

Pacific Institute
for the Mathematical Sciences

Institute Report 2001/02



The Pacific Institute for the Mathematical Sciences

Our Mission

The Pacific Institute for the Mathematical Sciences (PIMS) was created in 1996 by the community of mathematical scientists in Alberta and British Columbia and in 2000, they were joined in their endeavour by their colleagues in the State of Washington. PIMS is dedicated to:

- Promoting innovation and excellence in research in all areas encompassed by the mathematical sciences;
- Initiating collaborations and strengthening ties between the mathematical scientists in the academic community and those in the industrial, business and government sectors;
- Training highly qualified personnel for academic and industrial employment and creating new opportunities for developing scientists;
- Developing new technologies to support research, communication and training in the mathematical sciences.

Building on the strength and vitality of its programmes, PIMS is able to serve the mathematical sciences community as a catalyst in other areas of great importance:

- The communication and dissemination of mathematical ideas; public outreach, mathematical education and training at all school levels;
- The creation of strong mathematical partnerships and links within Canada and organizations in other countries, with a focus on the nations of the Pacific Rim.

Our Community

PIMS is a partnership between the following organizations and people:

- The six participating universities (Simon Fraser University, University of Alberta, University of British Columbia, University of Calgary, University of Victoria, University of Washington) and affiliated Institutions (University of Lethbridge and University of Northern British Columbia).
- The Government of British Columbia through the Ministry of Competition, Science and Enterprise, The Government of Alberta through the Alberta Ministry of Innovation and Science, and The Government of Canada through the Natural Sciences and Engineering Research Council of Canada.
- Over 350 scientists in its member universities who are actively working towards the Institute's mandate. Their disciplines include pure and applied mathematics, statistics, computer science, physical, chemical and life sciences, medical science, finance, management, and several engineering fields.
- Scientists, practitioners and government researchers using mathematical ideas in dozens of companies across Canada and the U.S.
- A large and rapidly growing group of high school and elementary school teachers and educators in Alberta, British Columbia and Washington State.

From the Chair of the Board

Hugh Morris, FRSC



Hugh Morris, Chair of the PIMS Board of Directors.

My association with the Pacific Institute for the Mathematical Sciences (PIMS) continues to be an exciting and rewarding experience. I am as fascinated by the energy, the vitality and the pace that the mathematical scientists of PIMS are

putting into their task as I was when I became Chair of the PIMS Board of Directors back in 1998.

The reallocation results of NSERC echo my faith in PIMS as one of the most innovative and promising research institutes in the mathematical sciences.

The opening of the Banff International Research Station (BIRS) is just weeks away. BIRS is destined to provide a tremendous boost for research in the mathematical sciences all over the world, and it will be exciting to see BIRS actually open its doors after all the hard work.

This annual report represents a compendium of the various activities and programmes organized and

supported by PIMS during 2001–02, together with a glimpse at the planned busy programme ahead. PIMS not only strives to be a world-class research institute in the mathematical sciences, but also to be prominent in the application of mathematics to industry and in mathematics education at all levels.

Through its Industrial Problem Solving Programme and its Industrial Math Training Programme, PIMS has played a key role in bringing mathematical scientists in academia together with their counterparts in the private sector. This year's the Industrial Problem Solving Workshop and the Graduate Industrial Mathematics Modelling Camp continued the highly successful format of previous years.

This year PIMS has continued its involvement in mathematics education, π in the *Sky* magazine is now distributed to more schools, and as you will see there are many education activities taking place in British Columbia and Alberta. PIMS is certainly doing a lot to reveal to students of all levels how much fun mathematics can be.

The development of the PIMS Collaborative Research Groups is something to truly be proud of. I look forward to seeing what these multi-university groups of mathematical scientists achieve in 2003.

My warmest congratulations to the director, Dr. Nassif Ghoussoub and to all mathematical scientists and staff of PIMS for their wonderful accomplishments.

Director's Notes

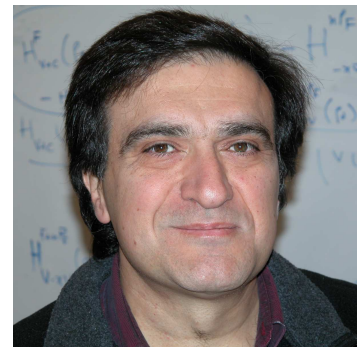
Nassif Ghoussoub, FRSC

NSERC's reallocations results are out and PIMS and the Canadian mathematical community have every reason to be proud of the accomplishments of the last 5 years. The site visit report had much to say about the institute's contributions: "*PIMS activities have broken through discipline and geographical boundaries*". They echoed the referees comments: "*PIMS has become in a very short time a model for the research institute of the twenty first century*" and "*PIMS has moved from an "idea" to a leading international institute*". One anonymous referee wrote about the international leadership shown by the Canadian mathematical community adding: "*Here, PIMS seems to be in the driver's seat with incredible results for the world's mathematical community*". Another referee concurred: "*Although [PIMS] is the youngest of the three, I believe that its reputation is rapidly on the rise, so I find the incremental funding which is requested in the PIMS proposal to be compelling. I believe that the leadership of PIMS is energetic and creative, and PIMS is perhaps the most ambitious of the three Canadian Institutes*".

PIMS: A Model for the Research Institute of the 21st Century

The site visit committee also stated that "*PIMS has been successful at multiplying the opportunities provided by NSERC funds. However, it is also particularly underfunded compared to the other two institutes.*" NSERC's reallocations committee agreed by awarding PIMS a 60% increase in its budget. Each one of the 3 Institutes (PIMS, Fields and CRM) will receive a grant of approximately \$1 million/year for the period 2003–07. In addition, a joint proposal of

the 3 institutes with the Statistics Grant Selection Committee (GSC 14) for a 4-year "National Programme on Complex Data Structures" has also been funded at the rate of \$172K/year.



Nassif Ghoussoub, Director of PIMS

NSERC Increases its Funding for the Mathematics Grant Selection Committees

The synergies between the math community and the institutes have again played a major role, even as the institutes carry on with their outreach efforts to other disciplines. Indeed, mathematics is one of only six submissions (out of 19 GSCs) that ended up with a budget increase: A major change from the dynamic of the first NSERC re-allocation exercise in 1994.

The reallocations committee first recognized the importance of increased funding to new applicants by returning \$805K/year to the GSC 336/337. In addition, the committee allocated \$270K/year to promote structured initiatives by recognized leaders. Indeed, this innovative approach was well received by the Committee which noted that "*initiatives that are built around a leader have been a recognized model for success in mathematics and other disciplines. The institutes are also using this model quite extensively*".

All are encouraged to take a look at the NSERC webpage, www.nserc.ca, so as to be aware of the new opportunities created by this result. Congratulations to all involved, especially to Richard Kane and Robert V. Moody who led this year's exercise for mathematics with exemplary judgment, skill, and patience.

Referees' Unanimity on the Banff International Research Station (BIRS)

BIRS has been referred to as a major coup for the Canadian community. The annual budget of BIRS is about \$2M (\$500K from each of NSF, ASRA, and NSERC's MFA program; \$100K from MITACS and \$400K from PIMS). In addition \$1.1M have finally been secured to renovate and upgrade the facilities (\$300K from the PIMS universities and \$800K from the Alberta government). We are looking forward to an outstanding inaugural programme for 2003 and we anticipate that our recently approved 2004 programme will be of an equally high calibre. Many thanks to Robert V. Moody for the incredible amount of work and energy he is investing to help set up this great continental resource.

The MITACS Network up for Renewal

The MITACS Network of Centres of Excellence developed by the 3 institutes has been a great boost to the applied and industrial mathematical science community in Canada. It has continued to thrive under the capable hands and entrepreneurial spirit of Arvind Gupta. The \$14.4M grant (given for the period 1999/03) is up for renewal next year. We invite the math. science research community to join the institutes in vigourously preparing for a successful renewal of MITACS.

Supporting Atlantic Canada and the Completion of the National Network for Collaboration in the Mathematical Sciences (NNCMS)

The directors of CRM, Fields and PIMS have just finished a tour of universities in Atlantic Canada, for the

purpose of completing the National Network for Research in the Mathematical Sciences (A first attempt at an NSERC's RPP research network had failed in 1997!). The 3 institutes funding for AARMS (Atlantic Association for Research in the Mathematical Sciences) has been matched by the Memorial University of Newfoundland in St. John's, the University of Nova Scotia at Dalhousie and the University of New Brunswick at Fredericton. In addition, MITACS has committed substantial funds for seed projects subject to appropriate matching from the provincial governments and local industries. The \$600K/year package should provide a great boost to Atlantic Canada research in the mathematical sciences. Here Hermann Brunner is to be heartily congratulated for his efforts and leadership.

The National Programme Committee to be Restructured

The National Programme Committee of the 3 institutes will be restructured soon so that it can effectively deal with the developing picture across the country. Every active Canadian researcher should/will have access to the infrastructural resources and to the research opportunities, new and old.

Search for a New Director

Though my mandate as director ends on June 30, 2004, I have recommended that the Board launches a search for a new director. The PIMS organization is complex and by now quite extensive, hence the need for time to select the next leadership and to insure a smooth transition. I am hoping that the new director can take over sometime between the summer of 2003 and June 2004.

It has been a great ride!

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