



Newsletter

Autumn 2006

Letter from Newfoundland



There are a number of developments to report in Newfoundland: Over the summer of 2006, the AARMS "Atlantic Algebra Centre" came into existence. Both AARMS and MUN's Dean of Science are contributing \$11K a year for two years. For the upcoming academic

year, this has allowed the Dept. of Mathematics and Statistics at MUN to top up the financial support for two PhD students in algebra (Jason McGraw and Xiande Yang), to provide support for Marina Tvalavadze as a post-doctoral fellow, and to invite the world-renowned Amitai Regev from the Weizmann Institute of Mathematics to deliver a short course at the end of September and early October in representation theory and related combinatorics.

Also, The 96 Core Myrinet 10G/16-way cluster ACE-net installation is now online at Memorial. This means that scholars here will now be able to participate in the Coast-to-Coast seminar series facilitated by the Westgrid venue server.

In the Department of Mathematics and Statistics, the following individuals received prestigious awards this summer: Dr. Serpil Kocabiyik won the Arthur Beaumont Distinguished Service Award from the Canadian Applied and Industrial Mathematics Society for tirelessly advancing the cause of applied mathematics. Dr. Brajendra Sutradhar was made a fellow of the American Statistical Association this August in Seattle, Washington. Drs. David Pike (lead applicant), Serpil Kocabiyik, and Paul Peng were just awarded a CFI grant valued at more than \$116,000 for a project titled Resources for Large-Memory Computational Problems in Mathematics and Statistics.

We're looking forward to a great academic year in 2006-2007 and to the continuing role that AARMS plays in advancing the mathematical sciences in our region.

Sherry Mantyka

Letter from New Brunswick/PEI



The New Brunswick - Prince Edward Island regional committee began operating in summer 2006, with Gordon MacDonald (UPEI), Tim Alderson (UNB Saint John), David Bremner, Colin Ingalls, Dan Kucеровsky, Renjun Ma, Jon Thompson and David

Wagner (UNB Fredericton) appointed as members and representing diverse traditions in the mathematical sciences as well as interest in educational and industrial outreach. The first activity it is supporting is the Atlantic Optimization Days meeting to be held in Fredericton, October 5 and 6. The meeting organizers, David Bremner and Hugh Thomas have developed a program that will attract interest from mathematical sciences faculty and graduate students in computer science, business, engineering and forestry, as well as in mathematics and statistics.

Members of the NB-PEI committee are coordinating the visit to the region of Barbara Lee Keyfitz (University of Houston and Director of the Fields Institute), during the week of October 15. In addition to giving talks on nonlinear hyperbolic systems, entitled "Multidimensional Gas Analysis", in which she is a leading international authority, at UNB, Memorial and Dalhousie, she will meet with senior administrators and others to discuss the benefits derived from government and university support for the mathematical sciences.

For 2007, conferences, workshops and visiting lectures in general relativity and quantum gravity, noncommutative geometry and applications, and algebraic combinatorics are being organized. The regional committee will be considering proposals from the organizers, who are applying also to the AARMS directorate and other agencies for support.

Jon Thompson

News

AARMS Continues to Grow

Within the past year we have welcomed several new members to AARMS: UPEI, Mount Allison and, most recently, Saint Mary's. We expect to be announcing further new members in the months ahead. Similarly, we have been making contacts outside our region and have informally affiliated ourselves to the New Zealand Institute of Mathematics and its Applications (NZIMA) and the Australian Mathematical Sciences Institute (AMSI). We are exploring with them reciprocal arrangements involving our respective summer schools.

The Atlantic Shared Curriculum Initiative (ASCI)

AARMS is currently putting together a proposal to run a pilot program of graduate-level courses in mathematics involving all three founding universities (Dalhousie, Memorial and UNB). The courses will be delivered via Access Grid Technology and the students on any particular course will be distributed amongst the three locations. Access Grid enables audio, visual and desktop collaboration between multiple locations in real time. The project aims to achieve efficient delivery of core curricula by combining the small enrollments at each university into a single class. As well as economic benefits, the project will demonstrate the added value of the electronic medium by seamlessly integrating written materials with online tools and software resources. And, it will free up the teaching resources at the participating universities enabling them to offer more courses in their own areas of research specialization. Watch this space for more news.

New AARMS Publications

The AARMS Summer School is one of our great success stories, bringing in experts from around the world to give specialist courses in topics which are often not available in most universities. It is our intention to draw on Jon Borwein's experience as Associate Publisher of Books and New Media for the CMS to create an AARMS book series based on the courses offered at the summer school. Lecturers will be given the opportunity to prepare a manuscript based on their course notes and will be given editorial support should they choose to do so. Further announcements are forthcoming.

AARMS on the Web

A few of Jon Borwein's favourites links from our ACMN pages (www.aarms.math.ca/ACMN/links)

1. Bending a Soccer Ball Mathematically

www.mathematicaguidebooks.org/soccer

2. The Springfield Theory - Mathematical References on The Simpsons

www.sciencenews.org/articles/20060610/bob8.asp

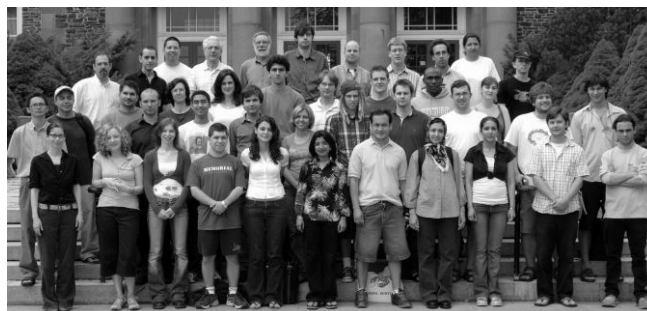
3. AAAS: Forty Seven Optical Illusions

www.michaelbach.de/ot

4. Virtual Researchers on Call

www.vroc.ca

Summer School 2006



The AARMS Summer School took place at Dalhousie University from Sunday July 16 to Saturday August 12. Four courses were offered: Elliptic Curve Cryptography by Mark Bauer of Calgary, Massive Networks and Internet Mathematics by Anthony Bonato of Wilfrid Laurier, Algebraic Geometry by Rick Miranda of Colorado State and Introduction to Wavelet Theory by Anita Tabacco of Politecnico di Torino. Each course met for 90 minutes each day. There were 38 students altogether. Of these, 11 were from Dalhousie and the other 27 were from 7 Canadian Provinces and 6 other countries. Some students from farther afield (Turkey and Iran) were unable to come.

In addition to the formal lectures there were a number of social activities. These included a welcoming reception sponsored by the Vice President Academic on the day of arrival, a pizza lunch the following day, a barbecue with members of the CMS math camp, a bus trip to Lunenburg and dinner on the waterfront and a final farewell barbecue put on by the Graduate Students' Society on the last day of classes.

This "barebones" account of the programme does not convey the sense of excitement and the pleasure of learning which pervaded the department for the four weeks of the school. These were engendered by the hard work and dedication of the four instructors and the students. All indicated that it was a very well-worthwhile experience in a setting conducive to teaching and learning.

Tony Thompson
Director, AARMS Summer School

People

AARMS Distinguished Lecturers

This autumn we are pleased to announce that two AARMS Distinguished Lecturers will be visiting the Atlantic Region. **Barbara Lee Kefyitz** (Director, Fields Institute and University of Houston) will visit UNB, Memorial and Dalhousie October 16-20, and will deliver a lecture on "Multidimensional Gas Analysis". **Terry Rockafellar** (University of Washington) will visit universities in Nova Scotia to speak on "Approaches to Risk in Optimization Under Uncertainty". Further details will be published on the AARMS website.

AARMS Director's PDF



This year the Director of AARMS has used his research stipend to fund a Postdoctoral Fellowship for **Dante Manna** who will be based at Dalhousie. Dante completed a B.A. in Mathematics in 2001 at Wesleyan University in Middletown, CT with a minor in Chinese language. His 2006 Ph. D. in Mathematics from Tulane University was

among the first granted in post-Katrina New Orleans. The title of his dissertation in classical analysis is "An Extension of Landen Transformations," written under Victor H. Moll. He has also researched divisibility properties of integer sequences. Dante is already acclimatizing to the Atlantic Provinces as his picture shows him "Lost in PEI".

NSERC USRAs and the Great Mathematical Constants



Over the summer months three NSERC USRAs have been getting to grips with the great mathematical constants. **Nicholas Oram**, **Jillian Falkenberg** and **Andrew Shouldice**

have been working on "The Numbers Project", supervised by **Jonathan Borwein** and **Keith Taylor** at Dalhousie. They designed an interactive website to

support a proposal for a television program on the Discovery Channel. The program will take the Canadian Idol format and will involve Jon and Keith competing to make a case for each of their favourite constants. The website is full of information about the proposed contest and about the constants themselves and will be published shortly at:

www.aarms.math.ca/outreach/numbers

Data Networks, Graph Theory and Modern Politics

The research of Jeannette Janssen (Dalhousie University) explores the mathematics of certain modern political issues.

Recent revelations of the US National Security Agency amassing a large database of long-distance phone records have raised many questions of social and scientific propriety. To graph theorists, however, this is yet another example of the growing importance of *data networks*. The network here is formed by phone calls linking subscribers. Another well-studied example is the World Wide Web, where the network is formed by the hyperlinks.

Usually, data networks are massive, containing hundreds of millions of nodes and a comparable number of edges. The problem of analyzing such structures is fundamentally empirical, closer in spirit to problems in the natural sciences rather than in mathematics. An essential part of the scientific method is to capture the data in a mathematical model. Several models have been proposed - how to determine which is best?

As part of my research under the MITACS project "Modelling and Mining in Networked Information Spaces (www.mathstat.dal.ca/~mominis), I am taking an approach to the analysis of different stochastic graph models that is new to graph theory, but common in disciplines such as physics; let time go to infinity. Assume the network grows over time. Then, after an infinite amount of time, the result is an infinite graph. Amazingly enough, many stochastic processes lead to a unique infinite limit. The graph properties of this limit can be seen as enormous caricatures of the properties of a typical graph generated by the process.

The silver lining to the dark clouds of lurking terrorists and institutional invaders of privacy is the impetus they have given to an interesting field of study that has the potential to transform the wired world we live in.

Recent and Upcoming Events

Atlantic Optimization Days

Organizers: David Bremner (UNB), Hugh Thomas (UNB)

Location: UNB Fredericton, New Brunswick

Date: October 5-6, 2006 More Information: www.cs.unb.ca/~bremner/atlanticopt/

APICS 2006: Special Session on Mathematical Modelling and Simulation

Organizer: George Chen (CBU)

Location: Cape Breton University, Nova Scotia

Date: October 14, 2006 More Information: apics.cbu.ca

APICS 2006: Special Session on Multivariate Statistical Analysis

Organizer: Edmund Rudiuk (CBU)

Location: Cape Breton University, Nova Scotia

Date: October 15, 2006 More Information: apics.cbu.ca

AARMS Distinguished Lecturer

Barbara Lee Keyfitz (Fields Institute and University of Houston)

Dates: October 16-20, 2006 Topic: Multidimensional Gas Analysis

Lectures at UNB, Memorial and Dalhousie. More Information: www.aarms.math.ca/events

AARMS Distinguished Lecturer

Terry Rockafellar (University of Washington)

Dates: October 30 - November 3, 2006

Topic: Approaches to Risk in Optimization under Uncertainty

Lectures at Nova Scotia Universities. More Information: www.aarms.math.ca/events

Atlantic Community Math Network Conference

Keynote Speakers: Keith Devlin, Frederic Gourdeau

Organizer: Jeff Hooper (Acadia)

Location: Acadia University, Nova Scotia

Date: November 25, 2006 More Information: [Jeff Hooper \(jeff.hooper@acadiau.ca\)](mailto:jeff.hooper@acadiau.ca)

Key Dates

October 5-6, 2006 Atlantic Optimization Days

October 14-15, 2006 APICS meetings

November 25, 2006 Atlantic Community Math Network Conference

January 31, 2007 Deadline for Applications for the PDF Program

AARMS Board of Directors

Evan Kipnis (Aliant)

Rod Nolan (Neill and Gunter)

Jonathan Borwein (Dalhousie)

Carl Breckenridge (Dalhousie)

Ivar Ekeland (PIMS)

Ron Fitzgerald (MathResources)

Edgar G. Goodaire (Memorial)

George Iwama (Acadia)

Gregory Kealey (UNB)

Barbara Lee Keyfitz (Fields)

Francois Lalonde (CRM)

Bob Lucas (Memorial)

Richard Nowakowski (Dalhousie)

Daniel A. J. Ryan (UPEI)

Katherine Schultz (UPEI)

Jon Thompson (UNB)

AARMS Scientific Review Panel

Uri Ascher (UBC)

Eric Aubanel (UNB)

Yuri Bahturin (Memorial)

Margaret Beattie (Mount Allison)

Jon Borwein (Dalhousie)

Paul Cabilio (Acadia)

John Clements (Dalhousie)

Ken Davidson (Waterloo)

Ivar Ekeland (PIMS)

Nassif Ghoussoub (UBC)

Lisa Jeffrey (Toronto)

Barbara Lee Keyfitz (Fields)

Dan Kucerovsky (UNB)

Francois Lalonde (CRM)

Bruce Smith (Dalhousie)

Catherine Sulem (Toronto)

Mary Williams (NRC)

Jianhong Wu (York)

*"The main foundations of every state, new states as well as ancient or composite ones, are good laws and good AARMS."
- Niccolo Machiavelli*