



# NEWSLETTER

## New Building for PIMS-UBC

The PIMS-UBC site has moved to a new state-of-the-art, centrally located facility on the 4th floor of the brand new Earth Sciences Building (ESB) at UBC.

This impressive building is centrally located at UBC's Point Grey Campus and PIMS' new space includes a reception area, offices for administration, offices for up to 24 visitors and postdoctoral fellows and lab workspace for ten graduate students. It also boasts a dedicated videoconferencing room, a spacious lounge and an array of classrooms throughout the building that are available for PIMS seminars and workshops.



The \$75 million ESB is home to Earth, Ocean and Atmospheric Sciences, Statistics, PIMS, and the dean's office of the Faculty of Science. It is the largest panelized wood building and the largest application of cross laminated timber in North America. The ESB was made possible by generous investments from the BC Government, partners in the minerals industry, UBC Science and Law alum Ross Beaty, and the Canada Wood Council.

PIMS looks forward to welcoming all members of the mathematical sciences community to our new site!

PIMS - UBC Site Office | University of British Columbia | 4176-2207 Main Mall | Vancouver, BC, V6T 1Z4 | Canada



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## Leadership Renewal

Alejandro Adem has been appointed to a second five-year term as Director of the Pacific Institute for the Mathematical Sciences (PIMS), beginning July 1, 2013.

Dr. Adem is a Professor of Mathematics at the University of British Columbia, and holds the Canada Research Chair in Algebraic Topology. His mathematical interests span a variety of topics in algebraic topology, group cohomology and related areas.

"Dr. Adem has guided PIMS in new directions, added major institutions to our membership and developed many international initiatives" says Dr. Brian Russell, Chair of the PIMS Board. "He works very well with NSERC and the Alberta government (two of our major funders). I felt it was crucial to retain Dr. Adem's strong presence as Director and am very pleased that he is serving a second term."

Dr. Adem has a wealth of international scientific and administrative experience. He has served as Chair of the Department of Mathematics at the University of Wisconsin-Madison, sits on the Board of Directors for AARMS, BIRS and the Council of the AMS, played a leading role in organizing the first joint meetings of the Canadian and Mexican mathematical societies, and has been instrumental in the development of the Pacific Rim Mathematical Association (PRIMA).

Dr. Adem said, "It is a great honour for me to continue as Director of PIMS. This is a world-class institute and I will continue to build on PIMS' outstanding record of success thanks to the tireless efforts of the mathematical sciences community in Canada and beyond. I am extremely grateful to the PIMS staff and the Board of Directors for their support."

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## Director's Message



I am delighted to report that the University of Lethbridge has become the ninth full member of the PIMS consortium. They have quickly become an active site, hosting a large number theory conference (CNTA XII) organized through the PIMS Collaborative Research Group in that field. With the incorporation of Lethbridge, PIMS now has all of the research universities in Western Canada as partners.

In August our central office at UBC moved into the magnificent Earth Sciences Building at the heart of campus. We now have a prime location on the fourth floor with an excellent view of the Strait of Georgia! The new building is a fantastic improvement and we are extremely grateful to UBC for making this possible.

This past summer, PIMS helped organize nine summer schools across a broad array of topics. In particular the PIMS-Mprime Summer School in Probability was an outstanding example of the synergies created by PIMS and its networks – top-level graduate students were recruited from all over the world, a number of world-class keynote speakers also attended and a lecture series was given by Gregory Miermont, a CNRS visitor at the PIMS Unite Mixte Internationale and the recent winner of the European Mathematical Society Award.

This past June, PIMS, IMA and Mprime partnered to organize the Mathematical Modeling in Industry Workshop at the University of Calgary, which provided a valuable opportunity for 42 students from Canada, the United States and Mexico to learn first-hand about industrial applications of mathematics. Projects were provided by companies such as Boeing, Corning, RBC, Siemens and CGG-Veritas. Thanks to all the organizers for making this such a successful event, especially Fasil Santosa (Director of IMA).

Our Collaborative Research Groups (CRGs) have been very active throughout the PIMS universities. Most recently, we saw kickoff events for the newly funded CRGs in Optimization: Theory, Algorithms and Applications (at UBC) and Algorithmic Theory of Networks (at UVic).

This summer we ran a number of math summer camps for Aboriginal students in Vancouver and the interior of British Columbia. We are very proud that this program received a three-year grant from the prestigious Vancouver Foundation, matching donations from our private donors. An indication of the great quality of our education coordinators, is that they include the two most recent recipients of the CMS' prestigious Adrien Pouliot Award, Malgorzata Dubiel from SFU (2011) and Melania Alvarez from UBC (2012).

This fall we have already seen a number of exciting lectures, such as the PIMS/UBC Colloquium by Ben Green and the Alan Turing Celebration Lecture by Leslie Valiant at UVic. In November

Calgary will host the second Hugh Morris Lecture, by Henri Darmon from McGill University. Next year we look forward to extensive collaboration with our colleagues at CRM and Fields on the Mathematics of Planet Earth Initiative, in particular, through the Pan-Canadian program on Models and Methods in Ecology, Epidemiology and Public Health.

Warmest regards,

Alejandro Adem  
*Director, PIMS*



Pacific Institute *for the*  
Mathematical Sciences

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## University of British Columbia BUD HOMSY

The UBC site has been busy with the move to our new location and a myriad of events which have included: Distinguished Visitor Robert McCann (UToronto), the Joint Alberta-British Columbia four-day Harmonic Analysis Seminar, the PIMS-Mprime Summer School in Probability featuring courses by Omer Angel (UBC) and Gregory Miermont (UParis-Sud), the 2012 Niven Lecture delivered by L. Mahadevan and several ongoing research seminars in areas such as math biology, algebraic geometry, probability, topology and applied mathematics. We have already seen several of the PIMS/UBC Distinguished Colloquium Series lecturers including Ben Green and Eva Bayer.

## University of Saskatchewan CHRIS SOTEROS

We had a successful season of PIMS Applied Mathematics Seminars; five seminars were held from October 2011 until March 2012 (details at <http://math.usask.ca/~amm/>). In September, we welcomed Sara Madariaga Merino as a new PIMS Postdoctoral Fellow working with Murray Bremner, Department of Mathematics and Statistics. Oluwaseun Sharomi continues into the second year of a PIMS Postdoctoral Fellowship working with Ray Spiteri, Department of Computer Science.

## University of Calgary CLIFTON CUNNINGHAM

Here at UCalgary, publications are coming in from the Mathematical Modeling in Industry Workshop held in June. The thematic summer of the CRG in L-functions and Number Theory included the Canadian Number Theory Association meeting at the University of Lethbridge. Spring saw three Turing Lectures in Calgary, available on [mathtube.org](http://mathtube.org) and during the fall, the Voyageur Lecture Series and the popular PIMS/Shell Lecture Series each presented three lectures in Calgary, while Ravi Vakil (Stanford) gave the 7th Richard and Louise Guy Lecture.

## University of Washington PETER HOFF

This summer UW, with support from PIMS, hosted two large workshops. Stability of Coherent Structures and Patterns, was hosted by the Applied Math department and included three mini-courses. The Mathematics department hosted a summer school and workshop on Cohomology and Support in Representation Theory and Related Topics. The first week consisted of a summer school that drew over 100 participants and the second consisted of a workshop on advanced topics, and included over 20 speakers.

## University of Regina DONALD STANLEY

URegina hosted the summer 2012 CMS meeting, preceded by two PIMS funded satellite workshops: the Workshop on Connections between Algebra and Geometry held May 29-June 1 and the Workshop on Representation Theory of Groups, Lie Algebras and Hopf Algebras held May 31 and June 1. We also hosted our annual math camp for grades 7-12 students on September 22, and in the April and May, Math on the Move (MOTM) visited over 150 students in seven schools.

## University of Lethbridge AMIR AKBARY

From June 17-22, we hosted the 12th meeting of the Canadian Number Theory Association (CNTA XII), the largest number theory conference in North America. This conference gathered 175 participants from North and South America, Europe, and Asia, from advanced undergraduates through to senior faculty. It featured 120 lectures (ten plenary lectures, one prize lecture, 34 invited lectures, seven Physics and Number Theory lectures, one public lecture, and 67 contributed lectures.)

The Ribenboim prize lecture was delivered by Dragos Ghioca (UBC) and the public lecturer was Andrew Granville (UMontréal).

## Simon Fraser University NILS BRUIN

The main event at SFU this summer was an intensive undergraduate summer school, Algebraic Graph Theory, which consisted of a series of lectures (delivered by Matt DeVos [SFU] and Chris Godsil [Waterloo]), tutorials and computer labs.

In September, Irmacs-SFU hosted the PIMS Hot Topics Workshop on Computational Criminology, exemplifying both interdisciplinary and international collaborative research. The 15th Changing the Culture: Good Questions, Big Ideas, took place in May, drawing more than 100 participants.

The CMS-PIMS Summer Math Camp for students was complemented by a camp for teachers, providing opportunities to improve their mathematical knowledge and teaching.

## University of Alberta CHARLES DORAN

UAlberta hosted the PIMS Fluid Dynamics Summer School in July with lecturers including PIMS Deputy Director, Bud Homsy, Neil Balmforth, and Ian Frigaard from UBC and Morris Flynn, Bruce Sutherland, and Rick Sydora from UAlberta. CRG 23, Applied and Computational Harmonic Analysis, held the joint Alberta-BC Seminar. Under the direction of Michael Li (UAlberta), five graduate students received summer support to study Mathematical Modeling, Statistical Inference and Data Mining in Public Health. The Alberta Summer Mathematics Institute for high school students, directed by UAlberta PIMS Site-Director Charles Doran, ran for its third summer. The day-camp style event featured both lectures and supervised student research projects.

## University of Victoria MARCELO LACA

With sponsorship from PIMS and UVic's 50th Anniversary Fund, we hosted the Alan Turing Celebration Lecture by Leslie Valiant (Harvard), winner of the 2010 Turing Award. A diverse audience of more than 200 people attended Valiant's lecture about current research inspired by Turing's seminal work of the 1930's on biological evolution as a form of learning.

UVic is also hosting PIMS Distinguished Speakers Brian Shader (UWyoming) and Branko Grubau (UWashington) and CNRS/PIMS visitor Nabile Boussaid (Besancon) and PIMS PDF Phan Minh Hung will be at UVic for the academic year.



## Language and Reason

Lakshminarayanan Mahadevan began his career in engineering. “In India” he says, “if you were good at math, you did engineering.” He realized that he liked math and began to visualize its utility in the world around him. His interest was piqued when he met his soon-to-be PhD advisor, Joe Keller. He started reading Keller’s work, “I thought it would be amazing to do some small fraction of what he did, which was to look around and explain things. And I think that’s really what ignited my interest in using mathematics as a language.”

Now, Mahadevan considers himself a denizen of the borders between disciplines. “I am sort of a mongrel. I am not a pure mathematician, not an engineer, but probably closest to some mixture of physics and math, and now leaning more towards biological questions, although not exclusively.”

“Though I am sure many people have said this, I will repeat it with a twist from my own perspective. I think of mathematics as a language, and I think it is the language of science and that interdisciplinarity comes naturally.”

“Historically, a large part of mathematics has been founded in



observations of nature. However, in the last few years the language has been evolving to try and describe our observed world, whether from the physical, biological, social or economic sciences.” And to Mahadevan, this interdisciplinarity is completely natural. “It is like asking someone if English is interdisciplinarity.”

Much of his research studies how shape arises in biology. “Mathematics is the study of patterns” says Mahadevan. “If you think of it as a language, it is used to describe ideas, and in this case, patterns in number, shape or connectivity. The initial stages of my study were focused on physical problems: how fluids flow, how solids deform, the different phases of matter: collides; polymers; liquid crystals. And more recently I have started asking the same questions in a biological context: why is the leaf shaped the way it is; how does a flower bloom; what defines the shapes of a limb on a tree; why does skin wrinkle?”

“I find that I get most excited by things that you can use your own naked senses to observe. We looked recently at how birds sing; how snakes move, how worms crawl, how a Venus flytrap catches flies.” He explains that this type of research makes it easy to do experiments and immediately test theories, and that the content is incredibly rich, meaning that you don’t have to look far to find interesting phenomena. “The questions are very simple” he says, “but the answers are often not. However they are very often applicable to a much larger set of examples than the original question.”

I always work on specific questions because I think that by looking at enough questions you can start to see the general picture. There are two ways to mountain climb: you could go climb Mount Everest, which is very hard and you may never get there. Or you could start climbing small hills, slowly getting better and better and starting to see a broader view of the world around you. This is like the kind of science I do. Gradually, by climbing enough hills of increasing height, you start to see the lay of the land and a view of the bigger tapestry.

Of the research he presented at PIMS, Mahadevan says he came to it slowly. “One very important part was reading a book written almost 100 years ago, *On Growth and Form*, by Darcy Thompson. Thompson had a very inspiring view of how you might describe shape in biology, growth and form. He wrote from the perspective of a mathematician, but was using analogy; the ability to see patterns and connect them. And even if the actual reason for why the patterns might be different, the similarities were sufficient that you could still learn something.”

“If you blow glass you can make something very beautiful. You must heat the glass and then use pressure and heat different parts differently so they don’t all flow the same amount. Our bodies, as they are being formed, use a very similar mechanism. The body has figured out how to make some parts flow more or less than others. We start as a single cell and then develop first in size, but then simultaneously parts develop differently.” As Mahadevan explains, “That analogy is a century old, but Thompson didn’t push it, beyond pointing out the similarity. What I have been trying to do is take that to the next level by being quantitative and using experiments to flesh out the mathematics behind it all.”

*On May 24, 2012, Lakshminarayanan Mahadevan delivered the 2012 Niven Lecture, “On growth and form: geometry, physics and biology” at the UBC site.*

*Lakshminarayanan Mahadevan is a Professor of Applied Mathematics, Organismic and Evolutionary Biology and Physics at Harvard University whose work centers around using mathematics to understand the organization of matter in space and time, particularly at the scale observable by the unaided senses.*

## IGTC Update

In 2012, the PIMS International Graduate Training Centre (IGTC) in Mathematical Biology has continued in its mission to support graduate student education and skills training in mathematical and computational biology. An exciting development has been the financial support of Mprime, which has allowed us to recruit five additional new student fellows and thus extend the IGTC into 2014. We are pleased to welcome these new students: Alejandra Herrera-Reyes (UBC), Stilianos Louca (UBC), Susan Fassnacht (UBC), Michael Bryniarksi (Alberta), Oksana Chkrebti (SFU), Amanda Swan (Alberta) and Ashok Rajaraman (SFU). We also congratulate the record crop of graduating IGTC students for 2012: Monica Delgado-Carrillo (UBC), Sheehan Khan (Alberta), Douglas Friesen (Alberta), Katrina Williams (UBC-O), Eric Foxall (UVic), Stephanie Peacock (Alberta), Josh Zukewich (UBC), Iman Hajirasouliha (SFU), Deniz Yorukoglu (SFU), Ben Wilson (UVic), Phuong Dao (SFU), Carly Rozins (UBC-O), Alison Muscat (UAlberta) and Anastasia Lukyanova (UAlberta).



STUDENTS AND FACULTY AT THE 2012 IGTC SUMMIT

The annual IGTC summit (Oct 12-14, in Naramata, BC) was attended by nearly 40 students from UVic, UBC, UBC-O, SFU, UAlberta, Venezuela and Mexico. Big thanks go to Rebecca Tyson (UBC-O) and Ruth Situma (IGTC Program Coordinator) for organizing another highly successful event. Our special guest was Prof. Steven Krone (UIIdaho), who gave an interactive workshop on biological modelling with interacting particle systems and a detailed research seminar on spatial pattern formation in bacteriophage experimental systems. Other events included the student poster session, sessions on finding new research projects (presented by Gerda de Vries and Thomas Hillen [UAlberta]), student talks, a wine-and-cheese-tasting excursion and some surprising karaoke performances.

In May 2012, Leah Edelstein-Keshet taught a summer course in Mathematical Cell Biology for graduate students. This course was taught live at UBC but lectures and materials were shared online. This was a pilot web-based course – facilitated by PIMS – to share expertise between the region's universities and further develop our regional mathematical biology community.

Looking forward, the IGTC will be a major participant in the Mathematics of Planet Earth thematic year through the pan-Canadian program Models and Methods in Ecology, Epidemiology and Public Health. The centre will support the conference Vaccination - a true multi-scale problem (January 17-19, 2013 at UBC) and the major IGTC summer school Mathematics Behind Biological Invasions (May 27 - June 14, 2013 at UAlberta). Both events will feature leading biological and mathematical scientists from around the world.

## PIMSBits

- **Recent award recipients:** CNRS-PIMS Researcher Gregory Miermont, European Mathematical Society Prize; PIMS Distinguished Chair Alexei Kitaev, Fundamental Physics Prize; PIMS BC Education Coordinator, Melania Alvarez, CMS 2012 Adrien Pouliot Award.

- **2012 PIMS Marsden Memorial Lecture:** On July 25, Richard Montgomery (UC Santa Cruz) spoke on “An Octahedral Gem Hidden in Newton’s Three Body Problem.” The lecture took place at the Fields Institute, as part of the Jerrold E Marsden Legacy program on Geometry, Mechanics and Dynamics. The well-attended lecture was followed by a reception.

- **Celebration of the 100th Birthday of Alan Turing:** On June 22, the UVic site held an all-day seminar in which current and emeritus professors presented Turing’s work including the Undecidability of the Halting Problem, the Turing Test, and methods of cryptanalysis. “Breaking the Code”, an acclaimed film about Turing, was shown. And there was a coffee and birthday cake reception.



(L-R) VAL KING, FRANCES DRUCE AND OLIVE BAILEY AT THE CAKE CUTTING

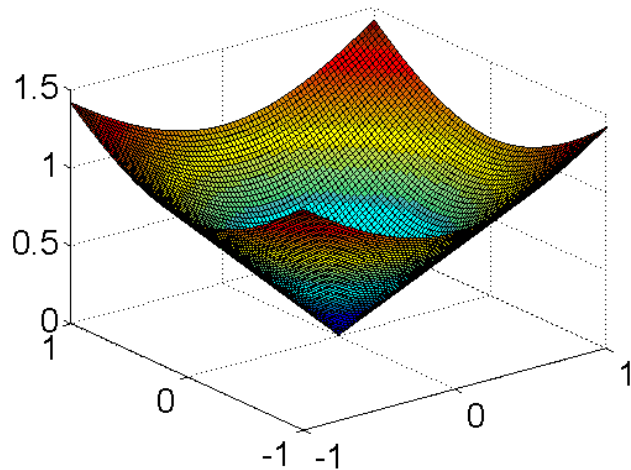
- **Site Director updates:** Marcelo Laca began his term at UVictoria and Raj Srinivasan started a one-year administrative leave from his position at USaskatchewan, while Chris Soteros takes over at that site.

## Numerical Solution of the Monge-Ampere Equation

Adam Oberman (SFU), CAIMS-PIMS Early Career Award (2011)

The elliptic Monge-Ampere equation is a fully nonlinear partial differential equation that originated in geometric surface theory and has been applied in dynamic meteorology, elasticity, geometric optics, image processing and image registration. Solutions can be singular, in which case standard numerical approaches fail.

Prof. Oberman and his colleague have developed a finite difference solver for the Monge-Ampere equation which converges even for singular solutions. Regularity results are used to select a priori between a stable, provably convergent monotone discretization and an accurate finite difference discretization in different regions of the computational domain. The resulting nonlinear equations are then solved by Newton's method, thus allowing both singular solutions to be computed and regular solutions to be computed more accurately.



### References:

[https://wiki.sfu.ca/personal/aoberman/index.php/Main\\_Page](https://wiki.sfu.ca/personal/aoberman/index.php/Main_Page)

## Analysis and Geometry of Optimal Transportation

Young-Heon Kim (UBC), Collaborative Research Group in Partial Differential Equations

In optimal transport theory, one wants to understand the phenomena arising when a mass distribution is transported to another in a most efficient way, where efficiency is measured by a given transportation cost function. For example, consider the problem of how to match water resources and towns that are distributed over a region.

A fundamental mathematical issue is whether such matching, called an optimal map, is continuous.

For example, if two towns are located close to each other, are they matched to water resources that are also nearby? It is not the case in general and deep mathematical structures are involved. In particular, such a problem is reduced to studying solutions to a fully nonlinear partial differential equation of Monge-Ampère type and it is related to the geometry of the domain (i.e. the landscape) and the transportation cost. Kim and his collaborators have proven various continuity results for optimal maps under a sharp condition, now called Ma-Trudinger-Wang condition, and also found unexpected connections to symplectic and pseudo-Riemannian geometry as well as microeconomics problems.

$$\det (D_{xx}^2 \phi(x) + D_{xx}^2 c(x, T(x))) \equiv |D_{x\bar{x}}^2 c(c, T(x))| \left( \frac{\rho(x)}{\bar{\rho}(T(x))} \right)$$

### Related References:

- A. FIGALLI, Y. KIM and R.J. MCCANN, Hölder continuity and injectivity of optimal maps (submitted July, 2011). <http://front.math.ucdavis.edu/1107.1014>
- A. FIGALLI, Y. KIM and R.J. MCCANN, Regularity of optimal transport maps on multiple products of spheres. (To appear in the Journal of the European Mathematical Society [JEMS]). <http://front.math.ucdavis.edu/0912.3033>



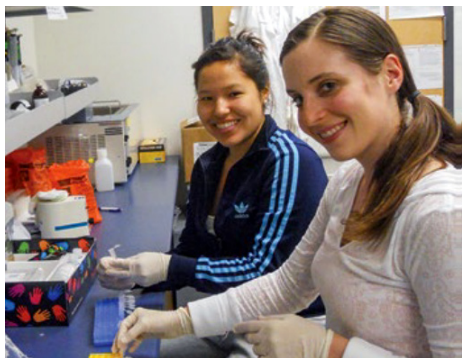
## Aboriginal Scholarship Program

From 2007 to 2012 PIMS, in collaboration with the UBC Math Department, has supported scholarships for more than 57 Aboriginal students attending Britannia, Templeton and Windermere Secondary Schools, with funding support provided by private donors, the government of British Columbia and the Federal Government.

Our programs have and will continue to help students to move into the higher level math and science courses required for post-secondary studies.

## Math on the Move

Math on the Move (MOTM) has been more ambitious in 2012 than ever before! The initiative (based in Regina, Saskatchewan) visited seven schools in five school districts and delivered inquiry-based mathematics activities to 157 students. Support for the 2012 of MOTM activities was provided by the Pacific Institute for the Mathematical Sciences (PIMS), the Faculties of Education and Science at the University of Regina, and Math Central.



PHOTOS: TWO OF OUR STUDENTS WILL BE ATTENDING THE MINI-MED SCHOOL ORGANIZED BY THE CHILD AND FAMILY RESEARCH INSTITUTE, A HIGHLY SELECTIVE PROGRAM FOR HIGH SCHOOL STUDENTS; 2012 MOTM TEAM - BACK (L-R): KATHY NOLAN, CHRISTINA SCHMIDT, REGAN BOMPAIS, DANIELLE GOMERSALL, HARLEY WESTON FRONT (L-R): SAMANTHA DOUGLAS, ERIC CROSBIE; PLAY AND LEARN SUMMER CAMP PARTICIPANTS.

MOTM originated as a means to involve students in inquiry-based mathematics activities, to give pre-service teachers an opportunity to design and deliver these activities, and to illustrate their use to practicing (in-service) teachers. Moving forward, MOTM activities will illustrate even more clearly to teachers how they can include these activities in their lessons by providing more deliberate links to mathematics curriculum goals and outcomes.

## Play and Learn Summer Camp

July 9 - August 3, 22 students aged six through nine attended this summer camp in Sooke, BC. In addition to sponsoring the camp, PIMS' BC Education Coordinator, Melania Alvarez, led the PIMS training session with the camp staff and contributed a number of resources for the students' learning. The camp's other sponsors were: Human Resources and Skills Development Canada (HRSDC) summer jobs, Rotary Club of Sooke, SD62 (Aboriginal Education Department) and the Sooke Region Literacy Project as well as numerous supporters giving small gifts.

Learning resources were provided by PIMS and the Sooke District Resource Centre.

## Lethbridge Joins as Full Member

PIMS is pleased to announce that in May, the University of Lethbridge, Alberta joined the PIMS consortium as a full member. The site has been a PIMS affiliate for many years, and has had significant participation in PIMS activities.

"We are delighted that Lethbridge has become a full member of the PIMS consortium, as they have valuable strengths in a number of areas in the mathematical sciences - number theory is a good example. Through our collaborative research groups,

summer schools, postdoctoral opportunities, broadcast seminars and educational activities, Lethbridge faculty and students will be important contributors to PIMS activities," remarked PIMS Director, Alejandro Adem.

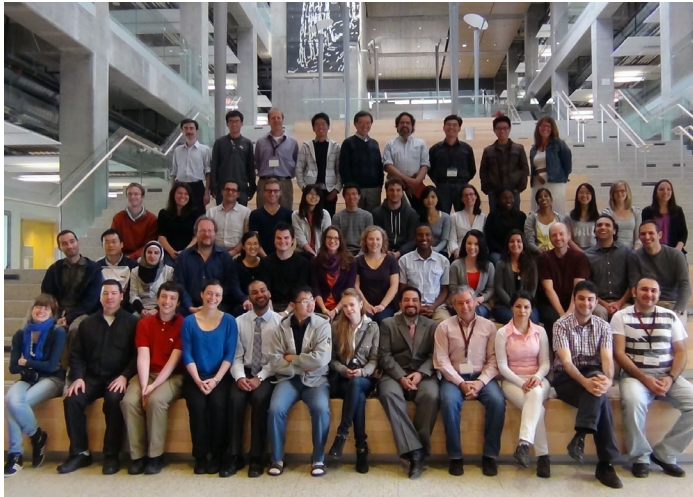
Dr. Chris Nichol, Dean of the Faculty of Arts and Science at the University of Lethbridge, will represent the University on the PIMS Board of Directors. Dr. Amir Akbary has been appointed as the interim PIMS site director and began on July 1, 2012.

# The 2012 IMA/Mprime/PIMS Math Modeling in Industry Workshop

BY BUD HOMSY

The 2012 IMA/Mprime/PIMS Mathematical Modeling in Industry Workshop (MMIW 2012) was held June 18-27 at the University of Calgary. Funding was provided by IMA, PIMS, Mprime, and NSERC. The workshop brought industrial researchers, mathematicians and graduate students and postdoctoral fellows from Canada, the USA, and Mexico together in an intensive workshop devoted to the development and solution of mathematical models of pressing industrial problems. There were 40 students total – 19 from Canadian institutions, one from Mexico and the remainder from the USA.

According to PIMS Director Alejandro Adem, “The funding from Mprime was critical in enabling students from all over Canada to attend.” The industrial researchers served as mentors, orienting the students to the problems and guiding them in their work.



The objectives of the ten-day workshop were to have the students gain skills needed to (i) become highly qualified industrial mathematicians, (ii) work in teams in a collaborative environment with realistic time pressures, and (iii) communicate their methods and results. The MMIW workshop consisted of seven projects, with approximately six students per project. Further details on the projects and team members is available on the IMA website: <http://bit.ly/V6XGrj>

A companion event, consisting of a Lunch and Learn, was held on June 20. Speakers from NSERC and Mitacs presented information on their respective programs for collaborative research with industrial partners to both local industrial researchers and the students from Canadian institutions.

As gauged by the results of student surveys, the workshop was an unqualified success. Indeed, Prof. Fadil Santosa, the Director of the IMA considers the Calgary workshop to be one of the most successful in recent memory. Thanks are due to Professors Yuiy Zinchenko and Christian Rios, who were the local organizers. Notable outcomes include:

- The workshop satisfaction ratings were very close to 100% satisfaction, with no fewer than 30 of the 31 respondents agreeing with each statement.
- Participants' reported interest in pursuing a career in industry increased from 19% to 50%.
- Similarly, the average level of interest in a career in industrial math research jumped over 14% from before to after the workshop. Also, the percentage of students reporting a “High Amount” of interest jumped from 16% before the workshop to 55% after the workshop.



**IMA** Institute for Mathematics  
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The 2<sup>nd</sup> Pacific Rim Mathematical Association (PRIMA) Congress  
June 24-28, 2013

Shanghai Jiaotong University, China

Visit the PRIMA 2013 Congress website:  
[www.math.sjtu.edu.cn/Conference/prima](http://www.math.sjtu.edu.cn/Conference/prima) for more details

