Report from the Centre de recherche mathématique

by Chantal David

The 2006–7 CRM thematic year was dedicated to various aspect of combinatorics, with a theme semester on "Combinatorial Optimization" in the Fall, and a theme semester on "Recent advances in Combinatorics" in the Winter. The topics of the year are as varied as approximation algorithms, network design, data mining, graph theory, algebraic combinatorics, combinatorics on words, Macdonald polynomials and Hopf algebras, enumerative questions in statistical mechanics, etc. The year ended with four intensive weeks on links between geometry and combinatorics, with concentration periods on "Algebraic Geometry and Algebraic Combinatorics" and "Real, Tropical, and Complex Enumerative Geometry". The André-Aisenstadt chairs of that year were Noga Alon (Tel Aviv), Paul Seymour (Princeton) ans Richard Stanley (MIT).

The 2006-7 academic year will also be remembered as the year of the NSERC MRS application, culminating in the Site Visit which took place at the end of January: those were hectic weeks indeed!

A series of blue boards with the names and photographs of the André-Aisenstadt Chair holders has now been installed at the entrance of the CRM, giving a glimpse of its activities almost going back to its founding years.

In the series of "Grandes Conférences du CRM," which started in 2005–06, scientists with a gift for communication are invited to present exciting recent developments in mathematics to a general public. Bart de Smit (Universiteit Leiden) presented a now famous conference on Escher and the Droste Effect, Jean-Paul Delahaye (Laboratoire d'informatique fondamentale, Université de Lille) presented Les limites logiques et mathématiques, Francis Clarke (Université Cllaude Bernard, Lyon) presented Euler: la vie, l'univers et l'optimisation and Étienne Ghyss (École Normale Supérieure de Lyon) talked about The Butterfly Effect.

The Fall Semester of 2007 at the CRM, devoted to Applied Dynamical Systems, consisted of 6 main workshops, with 5 taking place at the CRM, and a joint AARMS-CRM workshop in Halifax. Two of the Montréal workshops were preceded by graduate level minicourses. The semester focused on two themes. Firstly, the use of dynamical systems in applications, principally in physiology, and secondly the development of new numerical and dynamical systems tools needed in the study of such problems. However, in reality applications, analysis and numerical methods are all interconnected and some aspects of all three were found in each of the workshops.

The Spring Semester of 2008 will be devoted to Dynamical Systems and Evolution Equations. The central focus of the will be dynamical systems interpreted in a broad sense so as to include applications to fundamental problems in differential geometry as well as in mathematical physics. The academic year 2008–9,

dedicated to "Probabilistic Methods in Mathematical Physics" and "Perspectives and Challenges in Probability".

For more information on the programme and the support available see *http://www.crm.math.ca*

News from the Fields Institute

by Carl Riehm

Some of the upcoming events which might be of interest to CAIMS members are: November 17, 12:30pm: **Graduate School Information Day**. This is an information session for universities to display information on their graduate programs in mathematics, statistics and computer science. As part of the day's activities there will be one or two keynote lectures aimed at undergraduate students in the mathematical sciences. This year's speaker is Jeffrey S. Rosenthal (Statistics, University of Toronto), speaking on *What is MCMC?*

Fields Institute Colloquium/Seminar in Applied Mathematics
November 13, 2:10pm: Isom Herron (Rensselaer Polytechnic Institute) A new look at the principle of exchange of stabilities
November 13, 3:10pm: Laurette Tuckerman, (PMMH-ESPCI, University of Pierre and Marie Curie) Patterns in Turbulence
February 29, 2008, 1:10pm: Ivar Ekeland (UBC and PIMS)

Fields Industrial Optimization Seminar
This seminar meets on the first Tuesday of each month. Each meeting comprises two related lectures on a topic in optimization; typically, one speaker will be a university-based research and the other from the private or government sector.

Centre for Mathematical Medicine Seminar Series
January 25, 2008 - 3:30 p.m. David Earn, McMaster University and David Fisman, Hospital for Sick Children
March 28, 2008, 3:30pm: Lindi Wahl (U. Western Ontario) and Beni Sahai (Cadham Provincial Lab, Manitoba)
April 18, 2008, 3:30pm: Leon Glass (McGill)

Actuarial Science and Mathematical Finance Group Meetings January 30, 2pm: Matheus Grasselli (Dept. of Mathematics and Statistics, McMaster)

Seminar Series on Quantitative Finance January 30, 2008: Rama Cont (Columbia University) and Jim Gatheral (Merrill Lynch and Courant Institute)

Conference on Error-control Codes, Information Theory and Applied Cryptography
December 5–6. See *www.fields.utoronto.ca/programs/scientific/07-08/error-control/*

for more information.

Conference on Imaging and Lie Groups
February, 2008, organized by J. Patera (Montréal) and Hongmei Zhu (Calgary). See the Fields website *www.fields.utoronto.ca/* for more information.

Workshop on Taylor Model Methods
May 20-23, 2008: The focus will be the use of Taylor models in validated numerical methods. See *www.fields.utoronto.ca/programs/scientific/07-08/taylor-model/*

Symposium on Dependent Data Structures
May 21-23, 2008: This workshop will take place at Carleton University in Ottawa. It will feature the analysis and simulation of dependent responses, focusing on the areas of longitudinal data analysis, mixed models, missing data analysis, spatial data analysis, ordinal categorical data analysis, the simulation of dependent random variates, along with various biostatistical and health applications. See *www.fields.utoronto.ca/programs/scientific/07-08/dependent/* .

Winter/Spring 2008 Thematic Program
The Winter/Spring, 2008 thematic program is New Trends in Harmonic Analysis, organized by Alex Iosevich (Missouri-Columbia), Izabella Laba (UBC, lead organizer), Michael Lacey (Georgia Tech), and Eric Sawyer (McMaster). There will be 3 workshops:

- January 7-11 : Recent Advances in Operator Theory and Function Theory
- February 18-22: Harmonic Analysis
- April 5-13: Clay-Fields Conference on Additive Combinatorics, Number Theory, and Harmonic Analysis, co-organized with the Clay Mathematics Institute.

There will also be 2 graduate courses: *Function and Operator Theory*, Eric Sawyer (McMaster) and *Analytic Number Theory*, John Friedlander (Toronto)

The Coxeter Lecture Series will be delivered by Jill Pipher (Brown U.) on February 25-27, and the Distinguished Lecture Series by Tim Gowers, (U. Cambridge) on March 17-20, 2008 (to be confirmed).

Future thematic programs:

2008 (Fall)	Arithmetic Geometry, Hyperbolic Geometry And Related Topics
2009 (Winter/Spring)	O-Minimal Structures and Real Analytic Geometry
2010 (Winter/Spring)	Financial Mathematics

See *www.fields.utoronto.ca/programs/scientific/* for links to these programs (and to other activities).

News from the Pacific Institute for the Mathematical Sciences

By Breeonne Baxter, PIMS Communications Manager
http://www.pims.math.ca/

The Pacific Institute for the Mathematical Sciences (PIMS) is pleased to have inaugurated the first of our International Graduate Training Centres (IGTC), in Mathematical Biology, in September, 2007 *<http://www.pims.math.ca/International_Graduate_Training_Centre/>*. We will also continue our successful postdoctoral fellowships program and we have new collaborative research groups (CRGs) and industrial initiatives in strategic areas, such as the mathematics of the environment, in close cooperation with our international partners in Latin American and around the Pacific Rim.

International Collaborations

PIMS has become an Unité Mixte Internationale of the French Centre National de la Recherche Scientifique (CNRS), effective September, 2007. We will host CNRS researchers on a regular basis, and we can apply to European research programs. CNRS recognition is a label of quality. There are only four UMIs in mathematics around the world: in Moscow, Rio, Santiago, and now PIMS.

New PIMS Director

Alejandro Adem will commence his five-year term as the new Director of PIMS on July 1, 2008. Presently the PIMS Deputy Director, Professor Adem is a Professor of Mathematics and CRC at the University of British Columbia.

PIMS Board of Directors

PIMS has appointed three distinguished scientists and industry representatives to its board of directors. The new members are Charmaine Dean (Simon Fraser), Fernando Aguilar (CGG Veritas), Darrell Duffie (Stanford) (effective July 1, 2008).

PIMS also welcomes three new members to the Scientific Review Panel: Gunnar Carlsson (Stanford), Walter Craig (McMaster) and Bruce Reed (McGill).

Conferences and Activities

PIMS organizes and hosts a growing number of workshops and conferences each year through its member universities and Collaborative Research Groups:

The 10th PIMS Graduate Industrial Mathematics Modelling Camp (June 6–10, 2007) and the 11th PIMS Industrial Problem Solving Workshop (June 11–15, 2007) were held at the University of Alberta. The next GIMMC and IPSW will be held at the University of Regina in June, 2008.

PIMS' 10th Anniversary was held in 2006–07. As part of the 10th Anniversary events, the University of Victoria hosted the Symposium on Kinetic Equations and Methods on April 27–28, 2007. PIMS hosted a Scientific Symposium and Banquet on Sept. 27, 2007.

The Synchronous Rhythms in the Brain Workshop was held at the University of British Columbia (June 18-20, 2007) as part of the activities of the CRG in

Mathematical Modeling and Computation in Biology.

Conference on Applied Inverse Problems 2007: Theoretical and Computational Aspects. The University of British Columbia hosted the latest in a series of AIP Conferences aimed at providing a primary international forum for academic and industrial researchers working on all aspects of inverse problems (June 25-29, 2007).

The Summer School on Tropical Multiscale Convective Systems: Theory, Modeling, and Observations at the University of Victoria (July 30 to August 3, 2007) brought university researchers in applied math, physics, and meteorology departments working in the area of tropical meteorology together with government lab scientists working on operational weather and climate forecast models.

International Conference of Theoretical and Numerical Fluid Mechanics III was held in Vancouver (August 13-17, 2007) as an interdisciplinary meeting within the general field of mathematical and computational fluid dynamics, devoted mainly to Newtonian and non-Newtonian viscous flow.

International Graduate Training Centre (IGTC) in Mathematical Biology—First Graduate Research Summit. The Math Biology IGTC is a new PIMS initiative to develop and enhance graduate training opportunities in the Pacific Northwest. The Graduate Research Summit at the University of British Columbia (September 28-30, 2007) was attended by more than 50 graduate students, postdocs and researchers from U.Alberta, UBC, U.Victoria, U.Utah and Simon Fraser University.

PIMS-CINVESTAV Mathematics of Oil Exploration Workshop, part of the annual meeting of the Mexican Mathematical Society, hosted lectures by distinguished mathematical scientists and researchers from academia and industry in the U.S., Canada and Mexico about oil exploration as well as discussions of problems and future collaborations (October 18-19, 2007, Monterrey, Mexico).

A comprehensive list of all PIMS activities, conferences and workshops can be viewed in the Activities section of the PIMS website: http://www.pims.math.ca/wrapper/Activities/

Funding

Natural Sciences and Engineering Research Council of Canada (NSERC) has renewed and increased PIMS' grant to $5.5-million for the period 2008-2013.

The Province of British Columbia is providing $130,000 to the Pacific Institute for the Mathematical Sciences to help teachers increase math participation of Aboriginal students in First Nations schools.

MITACS Update

by Megan Airton

The past year has been a time of continued growth for MITACS. MITACS now funds 38 different research projects in five research themes: Biomedical & Health, Communication, Networks & Security, Risk & Finance, Information Processing and Environment & Natural Resources.

A new addition to the MITACS research portfolio is a project headed by Dr. Irene Abi-Zeid of Université Laval entitled Multi-criteria Mission Route Planning for Search, Surveillance and Rescue in Hazardous Environments. The research team will study the near optimal, multi-criteria, multi-stage search path problem for air vehicles searching for objects at unknown locations. Re-planning based on negative information and updating of the distributions of the whereabouts of search objects is an important element of this problem. Once the search object is located, another path planning problem of interest is the multi-criteria evaluation of land rescue routes using visibility-based terrain analysis in a hazardous environment. The team will work with project partner Defence R&D Canada – Valcartier to identify R&D needs and the directions for mission planning tools.

In May 2007, MITACS was awarded $1.1 million by Industry Canada via the federal Network of Centres of Excellence (NCE) program and the International Research Development Centre. This funding launched the I2M2CS, the International Initiative in Mathematical Modeling of Complex Systems, which will enable MITACS researchers to collaborate closely with their mathematical science counterparts around the world on such topics as the spread of avian flu and SARS, the development of new drugs for Alzheimer's and other diseases, terrorist threats and managing financial risk. To date, workshops and conferences have taken place with partners from Germany, Australia, China and the US on such topics as rock mechanics and logistics in mining, complex networks in the life sciences, the pricing and supply of electricity, environmental uncertainty and its impact on public policy and computational neuroscience. For more information about I2M2CS, visit <http://www.mitacs.ca/main.php?mid=10000354&pid=271>.

MITACS also funded a first-of-its-kind meeting from November 11–13 in Kampala, Uganda. Drawing attendees from Canada, Botswana, Zimbabwe, South Africa and Uganda, the goal of the meeting was to identify the most pressing issues surrounding the transmission of infectious diseases such as HIV/AIDS and tuberculosis and establish joint Africa-Canada teams of mathematical scientists. The result of the meeting was the formation of the Canada-Africa Biomath Network, which will undertake collaborative research aimed at developing mathematical models to address issues surrounding infectious disease.

On the training front, the MITACS Internship Program, <http://www.mitacsinternships.ca>, continued to expand across Canada. The Program connects

mathematical sciences graduate students and post-doctoral fellows, under the supervision of a faculty member, with a company or other organization. In collaboration with the partner company, the intern undertakes research on a business challenge of interest to all parties. In 2006–2007, the MITACS Internship Program funded over 150 internships from coast to coast.

In June 2007, because of the success of the internship program, the Government of British Columbia announced $10 million to expand the program to all academic disciplines in the province, including those outside of the mathematical sciences. This expanded program, dubbed ACCELERATE BC, BC's Graduate Research Internship Program, has funded over 100 internships in the province alone so far this year. MITACS is planning to similarly expand the internship program across Canada in the near future.

For more information about MITACS, visit <http://www.mitacs.ca>. For more information about ACCELERATE BC or the MITACS Internship Program, visit <http://www.mitacsinternships.ca>.

Upcoming Conferences

Conference:	SIAM Conference on Parallel Processing for Scientific Computing
Location:	Atlanta, Georgia
Dates:	March 12–14, 2008
Web Site:	http://www.siam.org/meetings/pp08
Program:	http://www.siam.org/meetings/pp08/program.php
Contact:	meetings@siam.org

Conference:	5th International Workshop on Parallel Matrix Algorithms and Applications (PMAA'08)
Location:	Neuchatel, Switzerland
Dates:	June 20–22, 2008
Web Site:	http://www.dcs.bbk.ac.uk/pmaa08/
Contact:	matrix@dcs.bbk.ac.uk

Conference:	Conference in Numerical Analysis (NumAn 2008) Recent Approaches to Numerical Analysis: Theory, Methods and Applications Honoring Richard S. Varga on his 80th birthday
Location:	Kalamata, Greece
Dates:	September 1–5, 2008
Web Site:	http://www.math.upatras.gr/numan2008/
Contact:	numan2008@math.upatras.gr