematical sciences for Postdoctoral Fellowships for the year 2006–07. For details please see the website
http://www.pims.math.ca/Scientific_Programme/PIMS_Postdoctoral_Fellowships/.

The deadline for submitting nominations is **December 15, 2005**. Please note that this is earlier than in previous years.

For more information about PIMS and its activities please see **www.pims.math.ca**.

The MITACS Internships Program

A Co-sponsored Opportunity for Graduate Students

by Megan Airton

More Brainpower for Industry

As an applied research program, the MITACS Internships Program funds graduate students and post-doctoral fellows to undertake research on-site within companies, applying advanced mathematical techniques to address high-level industry issues.

The program is designed to engage student researchers across many disciplines and their supervising university professor with partner organizations. From helping energy companies to model the dynamics of fuel cells. . .to increasing the efficiency of company operations. . .to creating more reliable cyber security solutions, the program is diverse and supports research in the fastest growing sectors of our economy. The program connects organizations with university researchers who have advanced levels of expertise in areas that address applied research opportunities. These connections help partners to utilize mathematical tools and technologies to address advanced scientific issues that are vital to an organization's success.

It's a win-win equation for all involved: organizations benefit from the power of advanced mathematical and computational research while interns and their supervisors benefit from new research opportunities.

With the support of provincial and federal agencies and universities, the MITACS has funding for more than 80 interns this year with a goal of increasing the number of interns annually.

How the MITACS Internships Program Works

Interns, sponsored by their supervising professors, spend a minimum of 50 per cent of their time over one semester on-site at the partner organization to research a problem identified jointly by the organization, student and the professor. The rest of their time is spent at the university, further advancing the research under the guidance of the supervisor. Both MITACS and the participating organization contribute $7,500 towards the program, resulting in $15,000 being awarded to the supervisor who then pays the intern. MITACS assists with matching students and companies, developing research plans, monitoring student progress and by providing travel funds.

MITACS is currently accepting internship applications. To apply, or for more information on the MITACS Internships Program, visit www.mitacs.ca or contact Karen Booth at (604) 268-6861 or kbooth@mitacs.ca, Jeff Lucas at (604) 268-6822 or jlucas@mitacs.ca or Jim Brookes at (604) 291-3970 or jwbrookes@mitacs.ca.

News from the Math Institutes

BIRS Workshop on Mathematical Epidemiology
by Herb Hethcote

A workshop on Mathematical Epidemiology was held on August 20-25, 2005 at the Banff International Research Station. Population growth and spread, global climate change, and the emergence and reemergence of novel and deadly forms of infectious diseases have increased the need for sound quantitative methods to guide disease intervention practice. This BIRS workshop focused on specific diseases, epidemiological problems, public health policies, comparisons of disease intervention strategies, recent advances, open questions, new approaches, and future directions for research. Participant interaction was promoted by long discussion periods following the thirteen lectures on influenza drift and evolution, modeling multi-strain diseases, network and compartmental modeling of disease transmission and vaccination, wildlife diseases, and emerging/re-emerging diseases such as HIV, SARS, and West Nile Virus. There were also many opportunities for informal discussions among the 40 participants consisting of applied mathematicians, statisticians, and epidemiologists. Both mathematical modelers and public health policy decision makers will ultimately benefit from this workshop on modeling as a decision making tool for the epidemiology and control of infectious diseases. For a summary of this BIRS workshop, see the final report at
http://www.pims.math.ca/birs/birspages.php?task=displayevent&event_id=05w5003
or in the Banff International Research Station Proceedings 2005.

NSERC-Mathematics Liaison Committee
by Bill Langford

From the Canadian Mathematics Leadership Retreat in October 2004 as described by Ken Jackson in his Past-President's report, there was created an NSERC-Mathematics Liaison Committee, formed to facilitate communications between NSERC and the Canadian mathematics community. It is important to have good communications at this time, because NSERC is in the process of designing a new mechanism to replace the Reallocation Exercises of recent years that have been judged too inefficient.

In addition, NSERC wants to regularize the funding of the Mathematics Institutes. Two plans have been proposed. The first would combine the Institute funding with the current math GSC Discovery Grants envelope. The second would put the Institutes into a new interdisciplinary Major Research Resources (MRR) envelope, which would include the current MFA envelope and other research institutes. The math institutes prefer the first option but NSERC prefers the second. This is an important decision that will affect all mathematics researchers.

Current membership of the Liaison Committee includes: N. Ghoussoub BIRS, F. Lalonde CRM, B. Keyfitz Fields, I. Ekeland PIMS, A. Gupta MITACS, E. Campbell CMS, W. Langford CAIMS, H. Brunner AARMS, N. Reid SSC, J. Stafford NPCDS, T. Salisbury CMS, R. Kane Secretary.

A statement of the guiding philosophy of the Liaison Committee can be found at:
http://www.caims.ca/Society/Liaison.htm