



**Atlantic Association for
Research in the
Mathematical Sciences**

Annual Report

2011

Preface

This year, AARMS supported a wide range of activities to promote mathematical research and education. It was able to do so through the contributions of its member universities, the provinces of New Brunswick and Nova Scotia, and the Institutes. AARMS wishes specifically to thank CRM, Fields and PIMS for their continued support.

AARMS funded 14 research events (workshops, conferences), as well as five outreach activities. This was the first year of the Collaborative Research Group program, with three regional groups receiving their first installment of funding. The AARMS distinguished lecturer was Dr. Anne Schilling, who visited UNB and Acadia University. Four new AARMS post-doctoral fellowships were awarded, bringing the total number of AARMS post-doctoral fellows to eight.

The tenth AARMS summer school was held at Memorial University. The school was well-attended, with 13 students from Atlantic Canada, 7 from the rest of Canada, and 15 international students. In recognition of the fact that the summer school is one of the largest and longest running programs of AARMS, a review process was implemented to consider its effectiveness. The results of the review will be presented at the April 2012 Board meeting.

Clearly, AARMS makes a difference to the mathematical community in Atlantic Canada. We receive increasing numbers of strong applications to our programs, especially for funding of research meetings and outreach events, and to the post-doctoral program. With a higher demand on our programs, it is becoming more important to set priorities and evaluate our programs. The ratification of the AARMS Statutes, the instigation of a yearly budgeting exercise, and the review of the summer school all help make decisions on the most effective way to achieve our goals.

In order to sustain our role in the community, we need to ensure our funding is stable. With the help of the Board and the Executive, I will strive to obtain or renew support from all Atlantic provinces. In order to guarantee continued support from all contributors, we will also need to show the success of AARMS, and publicize its activities. An exceptional opportunity to do so is the dedication of the year 2013 to the theme: Mathematics of Planet Earth. AARMS has focused a number of its activities in 2013, including the summer school, on this theme. The hope is that these will present opportunities to attract the attention of the larger community.

This year marked the beginning of my term as director. I would like to thank my predecessor Viqar Husain, under whose leadership a major expansion of the AARMS budget and of its activities took place. Finally, I wish to express my heartfelt thanks to David Langstroth, who has helped tremendously in the transition of the directorship, who has contributed many valuable ideas to our discussions, and who can always be counted on to make the operations of AARMS run smoothly.

Jeannette Janssen
AARMS Director
April, 2012

Report on Activities

Collaborative Research Groups Program

In the autumn of 2011 the first three AARMS Collaborative Research Groups started up with funding of \$12,000 each, per year, for two years. Funding for the second year will be dependent upon a satisfactory report from the group at the end of year one. They are:

- **The Atlantic Algebra Centre**, under the Administration of Yuri Bahturin.
- **The Collaborative Research Group in Dynamical Systems**, under the Administration of Theodore Kolokolnikov.
- **The Collaborative Research Group in Mathematical Ecology and Epidemiology**, under the Administration of James Watmough.

AARMS Summer School

The tenth AARMS Summer School took place at the St. John's campus of Memorial University of Newfoundland from June 2 to 29, 2011. As usual, four courses at the beginning graduate level were offered:

- **Analysis and Geometry of Partial Differential Equations**

Instructors: Robert J. McCann (University of Toronto) and Andrea Colesanti (University of Firenze)

- **Harmonic Analysis**

Instructor: Yongsheng Han (Auburn University)

- **Numerical Solution to Partial Differential Equations**

Instructor: Weizhang Huang (University of Kansas)

- **Mathematical Biology**

Instructors: Troy Day (Queen's University) and Abba Gumel (University of Manitoba)

Altogether, 35 students enrolled in courses, typically two each. Thirteen students were from the target group of Atlantic-Canadian universities, with seven more from elsewhere in Canada. Other students came from China, India, Germany, Mexico, Norway, South Africa, Turkey and the USA. Various social activities complemented our programme, including a weekend excursion to Quidi Vidi Lake, Signal Hill, Cape Spear and Petty Harbour; and an end-of-summer-school football match.

The eleventh annual Summer School will run July 16 to August 12, 2012 at the St. John's campus of Memorial University of Newfoundland. We will be offering the following courses:

- **Combinatorial Designs and Graph Decompositions**

Instructor: Darryn Bryant (University of Queensland)

- **Probabilistic Method and Random Graphs**

Instructor: Pawel Pralat (Ryerson University)

- **Lie Theory**

Instructor: Alberto Elduque (University of Zaragoza, Spain)

- **Hopf Algebras and Applications**

Instructors: Nicolas Andruskiewitsch (University of Cordoba, Argentina) and Leandro Vendramin

AARMS Summer School Review

In the autumn of 2011, in recognition of the fact that the Summer School is one of AARMS' largest and longest running programs, a review process was implemented to consider its effectiveness. A review committee was asked to gather information and come to some conclusions concerning:

- the overall impression of the program
- the strengths and weaknesses of the program
- opportunities for improvement

In order to facilitate the work of the committee AARMS provided them with detailed data on past summer schools, including courses, locations, budgets and lists of students, lecturers and directors. The committee is conducting their review by reading these materials, interviewing people involved with past summer schools, and consulting the larger AARMS community. The report from this committee will be presented at the 2012 AARMS Board meeting. The review committee is:

Robert Dawson, St. Mary's University

Margo Kondratieva (Chair), Memorial University

Peter Russell, McGill University

James Watmough, University of New Brunswick

AARMS Postdoctoral Fellowship Program

In 2011 four new Postdoctoral Fellowships were awarded:

- **Dawood Kothawala**, working at the University of New Brunswick under the supervision of Jack Gegenberg and Sanjeev Seahra. This fellowship is for the duration of one year only.
- **Hongying Shu**, working at the University of New Brunswick under the supervision of Lin Wang and James Watmough.
- **Ryan Tifenbach**, working at Memorial University under the supervision of Danny Dyer. The start of this fellowship was delayed until January 2012 as there was a delay in obtaining his PhD.
- **Francis Valiquette**, working at Dalhousie University under the supervision of Robert Milson.

The competition for 2012 positions opened in November 2011 with final decisions on awards expected in March 2012. During our budgeting process in the autumn of 2011, it was decided that the current level of 8 post-doctoral fellows is higher than desired, and a target of 5-6 PDFs (2-3 new positions per year) was deemed more sustainable. To achieve this, we will be offering fewer positions in 2012 than the previous year.

AARMS Distinguished Lecturer

In May 2011 AARMS welcomed the visit of Dr. Anne Schilling as part of our Distinguished Lecturer Series. Anne Schilling is a professor at the University of California, Davis. She is a leading researcher on affine Schubert calculus, a broad extension of classical Schubert calculus to affine Grassmannians and affine flag varieties, with links to symmetric function theory on the one hand and mathematical physics on the other. She was awarded a Humboldt Fellowship, and has held visiting positions at a variety of leading international research institutions. She is also a significant developer of code for the open source mathematical software package Sage. Dr. Schilling gave a talk in Fredericton on May 6, 2011 and attended the SAGE Days conference at Acadia University May 9-13.

AARMS Statutes

AARMS new statutes were approved by the AARMS Board in 2011 and have been signed by representatives of Dalhousie, Memorial, UNB and UPEI, the largest universities in each Atlantic province. These statutes are publicly available on our website at: www.aarms.math.ca/statutes.pdf

Scientific Activities

In 2010 AARMS funded or partially funded the following workshops conferences and events. These involved over 1000 participants, nearly 700 of whom were from other parts of Canada or from other countries:

- **Combinatorial Algebra Meets Algebraic Combinatorics**
Organizers: Sara Faridi, Tony Geramita, Adam Van Tuyl
Location: Lakehead University, Thunder Bay, ON
Date: January 21-23, 2011
- **Sage Days at Acadia University**
Organizers: Eva Curry, Hugh Thomas
Location: Acadia University, Wolfville, NS
Date: May 2-6, 2011
- **2011 East Coast Combinatorial Conference**
Organizers: Nancy Clarke, Jim Diamond
Location: Acadia University, Wolfville, NS
Date: May 4-5, 2011

- **Black Holes VIII**
 Organizer: Robert Mann
 Location: Niagara Falls
 Date: May 10-14, 2011
- **Theory Canada 6 and Atlantic General Relativity Meeting**
 Organizers: Aleksandrs Aleksejevs, Svetlana Barkanova, Rainer Dick, Ivan Booth
 Location: Memorial University, Corner Brook
 Date: June 10-12, 2011
- **CMESG - Annual Conference of Canadian Mathematics Education Study Group**
 Organizers: Margo Kondratieva and Mary Stordy
 Location: Memorial University, Saint John's
 Date: June 10-14, 2011
- **Statistical Society of Canada - Annual Meeting**
 Local Organizer: Hugh Chipman
 Location: Acadia University, Wolfville
 Date: June 12-15, 2011
- **Canadian Undergraduate Mathematics Conference 2011**
 Organizers: A. Papillon, A. Deschenes, L. Pelletier, D. Maheux, F. Gourdeau
 Location: Laval University, Quebec City
 Date: June 15-19, 2011
- **Bluenose Computational and Applied Mathematics Day 2011**
 Organizers: Paul Muir, Ronald Haynes, Theodore Kolokolnikov
 Location: Saint Mary's University, Halifax
 Date: June 17, 2011
- **23rd Canadian Conference on Computational Geometry**
 Organizers: Greg Aloupis and David Bremner
 Location: Fields Institute, University of Toronto
 Date: August 9-12, 2011
- **AARMS Workshop on Mathematical Biology**
 Organizers: Yuan Yuan, Xiaoqiang Zhao, James Watmough
 Location: Memorial University, St. John's
 Date: August 13-14, 2011
- **Polynomial Identities in Algebras II**
 Organizer: Yuri Bahturin
 Location: Memorial University, Saint John's
 Date: September 2-6, 2011
- **Special session on High-Dimensional Data Analysis at APICS Conference**
 Organizers: Martin van Bommel
 Location: St Francis Xavier University, Antigonish
 Date: October 15-16, 2011
- **Workshop on Numerical Weather Models for Space Geodesy Positioning**
 Organizers: Marcelo Santos
 Location: University of New Brunswick, Fredericton
 Date: October 18-20, 2011

Outreach

In 2011 AARMS supported the following outreach programs:

New Brunswick Grade 12 Mathematics Examination Workshop Project – A forum where teachers can participate in preparation of examination problems and grading schemes which they consider appropriate to use in final examinations for Math 120 (Advanced math with an introduction to calculus) and Math 122 (Trig and 3-space); also providing feedback to students about their readiness for post-secondary mathematics and providing feedback to teachers. Organized by Maureen Tingley (UNB).

Enhancing Our Appreciation of Mathematics Through Intentional Community Outreach

- A program for developing public appreciation of mathematics: by creating a recreational mathematics exhibit, staffed by volunteers from the UNB Faculty of Education that will be displayed in libraries; by implementing a public lecture series in the Fredericton Library; and by interactive visits to schools. Organized by John Grant McLoughlin (UNB).

UNB-CMS Mathematics Camp, Grades 10-11 – A long weekend of mathematical activities for grade 10 and 11 pupils presented by the faculty, students and staff of the UNB Dept of Mathematics and Statistics in Fredericton. Organized by Daryl Tingley

The New Brunswick Mathematics Competition, Grades 7-9 – Carried out at the University of New Brunswick (Fredericton) and l'Université de Moncton, this is a one-day event to encourage students with an interest and ability in mathematics and to introduce them to university mathematics. Organized by Maureen Tingley and Paul DeGuire.

The Blundon Seminar – A three-day event held at Memorial University in St. John's for students who have performed well in various national and provincial math competitions. It consists of lectures, problem-solving sessions and other fun activities. Organized by Danny Dyer and Margo Kondratieva.

Administrative

In 2011 AARMS implemented significant developments to its online systems. The postdoctoral fellowship competition system was re-coded to enable those who contribute letters of reference to gain a temporary secure account without having to go through the more laborious several-step process of registering, filling in a profile, etc. Under the new system referees are sent an automatically generated email from the system with a link which takes them directly into the system where they can upload their letter of reference in a couple of clicks. The other development was for the Workshop and Conferences Proposal System. This was amended to require applicants fill in a more lengthy online form rather than simply uploading a pdf file. The forms enable the Executive Committee and the SRP to compare the most significant details of competing proposals side by side without having to search through pages of text.

Also in 2011, a formal annual budgeting process was implemented. Each autumn AARMS will undertake the budgeting process for the following year and submit the proposed budget to the Board for its approval.



Income and Expenditure Account 2011

<u>Income</u> ¹	\$	\$	<u>2010</u>
Carried forward from previous year		79,861	152,667
Mathematical Institutes		90,000	90,000
Universities		95,000	81,000
Provinces		150,000	50,000
Other Revenue (1)		237	<u>7,876</u>
		<hr/>	
Total Income		415,098	381,543
<u>Expenditure</u>			
Summer School			
Instructors (2)	42,153.90		31,120
Students (3)	29,405.01		22,391
Other (4)	<u>1,322.23</u>		<u>15,447</u>
	72,881.14	72,881	68,958
Workshops and Events (5)		82,893	64,159
PDF Program (6)		107,322	123,112
Collaborative Research Groups (7)		24,000	0
Distinguished Lecturer Series		2,500	2,500
Book Series		0	1,000
Administrator Salary		28,761	26,416
AARMS Online system development		13,202	9,933
Travel		289	1,941
Office Expenses		1,639	3,662
Computer		1,230	0
Other		<u>114</u>	<u>0</u>
		<hr/>	
Total Expenditure		334,830	301,682
Surplus: Income Less Expenditure		80,268	79,861

Notes

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|--|---|
| <ol style="list-style-type: none"> 1. For a breakdown see Appendix 1 2. Travel, Accommodation and stipends of \$5,000 each 3. Residence and Meals 4. Texts and course materials, promotion, secretarial, computing , hospitality | <ol style="list-style-type: none"> 5. See Appendix 2 6. See Appendix 3 7. See Appendix 4 |
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Balance Sheet

31/12/2011

Assets

	\$	\$
Surplus from Operations (Income less expenditure)		80,268
Accounts Receivable ¹		
CRM	45,000	
Fields	30,000	
PIMS	30,000	
Acadia	5,000	
Cape Breton	1,000	
Dalhousie	26,000	
Memorial	30,000	
Moncton	1,000	
Mount Allison	1,000	
Saint Francis Xavier	1,000	
Saint Mary's	1,000	
UNB	45,000	
UPEI	1,000	
Province of Nova Scotia	50,000	
Province of New Brunswick	50,000	
	<u>317,000</u>	
Total Assets		397,268

Liabilities

Accounts Payable ²		
Summer School	72,000	
Postdoctoral Fellowships	157,500	
Scientific Activities ³	36,846	
Collaborative Research Groups	48,000	
AARMS Book Series	2,500	
Administrator Salary ⁴	28,761	
online development	4,000	
Distinguished Lecturers	2,500	
AARMS Poster	2,000	
Travel and Office expenses	3,000	
	<u>357,107</u>	
Unallocated funds - for AARMS activities		<u>40,161</u>
Total Liabilities		397,268

Notes

1. Fees due to be collected in 2012
2. Funding Commitments in 2012
3. Workshops, Conferences, Meetings, Atlantic Algebra Centre



Annual Accounts 2011

Appendix 1

Revenue Breakdown

Provinces			
	New Brunswick	50,000	
	Nova Scotia	100,000	
			150,000
Mathematical Institutes			
	CRM	30,000	
	Fields	30,000	
	PIMS	30,000	
		<hr/>	90,000
Universities			
	Acadia	5,000	
	Cape Breton	1,000	
	Dalhousie	24,000	
	Memorial	30,000	
	Moncton	1,000	
	Mount Allison	1,000	
	Saint Francis Xavier	1,000	
	Saint Mary's	1,000	
	UNB	30,000	
	UPEI	1,000	
		<hr/>	95,000
Other Revenue			
	Book Royalties	237	
		<hr/>	237
	total		335,237



Annual Accounts 2011

Appendix 2

Workshops and Scientific Events

Cdn Operator Theory and Operator Algebras Symposium	3,759
Category Theory Oktoberfest	3,000
Combinatorial Algebra meets Algebraic Combinatorics	3,685
Int'l Council for Industrial and Applied Mathematics meeting	2,000
Visit of Scientists from DFKI to MUN	4,379
Canadian Number Theory Meeting	19,180
Statistical Society of Canada annual Meeting	2,000
CMS AARMS Poster Prize	1,000
APICS 2010	1,585
Outreach Pilot in NB – John McLoughlin	1,000
NB Math Competition (Fredericton portion)	2,000
NBMath Competition (Moncton portion)	500
NB Grade 12 Math Exam Project	3,000
UNB CMS Math Camp	1,000
Atlantic Biostatistics and Epidemiology	6,651
Black Holes VIII	3,000
CMESG 2011	4,000
Blundon Seminar	2,000
East Coast Combinatorics Conference	2,992
Polynomial Identities in Algebra II	5,000
Bluenose Computational and Applied Math Day	3,205
Canadian Undergraduate Math Conference	560
Workshop on Mathematical Biology	4,898
Canadian Conference on Computational Geometry	2,500

total

82,893



Annual Accounts 2011

Appendix 3

Postdoctoral Fellowships

Evgeny Chibrikov	8,750
Alin Ciuperca	10,000
Maya Ghandehari	17,500
Golam Hossain	14,012
Dawood Kothawala	13,310
Peter Lumsdaine	17,500
Hongying Shu	8,750
Francis Valiquette	8,750
Michael Warren	8,750

total

107,322

Appendix 4

Collaborative Research Groups

Atlantic Algebra Centre	12,000
Dynamical Systems	12,000
Mathematical Ecology and Epidemiology	0

total

24,000