



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

# **Annual Report**

2010

## **Preface**

In 2010 AARMS activities increased significantly in all areas as the first provincial funding received at the end of 2009 (\$50,000/year each from the Governments of New Brunswick and Nova Scotia) was put to full use. AARMS also obtained new 3-year funding commitments from Dalhousie (\$24k/year) and MUN (\$30k/year), with an ongoing \$30k/year commitment from UNB. The smaller annual contributions from other universities and colleges remain in place. AARMS is grateful to CRM, Fields and PIMS for their continuing support of AARMS.

AARMS activities in the past year are summarized below. A new Collaborative Research Group program was initiated in the Fall with the first competition to be held in early 2011. AARMS aims to fund two groups in 2011 for up to two years.

AARMS Summer School: The 2010 school offered 3 courses on non-commutative and riemannian geometry, and a course on applied statistics. There were nine students from the Atlantic region, six from other parts of Canada, and nine from other countries. The Summer School will be held at MUN for the years 2011-2013. The school director for 2011 is Jie Xiao. The four courses will be on computational, geometric and applied analysis. I am grateful to him and the Summer School Committee at MUN for their work in putting together the school in a limited time frame.

PDF program: AARMS received 19 pdf applications in the 2010 competition, the largest to date, which is an increase of 58% over the previous year. AARMS offered five 2-year pdfs to maintain a steady state of 7-8 positions.

Conferences and Workshops: AARMS funded 15 events across the region compared to 11 in the previous year. There was a substantial increase in national and international participation in all activities, which demonstrates AARMS wider impact; regional participants were 656 (403 in 2009), and national/international participants were 593 (228 in 2009).

AARMS' smaller programs also continued in 2010. For the Distinguished Lecturer Series, a three-person committee was appointed to make recommendations to the Executive. Dr. Atle Minsaas (MARIINTEK, Norway) gave talks at Memorial and Dalhousie as the AARMS Distinguished Lecturer. The year's Coast to Coast Seminar Series were on High Energy Physics and Oceanography. Finally, AARMS' publications committee continued to work with some past Summer School lecturers who are preparing manuscripts based on their courses. There are currently 4 books in the pipeline.

Looking forward, AARMS will be providing a detailed submission to the NSERC Long Range Planning Committee with the aim of creating a firmer foundation for future support of the mathematical sciences in the Atlantic region. AARMS has already demonstrated that it can assist in substantially expanding research activities given sufficient resources; the large influx of young and very active researchers into the region represents a significant opportunity for further growth.

I would like to thank David Langstroth for his outstanding service to AARMS as administrator, and to the members of the Executive and the Scientific Review Panel for all their work over the past year.

Viqar Husain  
AARMS Director  
April, 2011

# Report on Activities

## Collaborative Research Groups Program

In the autumn of 2010 AARMS launched a new program, the Collaborative Research Groups (CRG) Program which will be open to groups of three or more Atlantic Provinces University Researchers who demonstrate that they have common research interests and wish to collaboratively develop some aspects of their research programs. AARMS believes that groups of researchers with common research interests can benefit from sharing resources and coordinating activities. Furthermore, CRGs offer young researchers a larger community for growing their research program. AARMS also believes that the critical mass achieved by CRGs will help the Atlantic Provinces to recruit and retain faculty in mathematical sciences, to attract post-doctoral fellows and offer enhanced training programs attracting more graduate students. AARMS will provide up to \$30,000, over a two-year period for successful applicants to this program. The first applications will be assessed by the Scientific Review Panel in early 2011, for CRGs to begin their research program in September.

## AARMS Summer School

The ninth AARMS Summer School took place at the University of New Brunswick in Fredericton from Saturday, July 10 to Saturday, August 7, 2010. As usual, four courses at the beginning graduate level were offered:

- **Biostatistics**, taught by Christian Boudreau, University of Waterloo and Hyun Ja (June) Lim (University of Saskatchewan)
- **Noncommutative Geometry**, taught by Masoud Khalkhali (University of Western Ontario)
- **Noncommutative Algebraic Geometry**, taught by Michael Wemyss (University of Edinburgh.)
- **Riemannian Geometry**, taught by Eric Woolgar (University of Alberta.)

Altogether, 24 students enrolled in courses, typically two each. Nine students were from the target group of Atlantic-Canadian universities, with six more from elsewhere in Canada. Other students came from Mexico, Poland, Sweden, Italy, France, Spain and the USA. Various social activities complemented our programme, including a weekend excursion to the King's Landing Historical Settlement, not far from Fredericton. We are grateful to a grant from MITACS in support of general Summer School expenses was very helpful.

The tenth annual Summer School will run June 2 to 29, 2011 at Memorial University in St. John's. We be offering the following courses:

- **Analysis and Geometry of Partial Differential Equations**, taught by Robert J. McCann (University of Toronto) & Andrea Colesanti (University of Firenze)

- **Harmonic Analysis**, taught by Yongsheng Han (Auburn University)
- Numerical Solution to Partial Differential Equations, taught by Weizhang Huang (University of Kansas)
- **Mathematical Biology**, taught by Troy Day (Queen's University) & Abba Gumel (University of Manitoba)

### **AARMS Postdoctoral Fellowship Program**

In 2010 five new Postdoctoral Fellowships were awarded: **Mahya Ghandehari**, working at Dalhousie University under the supervision of Keith Taylor; **Alexei Gordienko**, working at Memorial University under the supervision of Mikhail Kotchetov; **Peter LeFanu Lumsdaine**, working at Dalhousie University under the supervision of Peter Selinger and Richard Wood; **Rui Peng**, working at Memorial University under the supervision of Xiaoqiang Zhao; and **Michael A. Warren**, working at Dalhousie University under the supervision of Dorette Pronk. The competition for 2011 positions opened in November 2010 with final decisions on awards expected in March 2011.

### **AARMS Distinguished Lecturer**

In July 2010 AARMS welcomed the visit of Dr. Atle Minsaas as part of our Distinguished Lecturer Series. Dr. Minsaas, a researcher with MARINTEK (Norwegian Marine Technology Research Institute) attended the CAIMS annual conference at Memorial University in Saint John's where he delivered a lecture entitled "Ocean Space Centre – a centre of marine technology knowledge for the future. Dr. Minsaas also visited Dalhousie and gave his lecture to the Faculty of Engineering on July 21.

### **AARMS Statutes**

The process of creating formal statutes to define the structure and objectives of AARMS, its activities and responsibilities has proceeded throughout 2010. The statutes will define AARMS as an agreement between the largest universities in each province: Dalhousie, Memorial and UNB and UPEI. Thanks to PIMS director, Alejandro Adem, for providing us with the PIMS statutes as a starting point for the process. The statutes are currently with legal experts at UNB for their feedback and advice with the expectation that a final draft will be presented to the Board in April 2011.

### **Scientific Activities**

In 2010 AARMS funded or partially funded the following workshops conferences and events. These involved over 1100 participants, nearly 600 of which were attracted to the region from other parts of Canada or from other countries:

- **Sixth Annual East Coast Combinatorics Conference**  
Organizers: Art Finbow, Bert Hartnell  
Location: Saint Mary's University, Halifax, NS  
Date: April 29-30, 2010
- **W. J. Blundon Seminar**  
Organizer: High School Competitions Committee, Dept of Math and Stats, Memorial University  
Location: Memorial University, Saint John's, NL  
Date: May 19-21, 2010
- **Special Sessions at the CMS Summer Meeting**  
Organizers: Hugh Thomas, CMS Administration  
Location: University of New Brunswick, Fredericton, NB  
Date: June 4-6, 2010
- **Workshop on Mathematical Biology**  
Local Organizer: James Watmough  
Location: University of New Brunswick, Fredericton, NB  
Date: June 7-8, 2010
- **CMS Satellite Workshop on Noncommutative Geometry**  
Local Organizer: Bahram Rangipour  
Location: University of New Brunswick, Fredericton, NB  
Date: June 7-9, 2010
- **38th Annual Canadian Operator Theory and Operator Algebras Symposium**  
Local Organizer: Dan Kucerovsky  
Location: University of New Brunswick, Fredericton, NB  
Date: June 7-11, 2010
- **CAIMS Annual Conference**  
Organizer: Serpil Kocabiyik  
Location: Memorial University, St. John's, NL  
Date: July 17-20, 2010
- **Canadian Number Theory Conference**  
Local Organizer: Jeff Hooper  
Location: Acadia University, Wolfville, NS  
Date: July 10-16, 2010
- **International AAC workshop in Infinite Dimensional Lie Algebras**  
Organizer: Yuri Bahturin  
Location: Memorial University, St. John's, NL  
Date: July 18-23, 2010
- **AARMS Distinguished Lecturer: Atle Minsaas (MARINTEK, Norway)**  
**Ocean Space Centre - A centre of marine technology knowledge for the future (**  
Location: Atlantic Room, NRC Institute for Ocean Technology (NRC-IOT), St. John's, NL  
Date: July 19, 2010, 3:30pm - 4:30pm  
**Ocean Space Centre - A centre of marine technology knowledge for the future**

Location: A-103, Faculty of Engineering, Sexton Campus, Dalhousie, Halifax, NS  
Date: July 21, 2010, 10:30am - 11:30am

- **Atlantic Biostatistics and Epidemiology Conference**  
Organizers: Renjun Ma, M. Tariqul Hasan, Gouhoa Yan  
Location: University of New Brunswick, Fredericton, NB  
Date: August 18-20, 2010
- **APICS Mathematics/Statistics/Computer Science Conference**  
Organizer: Norma Linney and Robert Dawson  
Location: Saint Mary's University, Halifax, NS  
Date: October 15-17, 2010
- **Special Session in Graphy Theory at the APICS Conference**  
Organizers: Bert Hartnell and Art Finbow  
Location: Saint Mary's University, Halifax, NS  
Date: October 15-17, 2010
- **Category Theory "Octoberfest"**  
Organizer: Peter Selinger, Dorette Pronk  
Location: Dalhousie University, Halifax, NS  
Date: October 23-24, 2010
- **Visit of Scientists from the Centre for Artificial Intelligence (Germany) to MUN**  
Organizer: Sherry Mantyka  
Location: Memorial University, St. John's, NL  
Date: November 20-27, 2010

### **Outreach**

In 2010 AARMS continued to support the following outreach program in New Brunswick:

**New Brunswick Grade 12 Mathematics Examination Workshop Project** – Providing 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.



# Income and Expenditure Account 2010

<b><u>Income</u></b> <sup>1</sup>	\$	\$	<u>2009</u>
Carried forward from previous year		152,667	55,657
Mathematical Institutes		90,000	90,000
Universities		81,000	115,000
Provinces		50,000	100,000
Other Revenue (1)		7,876	<u>9,410</u>
<b>Total Income</b>		<b><u>381,543</u></b>	<b><u>370,067</u></b>
<b><u>Expenditure</u></b>			
Summer School			
Instructors (2)	31,120		32,145
Students (3)	22,391		21,901
Other (4)	<u>15,447</u>		<u>10,055</u>
	68,958	<b><u>68,958</u></b>	64,101
Workshops and Events (5)	x	64,159	74,613
PDF Program (6)	x	123,112	43,750
Distinguished Lecturer Series		2,500	2,500
Book Series		1,000	1,934
Administrator Salary	x	26,416	15,813
AARMS Online system development		9,933	7,822
Travel		1,941	4,113
Office Expenses	x	<u>3,662</u>	<u>2,753</u>
<b>Total Expenditure</b>		<b><u>301,682</u></b>	<b><u>217,400</u></b>
<b>Surplus: Income Less Expenditure</b>		<b><u>79,861</u></b>	<b><u>152,667</u></b>

## Notes

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 and Director's stipend
5. See Appendix 2
6. See Appendix 3



# Balance Sheet

31/12/2010

## **Assets**

	\$	\$
Surplus from Operations (Income less expenditure)		79,861
Accounts Receivable <sup>1</sup>		
CRM	45,000	
Fields	30,000	
PIMS	30,000	
MITACS	5,000	
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	45,000	
UPEI	1,000	
Province of Nova Scotia	100,000	
Province of New Brunswick	50,000	
	<u>370,000</u>	
<b>Total Assets</b>		<b>449,861</b>

## **Liabilities**

Accounts Payable <sup>2</sup>		
Summer School	70,000	
Postdoctoral Fellowships	122,500	
Scientific Activities <sup>3</sup>	47,659	
AARMS Book Series	5,000	
Administrator Salary <sup>4</sup>	27,500	
online development	4,000	
Distinguished Lecturers	2,500	
AARMS Poster	2,000	
Travel and Office expenses	7,000	
	<u>288,159</u>	
Unallocated funds - for AARMS activities		<u>161,702</u>
<b>Total Liabilities</b>		<b>449,861</b>

## **Notes**

1. Fees due to be collected in 2011
2. Funding Commitments in 2011
3. Workshops, Conferences, Meetings, Atlantic Algebra Centre





# Annual Accounts 2010

## Appendix 1

### *Revenue Breakdown*

Provinces			
	New Brunswick	50,000	
	Nova Scotia	0	
			<b>50,000</b>
Mathematical Institutes			
	CRM	15,000	
	Fields	45,000	
	PIMS	30,000	
		<hr/>	<b>90,000</b>
Universities			
	Acadia	5,000	
	Cape Breton	1,000	
	Dalhousie	24,000	
	Memorial	30,000	
	Moncton	2,000	
	Mount Allison	1,000	
	Saint Francis Xavier	1,000	
	Saint Mary's	1,000	
	UNB	15,000	
	UPEI	1,000	
		<hr/>	<b>81,000</b>
Other Revenue			
	MITACS (for summer school)	5,000	
	Book Royalties	2,283	
	Adjustment from 2009 summer school	593	
		<hr/>	<b>7,876</b>
	<b>total</b>		<b>228,876</b>



## Annual Accounts 2010

### Appendix 2

#### *Workshops and Scientific Events*

2009 East Coast Combinatorics Conference	4,644
Graph Theory Session at 2009 CMS Summer Meeting	5,000
New Brunswick Math Exam project	2,000
2010 East Coast Combinatorics Conference	2,340
CMS Summer meeting	15,042
AARMS Prize at CMS meeting	1,000
Blundon Seminar	1,490
AAC Workshop on Infinite Dimensional Lie Algebras	5,000
CMS Satellite workshop on noncommutative geometry	7,405
Cdn Operator Theory and Operator Algebras Symposium	5,732
Workshop on Mathematical Biology	2,447
APICS special session on Graph Theory	854
Atlantic Algebra Centre	5,000
CAIMS Annual Conference	6,000
APICS 2009	206

**total**

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**64,159**

### Appendix 3

#### *Postdoctoral Fellowships*

Golam Hossain	19,112
Dawood Kothawala	16,500
Daniel Horsley	8,750
Evgeny Chibrikov	17,500
Alin Ciuperca	17,500
Alexei Gordienko	8,750
Rui Peng	8,750
Maya Ghandehari	8,750
Peter Lumsdaine	8,750
Michael Warren	8,750

**total**

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**123,112**