Atlantic Association for Research in the Mathematical Sciences (AARMS)

Annual Report
July 2002 - December 2003

About AARMS

AARMS was founded in March 1997, at a time when the National Network for Research in the Mathematical Sciences was being discussed and planned. AARMS exists to encourage and advance research in all mathematical sciences, including statistics and computer science, in the Atlantic region. In addition, AARMS acts as a regional voice in discussions of the mathematical sciences on a national level. Since its inception, AARMS has played an important role in the research activities in the Atlantic region, sponsoring or co-sponsoring numerous meetings and workshops. In the summer of 2002, AARMS initiated an annual summer school for graduate students and promising undergraduates.

Director's Report

The summer of 2002 was in more than one way a significant milestone for AARMS. First, a series of meetings (in St. John's, Halifax and Fredericton) in June between:

Dr. Nassif Ghoussoub (director of the Pacific Institute for the Mathematical Sciences (PIMS),
Dr. Ken Davidson (director of the Fields Institute for Research in Mathematical Sciences),
Dr. Jacques Hurtubise (director of the Centre de recherches mathématiques (CRM),
Dr. Hermann Brunner (director of AARMS) and senior administrators of Memorial University of Newfoundland, Dalhousie University and the University of New Brunswick resulted in a long-term funding commitment by the three Institutes to AARMS, with matching funding provided by the three AARMS universities. This has given AARMS, for the first time, a stable funding basis and has – as can be seen below (or by consulting the AARMS Web site: *www.math.mun.ca/~aarms/*) – already led to a very significant increase in its scientific activities. I would like to thank Nassif, Ken and Jacques for their initiative and invaluable support which made all this possible, and express my gratitude to Dr. Chris Loomis, vice-president (research and international relations) at Memorial University of Newfoundland, Dr. Carl Breckenridge, vice-president (research) at Dalhousie University, and Dr. Greg Kealey, vice-president (research) at the University of New Brunswick in Fredericton, for their strong support.

I am pleased to add that, in the fall of 2003, Acadia University became the fourth university to sponsor the activities of AARMS; I am grateful to Dr. Tom Archibald (acting head of the Department of Mathematics and Statistics) for his initiative.

From July 22 to August 6, 2002, AARMS held its first summer school for graduate students, with Dr. Edgar Goodaire (Memorial University of Newfoundland) as its director. The school, modelled after the well-known summer school of Perugia / Italy, offered four courses (in Algebra, Computational Combinatorial Mathematics, Fractal Geometry and Differential Equations: Theory, Applications and Numerical Analysis) and was attended by 22 students from seven countries, including 11 students from Canada. Its obvious success has led to an even more successful second edition in 2003 (see below), with 31 students selected from some 200 applicants.
The third AARMS Summer School will be held from July 12 to August 6, 2004.

In October 2002, Dr. Arvind Gupta, the scientific director of MITACS (Mathematics of Information Technology and Complex Systems) and Dr. John Stockie (currently the

associate scientific director of MITACS) visited Memorial University, Dalhousie University and UNB. The purpose of these meetings, with representatives from the three universities and the provincial governments, was to relay information about MITACS's activities and plans for building a stronger presence in Atlantic Canada.

As a first result, MITACS held its First MITACS Atlantic Interchange at Dalhousie University on March 24, 2003. The event, sponsored by the Atlantic Canada Opportunities Agency (ACOA), Dalhousie University, the NRC, Memorial University and GINI University Services Inc., encompassed lectures on a wide range of topics, an industrial exhibition, and some 40 posters by undergraduate and graduate students from Atlantic Canada.

MITACS has also become a sponsor of the AARMS Summer Schools and associated workshops; it supported a number of graduate students attending the workshop on Financial Mathematics in August 2003, and it will contribute funding to the 2004 summer school. AARMS gratefully acknowledges this important support by MITACS and by Dr. Arvind Gupta.

In addition to the workshops and conferences AARMS has organized or sponsored since the summer of 2002, it was also able to hold, in March 2003, a first competition for AARMS postdoctoral fellowship support. As a result, AARMS is presently providing partial support, of up to $16,000 per year, for two years, to three postdoctoral fellows:

- Dr. Thomas Guedenon (Mount Allison University; supervisor: Dr. Margaret Beattie);
- Dr. Ping Wong Ng (University of New Brunswick; supervisors: Drs. Dan Kucerovsky and Colin Ingalls);
- Dr. Sigbjorn Hervik (Dalhousie University; supervisor: Dr. Alan Coley).

AARMS expects to hold a second competition for PDF support in February 2005.

Let me conclude these notes by expressing my thanks to Memorial University of Newfoundland and to its Department of Mathematics and Statistics for providing administrative support to AARMS. In particular, I would like to thank Rosalind English, Wanda Heath, Leonce Morrissey and Jackie Costello for their great help in administrative matters.

The AARMS Scientific Review Panel

- Hermann Brunner, Memorial University (director of AARMS), chair
- Christian Léger, Directeur of the Centre de Recherches Mathématiques (CRM)
- Ken Davidson, director of the Fields Institute for Research in Mathematical Science
- Ivar Ekeland, director of the Pacific Institute for the Mathematical Sciences (PIMS)
- Uri Ascher, University of British Columbia
- Eric Aubanel, University of New Brunswick
- Yuri Bahturin, Memorial University
- Margaret Beattie, Mount Allison University
- Richard Charron, Guigne International
- John Clements, Dalhousie University
- Nassif Ghoussoub, University of British Columbia
- Lisa Jeffrey, NSERC Steacie Fellow, University of Toronto
- Dan Kucerovsky, University of New Brunswick
- Francois Lalonde, CRC, Université de Montréal

- Bruce Smith, Dalhousie University
- Catherine Sulem, University of Toronto
- Mary Williams, director general, NRC Institute for Marine Dynamics
- Jianhong Wu, CRC, York University

Scientific Program - Summary of Upcoming Activities

International Workshop on Wavelets—Theory and Applications
Organizer: Nasser Saad (Prince Edward Island)
Location: UPEI, Charlottetown
Dates: April 26 - May 7, 2004

AARMS-CRM Workshop on Singular Integrals and Analysis on CR Manifolds
Organizers: Galia Dafni (Concordia) and Andrea Fraser (Dalhousie)
Location: Dalhousie University, Halifax
Dates: May 3-8, 2004

16th Canadian Symposium on Fluid Dynamics (CSFD-2004)
Organizers: Richard Karsten (Acadia) and Serpil Kocabiyik (Memorial)
Location: Dalhousie University, Halifax
Dates: June 13-15, 2004

International Conference on Nielsen Theory and Related Topics
Organizers: Philip Heath (Memorial), R. F. Brown (UCLA), E.C. Keppelmann (Reno, Nevada)
Location: Memorial University, St. John's
Dates: June 29 - July 2, 2004

International Conference on Nonlinear Dynamics and Evolution Equations
Organizers: X. Zhao and X. Zou (Memorial), J. Wu (York) and B. Sleeman (Leeds)
Location: Memorial University, St. John's
Dates: July 6-10, 2004

Third Annual AARMS Summer School

Director: Edgar Goodaire (Memorial)
Location: Memorial University of Newfoundland
Dates: July 12 - August 6, 2004

AARMS Distinguished Lecturers

The *AARMS Distinguished Lecturer* Award was created in 2000 to recognize excellence in mathematics and its exposition. We are pleased to highlight past winners of this award.

- Robert J. Elliott, University of Calgary, August 2003
- Jianhong Wu, York University, July 2002
- Hal Smith, Arizona State University, August 2001
- Susan Montgomery, University of California, May 2001

Scientific Program - Summary of Past Activities

AARMS Research Session in Linear Algebra
Organizers: Gordon MacDonald (Prince Edward Island) and Heydar Radjavi (Dalhousie)
Location: University of Prince Edward Island
Dates: October 18-19, 2003

Workshop on Financial Mathematics
Organizers: Robert Elliott (Calgary), Edgar Goodaire (Memorial) and John van der Hoek (Adelaide)
Location: Memorial University, St. John's
Dates: August 17-20, 2003

Second Annual AARMS Summer School
Director: Edgar Goodaire (Memorial)
Location: Memorial University, St. John's
Dates: July 21 - August 15, 2003

Workshop on Combinatorial Designs and Related Topics
Organizers: Rolf Rees and Nabil Shalaby (Memorial)

Location: Memorial University, St. John's
Dates: July 14-18, 2003

31st Annual Canadian Operator Theory and Operator Algebra Symposium
Organizer: D. Kucerovsky (New Brunswick)
Location: University of New Brunswick, Fredeicton
Dates: May 20-24, 2003

AARMS Session in Ring Theory (rm_in memory of Patrick N. Stewart)
Organizers: Margaret Beattie (Mount Allison) and Michael Parmenter (Memorial)
Location: Mount Allison University, Sackville
Dates: October 19-20, 2002

AARMS Session in Numerical Analysis and Scientific Computation
Organizers: Paul Muir (St. Mary's), Pat Keast and Ray Spiteri (Dalhousie)
Location: Mount Allison University, Sackville

Dates: October 19-20, 2002

International Workshop on Polynomial Identities in Algebra
Organizers: Y. Bahturin (Memorial), A. Giambruno (Palermo, Italy), A. Regev (Weizmann Institute, Israel), D. Passman (Wisconsin, USA)
Location : Memorial University, St. John's
Dates: August 29 - September 3, 2002

First Annual Summer School
Organizers: Edgar Goodaire and Hermann Brunner (Memorial)
Location: Memorial University, St. John's
Dates: July 22 - August 16, 2002

Nonlinear Differential Equations and Dynamical Systems with Applications
Organizers: Hermann Brunner and Xiaoqiang Zhao (Memorial University)
Location: Memorial University, St. John's
Dates: July 15-18, 2002

East Coast Discrete Mathematics Conference
Organizer: Ping Wang (St. Francis Xavier)
Location: St. Francis Xavier University, Antigonish
Dates: October 20-21, 2001

Atlantic Provinces General Relativity and Cosmology Conference
Organizer: Robert van den Hoogen (St Francis Xavier)
Location: St. Francis Xavier University, Antigonish
Dates: October 20-21, 2001

Workshop on Modelling and Scientific Computation
Organizers: J. Stockie, J. Watmough and V. Husain (New Brunswick)
Location: University of New Brunswick, Frederiction
Dates: September 28-30, 2001

International Workshop on Dynamical Systems and Their Application to Biology
Organizers: Shigui Ruan (Dalhousie), Gail Wolkowicz (McMaster), Jianhong Wu (York),
Location: University of Cape Breton, Cape Breton
Dates: August 2-6, 2001

International Workshop on Groups, Rings, Lie and Hopf Algebras
Organizers: Yu. Bahturin, E. Goodaire, M. Parmenter and Y. Zhou (Memorial)
Location: Memorial University, St. John's
Dates: May 28 - June 1, 2001

Reports on Past Events

AARMS International Workshop on Nonlinear Dynamical Systems with Applications

Memorial University of Newfoundland, St.

John's, July 15-18, 2002
Organizers: Xiaoqiang Zhao and Hermann Brunner (Memorial)

This international workshop was a follow-up event to the Fifth Americas Conference on Differential Equations and Nonlinear Dynamics (University of Alberta, July 7-12, 2002). It was organized by Xiaoqiang Zhao and Hermann Brunner (Memorial University) and funded by the National Program Committee of CRM, the Fields Institute and PIMS. The purpose of the event was to provide an informal opportunity for researchers and graduate students in the fields of nonlinear differential equations and dynamical systems and their applications, to communicate new research results, ideas and open problems; to discuss future research directions; and to initiate research collaborations in the conducive small setting of an Oberwolfach/BIRS-type workshop. The workshop topics included the asymptotic behavior in finite and infinite dimensional dynamical systems, special solutions in partial differential equations (steady states, waves, etc), Hamiltonian systems and Morse theory, bifurcations and chaos, evolution equations and population biology, and numerical methods in nonlinear (functional) differential equations. It was attended by some 25 researchers, including six graduate students.

Dr. Jianhong Wu was the AARMS Distinguished Lecturer and spoke on "Non-local interaction through spatial diffusion and temporal delay: Dynamics and biological applications."

These wide-ranging talks were complemented by a very successful (and well attended) public lecture, held under the auspices of AARMS and Memorial University by Professor George Sell on "Predictions of the El Nino event: A mathematical perspective."

The invited 50-minute lectures were given by:

Speakers:
Hermann Brunner, Memorial
Teresa Faria, Portugal
Andy Foster, Memorial
Yuxia Guo, Tsinghua
Mats Gyllenberg, Turku
John R. Haddock, Memphis
Stuart Hastings, Pittsburgh
Jingtang Ma, Memorial
Angelo Mingarelli, Carleton
James Muldowney, Alberta
George Sell, Minnesota
Horst Thieme, Arizona
Dashun Xu, Memorial
Jianhong Wu, York
Yingfei Yi, Georgia Institute of Technology

Professor Sell is one of the outstanding experts in the areas of nonlinear differential equations, dynamical systems, and their applications–one of which he would describe in this "non-specialist" lecture. He is currently Professor of Mathematics at the University of Minnesota; there, he was a co-founder and the first associate director of the now an invited speaker at the International Congress of Mathematicians at Warsaw in 1983. Among the numerous honours he has been awarded, we mention the Honourary Doctorate from St. Petersburg University (Russia) in 1990.

First AARMS Summer School

Memorial University of Newfoundland, St. John's, Newfoundland, July 22 - August 16, 2002.
Organizers: Edgar Goodaire

- *Algebra*
Instructor: Francisco César Polcino Milies
Universidade de São Paulo, São Paulo, Brazil

- *Computational Combinatorial*

Mathematics
Instructor: Jason Brown, Dalhousie University, Halifax, Nova Scotia

- ### *Fractal Geometry*
Instructor: Kathryn E. Hare, University of Waterloo, Waterloo, Ontario

- ### *Differential Equations (Theory, Applications and Numerical Analysis)*
Instructors: Sue Ann Campbell, University of Waterloo, Waterloo, Ontario and Penny J. Davies, University of Strathclyde, Glasgow, Scotland

In addition, on the evening of August 13, a warm summer's night, over 85 people attended a public lecture by Dr. Douglas R. Stinson of the Department of Combinatorics and Optimization at the University of Waterloo. A renowned expert in the field of cryptography, no one was more qualified to talk on the subject "The past, present and future of cyptography".

- ### *Summer School Students*

Anthony Aldous, Brunel
Ben Baird, Alberta
Julia Boettcher, Berlin
Derek Brennan, Concordia
Tim Carlson, Alaska
Brennan Cornell, Ottawa
Justyna Florek, Cardinal Stefan Wyszynski
Sherkan Gunel, Dokuz Eylul
Justin Hatt, Lakehead
Richard Hoshino, Dalhousie
Chris Hynes, British Columbia
Andrew King, Victoria
Sarah McCurdy, Dalhousie
Manti Mendi, Brunel
Graham McNeill, Newcastle upon Tyne
Michal Pozarzycki, Warsaw
Oana Radu, Memorial
Leo Tzou, British Columbia

Faruk Uygul, Alberta
Tim Wotherspoon, Acadia
Isil Yapali, Dokuz Eylul
Chao Zhong, Memorial

International Workshop on Polynomial Identities in Algebra

Memorial University of Newfoundland, St. John's, August 29 - September 3, 2002.
Organizers: Yuri Bahturin, Memorial
Antonio Giambruno, Palermo
Amitai Regev, Weizmann Institute of Science
Mikhail, Zaicev, Moscow.

The workshop was supported by three institutes: CRM, Fields and PIMS, the Atlantic Association for Research in the Mathematical Sciences (AARMS), the president and the dean of science of Memorial University, and the Department of Mathematics and Statistics, Memorial University.

This workshop was number five in the series of workshops started in 1992 and devoted to the same topic, with number one, two and four held in Italy and number three in Israel. The workshops usually gathers 24-40 participants from a number of countries, including Brazil, Bulgaria, Canada, Germany, Hungary, Israel, Italy, Russia, USA and some others. The frequency of the workshops depends on the number of new results obtained in this area. It should be noted that the area has experienced an intensive growth within the last five years. A number of problems have been solved which remained open for several decades. The methods of the theory became significantly stronger and now find applications in other branches of algebra. The papers with the results in this area find their way to the best mathematical journal, such as *Advances in Mathematics, Inventiones Mathematicae, Journal of Algebra*, etc. A number of talented young researchers come

into the area and make their valuable contributions. All these factors make the workshops in this series very interesting and full of fresh results and ideas.

The workshop held in St. John's was no exception. It attracted 28 participants from seven countries. What is very important - we managed to invite almost all key persons in the area of various generations. One of the "patriarchs" of the theory of PI-algebras, Professor Viktor Latyshev from Moscow University, who started his work more than 40 years ago, delivered a survey lecture on the most recent achievements of younger Russian algebraists on so-called Specht's problem in positive characteristic. Specht's problem has remained in the focus of attention in this area since the beginning of the 1850s. Another top person in the area, Professor Alexander Kemer, who is world famous for solving Specht's problem in the most important case of zero characteristic, has given a lecture on his achievements in solving a well-known Procesi's problem. Another "patriarch," Professor Amitai Regev, came from the Weizmann Institute of Science in Israel. His theorems, along with those of the late Professor Shimshon Amitsur, also from Israel, form a basis for every research in the theory of PI-algebras for several decades. Professor Antonio Giambruno from Italy, who has been the heart of these workshops since 1992, delivered lectures on his joint work with another participant, a prominent Russian Professor from Moscow State University, Mikhail Zaicev. Their results completely changed the face of the theory within the last five years and have been published in the most prestigious journals. Among the lecturers we also had Professor Edward Formanek from USA, whose work on so-called central polynomials was a sensation in the 1970s and remains to be one of the basic tools in all researches on PI-algebras. In other words, this was a constellation of very bright stars in the

Theory of Polynomial Identities in Algebra. Altogether, the lecturers delivered 14 one-hour lectures; other participants gave 13 more talks. It should be noted that we had several graduate students and recent graduates from Canada, Italy and USA, most of whom gave talks as well. On one day of the Labour Day weekend the participants visited the Seabird Sanctuary on the Cape of St. Mary's.

List of participants

Yuri Bahturin, Memorial
Adalbert Bovdi, Debrecen, Hungary
Viktor Bovdi, Debrecen, Hungary
Murray Bremmer, Saskatchewan
Stefan Catoiu, DePaul
Alain D'Amour, Southern Connecticut
Vesselin Drensky, Bulgarian Academy of Sciences
Edward Formanek, Penn State
Antonio Giambruno, Palermo
Alexander Kemer, Ulyanovsk
Plamen Koshluko, Capminas
Mikhail Kotchetov, Memorial
Leonid Krop, DePaul
Roberto La Scala, Bari
Victor Latyshev, Moscow
Sergei Mishchenko, Ulyanovsk
Vincenzo Nardozza, Bari
Fabio Otera, Palermo
Michel Racine, Ottawa
Heydar Radjavi, Dalhousie
Rolf Rees, Memorial
Amitai Regev, Weizmann Institute of Western Ontario
Jeno Szigeti, Miscolc
Vladimir Tasic, New Brunswick
Angela Valenti, Palermo
Mikhail Zaicev, Moscow

APICS 2002: Special AARMS Sessions

Mount Allison University, Sackville, New

Brunswick, October 19-20, 2002

Numerical Analysis and Scientific Computing

Organizers: Paul Muir (Saint Mary's); Pat Keast Ray Spiteri, Dalhousie.

Speakers:
- Uri M. Ascher, University of British Columbia
- Shaohua Chen, University College of Cape Brenton
- Graeme Fairweather, School of Mines, Colorado
- Mohammad Hamdan, University of New Brunswick at Saint John
- Mary MacIachlan, Dalhousie University
- John Mason, Dalhousie University
- Jeffrey McNally, University of New Brunswick at Saint John
- Gerda de Vries, University of Alberta
- James Watmough, University of New Brunswick

Ring Theory

Organizers: M. Beattie (Mount Allison), M.M. Parmenter (Memorial) and R.J. Wood (Dalhousie).
Speakers: Yuri Bahturin, Memorial University of Newfoundland
Barry Gardner, University of Tasmaina
Edgar Goodaire, Memorial University of Newfoundland
Luzius Grunenfelder, Dalhousie University
Gordon Mason, University of New Brunswick
Bob Pare, Dalhousie University
Mike Parmenter, Memorial University of Newfoundland
David Poole, Trent University
Heydar Radjavi, Dalhousie University
Richard Wiegandt, Mathematical Institute of the Hungarian Academy of Sciences

Canadian Operator Theory and

Operator Algebra Symposium

University of New Brunswick, Fredericton, New Brunswick
May 21-23, 2003.

Organizer: Dan Kucerovsky (UNB)

The Canadian Operator Theory and Operator Algebras Symposium (COAS) has been one of the two most important annual meetings worldwide in this subject area (the other being the Great Plains Operator Theory Symposium). The meeting has been held annually since 1972, when Israel Halperin organized the first installment of the symposium at the University of Toronto. The general objective of the COAS has been, briefly, to further the field of operator algebras, both internally and in its interaction with other fields.

This particular installment of the Canadian Operator Theory and Operator Algebras Symposium took place at the University of New Brunswick, Fredericton, May 21–23, 2003 (main organizer: Dan Kucerovsky). In order to keep the conference brief yet effective, there were two parallel sessions during all three days of the conference. In spite of the level of general concerns about SARS and terrorism at that time, the conference was attended by 55 mathematicians from Canada, Bangladesh, Denmark, Germany, India, Iran, Ireland, Italy, the USA, and other countries. Feedback from participants was uniformly positive; they liked the online registration system, and the high quality of the conference talks. Moreover, they were favourably impressed by the recently-built conference centre where the meeting was held. Our expenses were higher than expected, due to rises in both airfare and hotel charges since the budget was finalized. However, we managed to meet our goals even with these new constraints, while remaining

within our budget. Our efforts to make the conference as accessible as possible by subsidizing students and postdoctoral fellows were not greatly impacted, since most of the cuts were made in the invited overseas speaker budget.

In conclusion, the symposium advanced the state of the art in the field of operator algebras, and introduced our visitors to the beauty of Canada, and the Atlantic region in particular. We thank AARMS for helping us to achieve this goal. We also thank the Centre de recherches mathématiques and the Faculty of Science of the University of New Brunswick for financial support.

Some of our invited speakers were:

- Ken Davidson (University of Waterloo, and director of the Fields Institute).
  Professor Davidson is prominent in single operator theory, as well as in the theory of nest algebras. His "similarity theorem" for nest algebras is a major result in this area. He spoke upon the non-selfadjoint counterpart of Cuntz algebras. He has been a recipient of a Killam Prize, and the Israel Halperin Prize in Operator Theory, as well as various other awards.

- George Elliott (University of Toronto and University of Copenhagen)
  Professor Elliott is a world authority in the theory of C*-algebras. His classification of inductive limits of finite dimensional C*-algebras based on K-theoretical invariants is now a classic result.

- Guihua Gong (University of Puerto Rico)
  Professor Gong has done important work on the classification of C*-algebras given by simple inductive limits, and at the conference spoke upon his work classifying simple AH-algebras. He was one of only two mathematicians to be

ranked among the top 20 scientists of Puerto Rico.

- Chris Phillips (University of Oregon)
  Professor Phillips has contributed to the study of C*-algebras and dynamical systems by methods of noncommutative homotopy theory, and spoke upon a very interesting application of the classification machinery together with the Baum-Connes conjecture to classify fixed point algebras.

- Gert Pedersen (University of Copenhagen)
  Professor Pedersen is a world expert in the classical aspects of C*-algebra theory, and his book on the topic has become a standard reference. He spoke upon a very interesting technical problem dealing with interpolation by projections.

- Mikael Rørdam (University of Southern Denmark)
  Professor Rørdam has, together with co-workers, made major contributions to the theory of purely infinite C*-algebras. His general results on the stability of C*-algebras are an important and fundamental contribution, and have led to the important technical results on embeddings of AF-algebras upon which he spoke at this conference.

List of Participants

Edward Antwi Appah
Martin Argerami, University of Regina
Yuri Bahturin, Memorial University of Newfoundland
Janez Bernik, Dalhousie University
Tirthankar Bhattacharyya, Indian Institute of Science
Ariel Blanco, Laval University
Nate Brown, Penn State University
Man-Duen Choi, University of Toronto
Kristofer Coward, University of Toronto

Marius Dadarlat, Purdue University
Ken Davidson, Fields Institute/University of Waterloo
Andrew Dean, Lakehead University
Driss Drissi, Kuwait University
George Elliott, Fields Institute/University of Toronto
Doug Farenick, University of Regina
Peter Fillmore, Dalhousie University
Carol Gerlach
Eberhard Gerlach, Mathematical Reviews
Guihua Gong, University of Puerto Rico
Xiaodong Hu, University of Toronto
Cristian Ivanescu, University of Toronto
Trevor H. Jones, University of New Brunswick
Claus Koestler, Queen's University
Dan Kucerovsky, University of New Brunswick
Philippe Larocque, University of Waterloo
Hanfeng Li, University of Toronto
Dave Mackenzie, University of New Brunswick
Mahmoud Manjegani, University of Regina
Laurent Marcoux, University of Waterloo
Javad Mashreghi, Laval University
Martin Mathieu, Queen's University, Belfast
Jamie Mingo, Queen's University, Kingston
Ping Wong Ng, Field Institute
Zhuang Niu, University of Toronto
Kourosh Nourouzi, K.N. Toosi University of Technology
Gert K. Pedersen, University of Copenhagen
Rajesh Pereira, University of Toronto
Christopher Phillips, University of Oregon
Dan Pollock, University of Waterloo
B. Radjabalipour
D. Radjabalipour
G. Radjabalipour
Mehdi Radjabalipour, University of Toronto
Heydar Radjavi, Dalhousie University
Thomas Ransford, Laval University
Leonel Robert, University of Toronto
Mikael Rordam, University of Southern Denmark
Mikhail Shchukin, Belarusian State University

Fred Shultz, Wellesley College
Jon Thompson, University of New Brunswick
Vadim Tsydypov
Michel Valley, Laval University
Bamdad Yahaghi, University of Toronto
Ali Zohri, Payame Noor University
Laszlo Zsido, University of Rome "Tor Vergata"

Fourth Annual Bluenose Numerical Analysis Day

St. Mary's University, Halifax, Nova Scotia, June 6, 2003.

Organizers: Pat Keast, Ray Spiteri (Dalhousie), Paul Muir (St. Mary's)

The fourth in the sequence of one-day meetings of researchers interested in numerical analysis and scientific computing was held at Saint Mary's University, on Friday, June 6, 2003, from 9:30 am to 4:30 pm. The previous three meetings were held in 2000 at Dalhousie University. This meeting was supported by a grant from the Atlantic Association for Research in the Mathematical Sciences (AARMS).

Research in many disciplines within science and engineering relies upon mathematical modelling as a key component of the investigative process. Although sophisticated applications-based models can lend substantial insight, it is usually the case that these models cannot be treated with classical mathematical techniques, and it therefore becomes necessary to turn to computer-software-based approaches for the accurate solution of these models. Examples of areas where numerical modelling plays a significant role include mathematics of finance, weather forecasting, mathematical biology, computational geophysics, computer graphics, and computational astronomy. It is often expensive, impractical, or in many cases, e.g.,

analysis of financial markets, geophysics, or astronomy, impossible to set up and perform physical experiments, and thus mathematical/ computational modelling must play a central role.

The keynote speaker was John McPhee of the Department of System Design Engineering, University of Waterloo. Dr. McPhee's work includes the study of the dynamics of multibody systems with application to vehicle systems, robotic and mechatronic systems, biomechanics, and sports engineering, including the study of associated computational methods. He is the director of the Motion Research Group at the University of Waterloo.

Additional talks were presented by:

Colin MacDonald, Simon Fraser University
Robert Ripley, Martec Limited
Dr. John McPhee, University of Waterloo
Dr. Sageev Oore, Saint Mary's University
Dr. Richard Darsten, Acadia Unversity
Sarah Mackinnon-Cormier, Dalhousie University
Dr. Andrew Rutenberg, Dalhousie University
Dr. Ernst W. Grundke, Dalhousie University
Zhengyan Sun, Norma Linney, Saint Mary's University

Workshop on Combinatorial Designs and Related Topics

Memorial University of Newfoundland, St. John's, July 14-18, 2003.

Organizers: Nabil Shalaby and Rolf Rees (Memorial)

This workshop was attended by approximately 30 people, including 11 senior researchers, nine graduate students and three post-docs.

The scope of the workshop was combinatorics with emphasis on combinatorial designs, their constructions and related open problems, also including graph theory and cryptography.

The program consisted of talks with opportunities of interactions and questions. Topics covered in designs were; mandatory representation designs (Gruettmuller), probabilistic methods for constructing designs (Deng), algorithmic methods (Koubi), Bhaskar Roa designs (Greig), pancyclic BIBDs (Pike), leaves and excesses for covering and packing designs (Zhong), Skolem sequences (Linek), Rosa-type sequences with applications (Shalaby) and constructions of pairwise balanced designs (Rees).

In graph theory and applications; two-coloured path decompositions (Dyer), multigraph decompositions (Priesler) and tandem version of the cops and robbers graph problems (Clarke). The program featured a full day devoted to Cryptography, approaching the subject from various view points: combinatorial (Stinson), number theoretical (Williams) and engineering and design of block ciphers (Heys, Keliher and Xiao). Finally, we had an AARMS public lecture, "Algebraic and computational methods in contemporary mathematics", given by Dr. Donald Kreher (assisted in the preparations and results presented by Kimberly Lauinger, graduate student).

We can describe many of the participants as senior researchers internationally recognized as experts in their fields (Stinson, Williams, Kreher). They had many discussions with graduate students and researchers.

We also had what we describe as rising stars in the field of combinatorics, e.g Nancy Clarke from Acadia University, a former Memorial University student, recently

graduated from Dalhousie and featured as a new recipient of an NSERC grant, Martin Gruettmuller (combinatorial designs) from Rostock University, Liam Keliher (cryptography) of Mount Allison University and Dameng Deng (combinatorics) of the University of Waterloo. There were several reearchers and post-docs Linek, Gruettmuller, Deng and Greig) stayed for another week doing more collaborative works with Rees and Shalaby. Also several collaborations started with some of the senior researchers. Two undergraduate students (Koubi and Howell) started their graduate programs after the workshop.

As part of this workshop, Dr. Donald Kreher (Michigan Technological University) presented a public lecture on "Algebraic and computational methods in contemporary mathematics."

A world-renowned expert in the application of algebra and computer science to the construction of combinatorial designs, Dr. Kreher holds the chair at the Combinatorics Research Institute at Michigan Technological University. His research interests include computational and algebraic methods for determining the structure and existence of combinatorial configurations and is well known for his work in the design and analysis of combinatorial algorithms for problems considered almost intractable.

List of Participants

Nancy Clarke, Acadia University
Dameng Deng, University of Waterloo
Danny Dyer, Simon Fraser University
Malcolm Greig, Greig Consulting
Martin Gruettmueller, University of Rostock, Germany
Howare Heys, Memorial University
Jared Howell, Memorial University
Liam Keliher, Mount Allison University

Sharon Koubi, Memorial University
Donald Kreher, Michigan Technological University
Kimberly Lauinger, Michigan Technological University
Vaclav Linek, University of Winnipeg
Neil McKay, Memorial University
Mike Parmenter, Memorial University
David Pike, Memorial University
Miri Priesler, Tel Aviv University, Israel
Rolf Rees, Memorial University
Colin Reid, Memorial University
Leslie Rose, Memorial University
Nabil Shalaby, Memorial University
Douglas Stinson, University of Waterloo
Tara Stuckless, Simon Fraser University
Michael Watson, University of Waterloo
Hugh Williams, University of Calgary
Lu Xiao, Memorial University
Yubo Zou, Memorial University

Second AARMS Summer School

Memorial University of Newfoundland, St. John's, July 21 - August 15, 2003.

As in 2002, we offered courses in four subjects:

- *Cryptography*
Instructor: Hugh C. Williams(CRC), University of Calgary

- *Financial Matters*
Instructor: John van der Hoek, University of Adelaide

- *Mathematical Biology*
Instructor: Jianhong Wu(CRC), York University

- *Partial Differential Equations*
Instructor: James Robinson, University of Warwick

In addition, AARMS sponsored a public lecture by Dr. Robert J. Elliott, RBC Financial Group Professor of Finance at the Haskayne School of Business, University of Calgary. The lecture, entitled "Money markets and mathematics," was delivered to a large audience on August 7, 2003.

Our Students

Emilia Adolph, Poland
Charles Bergeron, Quebec
Bogdan Dobrzeniecki, Poland
Anna Downarowicz, Spain
Maria Lopez Fernandez, Spain
Laura Ferracuti, Italy
Alessandro Ferriero, Italy
Asrat Gashaw, Ontario)
Attila Gossler, Romania
Joseph Hobart, British Columbia
Jared Howell, Newfoundland
Marcin Kaminski, New Brunswick, New Jersey
Ronald Lee, British Columbia
Rongsong Liu, Ontario
Giancarlo Manzi, Italy
Margaret-Ellen Messinger, Prince Edward Island
Valentyn Panchenko, The Netherlands
Federica Pasca, Italy
Olena Plaksa, Germany
Lara Pow, British Columbia
Patrick Reynolds, Nova Scotia
Leslie Rose, Newfoundland
Darja Saveljeva, Estonia)
Benjamin Seamone, Nova Scotia
Xia Teng, New Brunswick
Julia Viladomat, Spain
Gang Wei, Nova Scotia
Jacki Whiteley, Nova Scotia
Kathleen Wilkie, Ontario
Dashun Xu, Newfoundland
Fang Zhang, Newfoundland

AARMS Workshop on Financial Mathematics

Immediately following the summer school, from August 17-20, AARMS sponsored a highly successful Workshop on Financial Mathematics, which 13 summer school students attended. The workshop was organized by Robert Elliott (Calgary) and John van der Hoek (Adelaide).

Speakers

Robert Elliott, Calgary
John van der Hoek, Adelaide
Tomasz Bielecki, Northeastern Illinois
Abel Cadenillas, Edmonton
David Heath, Carneigie Mellon
Cody Blaine Hyndman, Waterloo
Monique Jeanblanc, Evry
Ekkehard Kipp, Hull
Dilip Madan, College Park
Sasha Melnikow, Edmonton
Ragnar Norberg, London
Eckhard Platen, Sydney
Stanley Plishka, Chicago

Other participants

Emilia Adolph, Poland
Anna Downarowicz, Spain
Laura Ferracuti, Italy
Asrat Gashaw, Ontario
Joseph Hobart, British Columbia
Viqar Hasain, New Brunswick
Ronald lee, British Columbia
Maria Lopez Fernandez, Spain
Giancarlo Manzi, Italy
Asmo Palasvirta, Newfoundland
Valentyn Panchenko, The Netherlands
Michael Parmenter, Newfoundland
Federica Pasca, Italy
Jelena Plaksa
Lara Pow, British Columbia
Julia Viladomat, Spain

15th Canadian Conference on Computational Geometry (CCCG'03)

Dalhousie University, Halifax, Nova Scotia, August 11-13, 2003

Organizers: Michael McAllister (Dalhousie)

I am pleased to report that the 15th Canadian Conference on Computational Geometry (CCCG'03), held at Dalhousie University on August 11-13, 2003 was a success. The support that we received from AARMS, CRM, the Fields Institute and PIMS allowed us to keep a high level of student participation, to keep student conference fees low, and to invite first-class plenary speakers. Registration for the conference was comparable with past years. We had a total of 70 registrants of which 26 were students and four were one-day registrants. The conference continued to attract participants from the international community while maintaining a strong showing from within Canada. The distribution of participants was

Location	students	non-student
Newfoundland	2	1
Nova Scotia	6	3
New Brunswick	0	1
Quebec	1	2
Ontario	7	8
Saskatchewan	2	0
Alberta	0	2
British Columbia	4	2
United States	1	12
Europe	3	9
Asia	0	4

The program committee selected a total of 41 papers to be presented at the conference and included in the conference proceedings. The papers were supplemented with invited talks by Dr. Ferran Hurtado, Dr. Tetsuo Asano, and Dr. Mark de Berg. The conference also held its traditional open problems session, which was chaired by Joseph O'Rourke from Smith College and Erik Demaine from MIT.

The conference received additional support from Dalhousie University and from local industry. Dalhousie contributed conference space and technical services, GINI University Services contributed administration support for the conference and Sun Microsystems contributed conference bags for the participants.

List of Participants

Oswin Aichholxer, Austria
Tetsuo Asano, Ishikawa, Japan
Sergei, Bespamyatnikh, University of Texas at Dallas
Greg Aloupis , Montreal
Robert Benkoczi, Simon Fraser University
Billy Biggs, Halifax, Nova Scotia
Prosenjit Bose, Carleton University
Eric Y. Chen, University of Waterloo
Chris Dabrowski, Halifax, Nova Scotia
Karen Daniels, University of Massachusetts, Lowell
Robert Dawson, Saint Mary's University
Herve Bronnimann, Polytechnic University, Brooklyn, New York
Kiat-Choong Chen, Memorial University
Mirela Damian, Villanova University
David Hart, Wayne State University
Mark de Berg, TU Eindhoven, The Netherlands
Erik Demaine, MIT
Steph Durocher, Vancouver
Thomas Fevens, Concordia University
Dr. Marina L. Gavrilova, Calgary, Alberta
Marc Glisse, Fontenay-sous-Bois, France
Kathryn Duffy, Halifax, Nova Scotia
Will Evans, University of British Columbia
Tim Furlong, Ottawa
Laxmi Gewali, University of Navada, Las Vegas
Alex Golynski, University of Waterloo
Harish Gopala, Ottawa, Ontario
Bob Hearn, Vancouver, British Columbia
Shiyan Hu, Polytechnic University, Brooklyn, New York

John Iacona, Polytechnic University, Brooklyn, New York
Masud Hasan, University of Waterloo
Ian Hsieh, St. John's, Newfoundland
Ferran Hurtado, Universitat Politecnica de Catalunya (UPC) Barcelona, Spain
Chirs Kao, Halifax, Nova Scotia
Ali Khanban, Imperial College, London
Hannes Krasser, Graz, Austria
Ying Liu, Homilton, Ontario
Anna Lubiw, University of Waterloo
David Kirkpatrick, University of British Columbia
Stefan Langerman, Universitt Libre de Bruxeles, Belgique
Alex López-Ortiz, University of Waterloo
Anil Maheshwari, Carleton University, Ottawa
M. Melkemi, Universit Claude Bernar, Villerubanne, France
Henk Meijer, Queen's University
Asish Mukhopadhyay, University of Windsor
Takayuki Nagai, Tottori, Japan
Mike McAllister, Dalhousie University
Pat Morin, Carleton University, Ottawa
Jennifer Murdoch, Halifax, Nova Scotia
Brad Nickerson, University of New Brunswick, Fredericton, New Brunswick
Joseph O'Rourke, Smith College, Northampton, Massachusetts
Dorette Pronk, Dalhousie University
David Rappaport, Queen's University
Jonathan Shewschuk, University of California, Berkeley
Dr. Kunsuke Onishi, University of Electro-Communications
S.V. Rao, ITT, Guwahati, Assom, India
Klaus Reinhardt, Universit of Tübingen, Germany
Jocelyn Smith, Vancouver, British Columbia
Bettina Speckmann, Tu Eindhoven, Eindhoven, The Netherlands
Andrzej Szymczak, Georgia Tech.
T. Kavitha, Max-planck-Institut fur Informatik, Saarbrucken, Germany

Csaba D. Toth, University of California at Santa Barbara
Michael Spriggs, University of Waterloo
Tara Taylor, Dalhousie University
Petr Tobola, Brno, Czech Republic
Godfried Toussaint, McGill University
Tzvetalin S. Vassilev, University of Saskatchewan, Saskatoon
Stephen Wismath, University of Lethbridge
C.A. Wang, Memorial University
Chris Worman, University of Saskatchewan

APICS 2003: Special AARMS Research Session in Linear Algebra

University of Prince Edward Island, Charlottetown, October 18-19, 2003
Organizers: Gordon MacDonald (UPEI) and Heydar Radjavi (Dalhousie).

The AARMS research session in Linear Algebra was held on October 18 and 19, 2003 at the University of Prince Edward Island, in conjunction with the APICS Mathematics, Statistics and Computer Science Annual Conference. There were 230 attendees at the conference and many of these took in some or all of the talks in the Linear Algebra Research Session.

Linear algebra methods are pervasive throughout pure and applied mathematics. Many linear algebraic results are generalizable to operator theory and algebra, and techniques and theorems from linear algebra are widely applicable to diverse areas of mathematics and science. This research session will bring together mathematicians who use linear algebra widely in their research, and explore common themes and methods. The topic is a natural fit for a research session associated with the APICS conference. Linear algebra is an accessible point for undergraduates to be exposed to research mathematics and we encourage students attending the APICS

conference to also attend some of this research session.

The two main speakers for the research session were Donald Hadwin (New Hampshire) who spoke on "A general view of multiplicative composition operators" and Peter Semrl (Ljubljana) who spoke on "Non-linear preservers on matrix spaces." Other speakers were: Eric Nordgren (New Hampshire), Dan Kucerovsky (New Brunswick), Laurent Marcoux (Waterloo), Ahmed Sourour (Victoria), M-D. Choi (Toronto), Bamdad Yahaghi (Toronto), Vladimir Troitsky (Alberta), Ali Jafarian (New Haven), Doug Farenick (Regina), Keith Taylor (Dalhousie), Peter Rosenthal (Toronto), Mitja Mastnak (Dalhousie) and Lucius Grunenfelder (Dalhousie). The session was chaired by Heydar Radjavi (Dalhousie).

Speakers:

Man-Duen Choi, University of Toronto
L. Grunenfelder, Dalhousie University
Don Hadwin, University of New Hampshire
Ali Jafarian, University of New Haven
Dan Kucerovski, University of New Brunswick
Leo Livshits, Colby College
Laurent Marcoux, University of Waterloo
Mitja Mastnak, Dalhousie University
Eric Nordgren, University of New Hampshire
Peter Rosenthal, University of Toronto
Peter Semrl, University of Ljubljana
Ahmed Sourour, University of Victoria
Keith Taylor, Dalhousie University
Vladimir Troitsky, University of Alberta
Bamdad Yahaghi, University of Toronto