# African Institute for Mathematical Sciences

Annual Report 2006/7


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# Contents

# Executive Summary

This report covers the fourth year of operation (August 2006 to July 2007) of the African Institute for Mathematical Sciences (AIMS). The financial reporting is for the calendar year 2006, in accordance with that of Stellenbosch University which provides financial administration services to AIMS.

In August 2006, 49 students from 19 African countries enrolled at AIMS. New countries represented were Togo, Niger, Chad, Central African Republic, Liberia and Uganda. The tried-and-tested course structure of two sections, one focussing on skills, and the other on the review of new developments, was followed. During the third and final part of the programme, the students each prepared and defended essays on a wide range of mathematical topics, many of an interdisciplinary nature.

AIMS was fortunate to recruit 29 outstanding African and international lecturers to teach the skills and review courses, and to receive over 90 proposals to supervise essays on specific topics. This enthusiastic support from local and international scientists is a mainstay of the AIMS project. AIMS appointed seven post-Masters and post-doctoral tutors which served for different periods during the academic year. The majority of these are Africans. Their experience at AIMS develops their pedagogical and scientific skills which are desperately needed throughout the continent.

On the basis of its highly successful postgraduate training programme, AIMS is now embarking on several new and natural extensions. Firstly, significant progress is being made on the initiation of the African Mathematical Institutes Network, AMI-Net. A call was issued for proposed Nodes of the network, and 15 proposals were received. These were evaluated and six sites were visited to evaluate their potential. Detailed business plans are now being developed for the most promising sites.

Secondly, AIMS is about to establish a Pan-African Research Centre in the Mathematical Sciences for which substantial additional office space is required. The different options have been carefully examined and funding has been secured for a large part of the infrastructural needs. AIMS has been encouraged by the Department of Science and Technology to submit a detailed funding proposal. It is anticipated that the Research Centre will be operational by April 2008 or shortly thereafter.

Several very successful international workshops were hosted at AIMS. As well as contributing to the development of science in Africa, these activities serve to focus the AIMS programme on fields of greatest need and strengthen cooperation with other projects. An example of this is the successful joint project which was undertaken with the US group DIMACS and the local research group at SACEMA, focussed on modelling diseases in Africa.

These activities have the potential to grow into a large longer-term international collaborations involving several African centres. Exciting programmes of this kind are the best way to counter the brain drain from Africa and, at the same time, to address and solve the pressing problems of the continent.

AIMS is made possible through the generous support it receives from its funders. This report lists the many sponsors who have granted significant funds. It also describes the commitment of individuals to various forms of engagement and support. To all of them we express our sincere gratitude.

# 1 Introduction

This report covers the activities of the African Institute for Mathematical Sciences for the academic year 2006/7. It includes an overview of all programmes, as well as a financial report for the calendar year 2006 and a discussion of our plans for the future.

The African Institute for Mathematical Sciences was established in 2003 as a tertiary level educational institute specializing in cutting-edge mathematical training for post-graduate students from all over Africa. The goals of AIMS are:

- To promote mathematics and science in Africa
- To recruit and train talented students and teachers in Africa
- To build capacity for African initiatives in education, research and technology.

The Institute's main focus is a nine-month long postgraduate diploma taught by African and international academics, many of whom are leaders in their fields. AIMS is the joint collaborative project of six institutions:

- University of Cambridge
- University of Cape Town
- University of Oxford
- Universite de Paris Sud XI
- University of Stellenbosch
- University of the Western Cape

In just four years, AIMS has succeeded in building a reputation as a world class educational institute. Outstanding African students and excellent international lecturers now apply to study and to teach at the Institute. The academic programme provides a unique approach with a strong focus on problem solving and a great deal of interactivity. To date, 160 students from 27 different countries have graduated the AIMS postgraduate diploma, and the vast majority have proceeded to Masters and PhD degrees within strong research programmes.

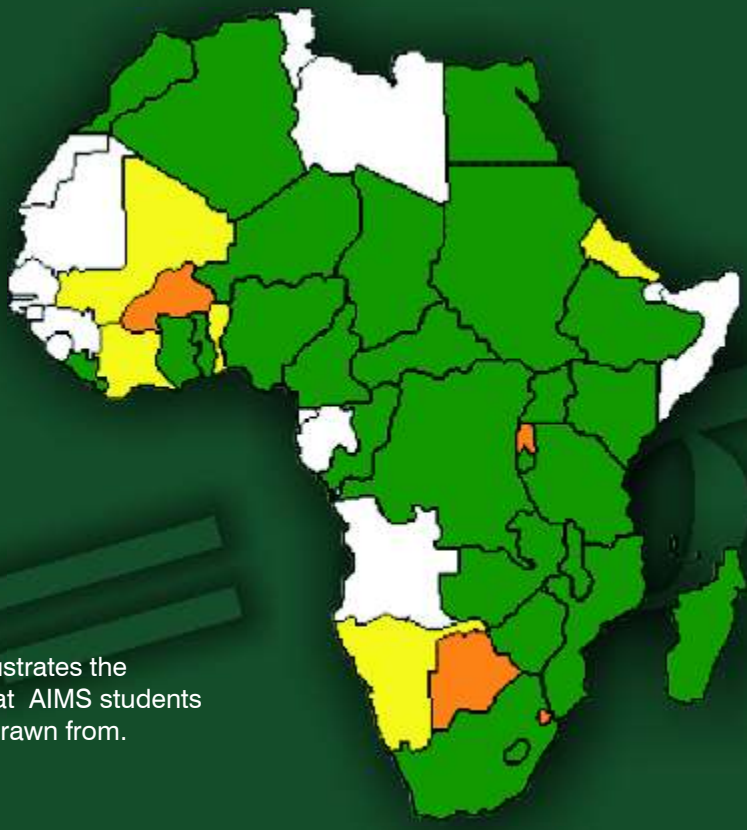
AIMS has now moved into a second phase, marked by an expansion of its activities. This has taken place most notably through 1) the establishment of AMI-Net, 2) plans to develop a Research Centre of Excellence, and 3) plans to implement an industry-related training programme.

One of the greatest challenges to AIMS is that it remains exceedingly difficult to attract South African students. There is a severe scarcity of mathematically qualified graduates in South Africa, and those there are have many attractive opportunities available to them, being sought after by academia and industry. Although enrollment figures from third year South African students were too low to run the Advanced Mathematical Science Programme (AMSP) this year, there is a good possibility that this programme will be revived in a revised format in 2008. It is also planned to implement an industry aligned programme offering training to South Africans who are already in employment.

# 2 Academic Programmes

## 2.1 AIMS Postgraduate Diploma in Mathematical Sciences

The AIMS postgraduate diploma in the mathematical sciences continued as the main academic programme during this academic year. The diploma programme is a 9 month course accredited by the three universities in the Western Cape: University of Cape Town, University of the Western Cape and Stellenbosch University. Applications for the Diploma programme are called for via the AIMS newsletter, announcements and website 9 months prior to the course start date. Over the years the number of applications has increased, with 262 applications from 32 different countries received for the August 2006 intake. After a careful screening process, 59 applicants were selected and invited to attend the course. Of these 49 students from 19 different countries arrived at AIMS to begin an intensive period of study and interaction.



This map illustrates the countries that AIMS students have been drawn from.

Countries are indicated in yellow when applications are received, orange when students are admitted and green when students graduate. AIMS hopes to turn as much of the map green as possible.

This year students were enrolled from 6 new countries: Liberia, Niger, Uganda, Togo, Chad and Central African Republic. In order to spread high-level mathematical skills, and to build and strengthen a pan-African network of scientists in Africa, AIMS hopes to eventually have trained significant numbers of students from almost all African countries.

The Postgraduate Diploma programme comprises three phases: the skills course, the review courses and the essay phase. The structure of the AIMS diploma programme was modified this year by adding the English Language and Communication Skills course to the first set of skills courses (Computing, Python programming and Mathematical Problem Solving).

## 2.2 Skills courses

The first semester is focused on providing the students with general skills in mathematical and physical problem solving as well as strengthening their computer skills, fluency in English and general communication skills. All of the skills courses are compulsory. The English teacher Anahita New taught General English and Scientific writing classes during this period.

| Lecturer(s) | Institution | Course Title |
|---|---|---|
| Jan Groenewald | AIMS | Computing Problem Solving |
| Anahita New | AIMS | English Essentials |
| Anahita New | AIMS | Communication Skills |
| Jesus Cerquides | Barcelona | Software Development using Python |
| Alan Beardon | Cambridge | Mathematical Problem Solving |
| David MacKay | Cambridge | Probability and Statistics |
| Alan Mafarlane | Cambridge | Mathematical Methods |
| David Aschman, Roger Fearick, and Andy Buffler | University of Cape Town | Physical Problem Solving |
| Bernd Schroers | Heriot Watt | Ordinary Differential Equations |
| Robert De Mello Koch and Jeff Murugan | Witwatersrand and Cape Town | Electromagnetics |

One of the students (Geomira Sanga) left the programme at the end of the skills courses for personal reasons, and will return to complete the programme in the next academic year.

## 2.3 Review courses

The review courses were presented from December 2006 to the 4th of April 2007. The students were allowed to make their own selection of a minimum of 9 courses. In this way, they could orientate their diploma towards physics, pure mathematics or applied mathematics. The courses and lecturers were as follows:

| Lecturer | Institu tion | Course Title |
|---|---|---|
| Gabriel Lord | Heriot Watt | Numerical Methods |
| Jeroen van den Brink | Leiden | Symmetry and Symmetry Breaking in Condensed Matter Systems |
| Liz Moyer and Irina Marinov | Harvard | Introduction to Climate Modelling |
| Ralf Wittenberg | Simon Fraser | Non-linear Dynamics |
| Barry Green | Stellenbosch | Topics in Computational Algebra and Applications |
| Tadashi Tokieda | Cambridge | Topology and Geometry |
| Ekkehard Kopp, Alet Roux | Hull Stellenbosch | Mathematical Methods in Modern Finance |
| Jan Govaerts | Universite Catholique de Louvain | A Pedestrian Introduction to Quantum Physics and Relativistic Quantum Field Theory |
| John Weiner | Toulouse | The Interaction of Light and Matter at the Atomic and Nano Scale |
| Vincent Rivasseau | Paris-Sud XI | Advanced Real and Complex Analysis |
| John Cardy | Oxford | Statistical Mechanics and Phase Transitions |
| Gareth Amery and Jim McKenzie | Kwazulu Natal | Fluid Dynamics in Astrophysics and Space |
| Patrick Dorey | Durham | Solitons |
| Kevin Burrage and Andre Weideman | Queensland, Stellenbosch | An Overview of Computational Biology |

## 2.4 Essay Phase

The third semester of the diploma programme is the essay phase. During this period the students prepare an essay on a topic of their choice. In the preceding months, AIMS calls for proposals for essay topics from a wide range of academics and institutions. Students then select a topic from an approved list. As can be seen from the list below, the chosen topics are very diverse and provide a wide sample of the many applications and specializations of mathematics. During this period, the students work closely with their supervisors and the AIMS tutors while the English teacher assists in honing their academic writing skills.

| STUDENT | ESSAY | SUPERVISOR |
|---|---|---|
| ABUELDAHAB, Sheima Mohammed Eldirdiri | Regularization of Ill-conditioned Linear Systems | Francis Benyah, UWC |
| ADAM, Buthaina Abdalla Suleiman | Monte Carlo Simulations of Co-60 Dose rates for an Industrial Irradiator | Kobus Slabbert, iTemba Labs |
| ADERA, Gashaw Bekele | Relativistic description of two-body scattering reactions | Brandon van der Ventel, SU |
| AHIATI, Veronica Sitsofe | Discrete time series analysis with ARMA processes | Tina Marquardt, Munich |
| AKINDEINDE, Saheed Ojo | The braid group | David Gay, UCT |
| ALFEDEEL, Alnadhief Hamed Ahmed | Emergent phenomena in analogue gravity | Jeff Murugan, UCT |
| ANDRIAMARO, Miangaly Gaelle | Implementation of option pricing algorithms under transaction costs | Alet Roux, SU |
| BANDA, Adson | Algebras over monads | George Janelidze, UCT |
| BOULKAIBET, Ilyes | Modelling Collaborative Motion in Mobile Ad-Hoc Networks | A.E. Krzesinski, SU |
| CHAMA, Abdoulkadri | Numerical implementation of Adomian decomposition method for Volterra integral equations of the second kind with weakly singular kernels | Shirley Abelman, Wits |
| ELAMIN, Dalal Salah Mohammed Ali | Applications of Random Graph Theory to the spread and the persistence of transmittable diseases | Carel Pretorius, SACEMA |
| GELAW, Balew Getahun | Construction of MRI images | Mark Swanepoel, iTemba Labs |
| JONAH, Emmanuel Ohieku | Modelling Electrical Conductivity in Cluster Networks | D.T. Britton, UCT |
| KAJOTONI, Margaret Modupe | Operators on Hilbert spaces | S. Mouton, SU |
| KAJUNGURI, Damian | Branching processes, extinction probabilities with application to pest eradication | John Hargrov, SACEMA |
| KALALA MUTOMBO, Franck | LLM Geometries, Fermions and the Gauge Theory/Gravity Correspondence | Robert de Mello Koch, Wits |
| KARAMBAL, Issa | On Cardinal Spline Wavelet Decomposition | Johan de Villiers, SU |
| KHABIR,Mohmed Hassan Mohmed | Solving Oscillatory Singular Perturbation Problems via Adaptive Spline Methods | Kailash C. Patidar, UWC |
| KIMBA PHONGI, Eddy | Route Optimisation in Mobile Ad Hoc Networks | A.E. Krzesinski, SU |
| KPANZOU, Tchilabalo Abozou | Copulas in Statistics | T. de Wet, SU |
| LOUFOUMA MAKALA, Narcisse Roland | Metrizability of topological spaces | Hans-Peter Kunzi, UCT |
| MABIALA,Justin | A study of the theoretical formulation and calculations for the12C(p,pa)8Be reaction at an incident energy of 100 MeV | Greg Hillhouse/ A.A. Cowley, SU |
| MAHLANGU, Alfred Tswinyane | Levy Processes in Finance | Diane Wilcox, UCT |
| MELESSE, Dessalegn Yizengaw | GrA¶bner Bases and an improvement on Buchberges algorithm. | Cornelia Naude, SU |
| MOHAMED, Hisham Anwer Saleh | The light-and-button puzzle and the parity dimension | Stephan Wagner, SU |
| MONTSHIWA, Mosimanegape Irvin | Leslie Matrix population models | David Sherwell, Wits |
| MUSONDA, Ededias | Dynamics of viscous and heat-conducting fluids | Azwinndini Muronga, UCT |
| NARTEY, Samuel | Automatic Geometric Theorem Proving: An application of Groebner Bases | Barry Green, SU |
| NOURAIN, Sarrah Mirghani Billal | Gamma-ray tracking | Simon Mullins, Itemba Labs |
| NWOSU, Victoria Onyeka | Second harmonic generation | E.G. Rohwer, SU |
| OKONKWO, Joy Ukamaka | The origins of model checking | Jaco Geldenhuys, SU |
| OKYERE, Eric | Deterministic compartmental models for HIV and TB | John Hargrov, SACEMA |
| OLATAYO, Lois | Automatic Geometric Theorem Proving: An application of Groebner Bases | Barry Gree, SU |
| OMAGHALI, Ndubuisi Emmanuel Jude | Four wave mixing | E.G. Rohwer, SU |
| POUGAZA Doriano-Boris | The Lotka Integral equation as a stable population model. | David Sherwell, Wits |
| RABARISON, Andrianarivo Fabien | Partial metrics | Hans-Peter Kunzi, UCT |
| RALAIVAOSAONA Dimbinaina | The Prime Number Theorem | Florian Breuer, SU |
| RAMARIMBAHOAKA, Dimbinirina RANARIBOANA, Hajanirina | Option Valuation using the Fourier Transform Methods | Diane Wilcox, UCT |
| Natacha | Automatic Geometric Theorem Proving: An application of Groebner Bases | Barry Green, SU |
| SALI, Wolobah B | Geophysics Exploration using Gravity Gradients | Robert de Mello Koch, Wits |
| SOLANA, Oluwole David | Ultra fast pulses | E.G. Rohwer, SU |
| SSEBULIBA, Joseph | Diffusion processes in biology with special reference to insect dispersal | John Hargrove, SACEMA |
| SUNZU, Jefta Mvukaye | American Options and Optimal Stopping Problems | Nadia Uys, Wits |
| TAKAM TAKOUGANG, Eric-Martial | What happens with all that CO2 The role of the ocean in climate and in the global carbon cycle | Irina Marinov, MIT |
| TAMBUE, Antoine | Monte Carlo and the American Put | David Taylor, Wits |
| TCHOUKOUEGNO NGNOTCHOUYE, Jean Medard | A pattern search algorithm for non-linearly constrained global optimization problems | Montaz Ali, Wits |
| URGESSA, Zelalem Nigussa | Molecular dynamics simulation of a polymer chain | Kristian Muller-Nedebock, SU |
| ZAFACK TAKADONG, Thibaut | Introduction to Stochastic Portfolio Theory | Raouf Ghomrasni, Wits |

## 2.5 Assessment and Oral Examination

Throughout the skill and review courses, students are assessed on a continuous basis by completing assignments marked by the lecturers and tutors. The essays are assessed by means of an oral examination before a panel consisting of: an external examiner, the student's tutor and the Director of the Institute. A final assessment is then made of the student, taking the full performance throughout the year into account.

# 3 Extra curricular activities

## 3.1 Conferences

Students attended many of the conferences, short courses and seminars hosted or co-organised by AIMS (see Collaborations below) as well as the EBASI Conference on Physics and Technology for Sustainable Development (24th to the 26th of January 2007).

Excursions were made on a regular basis to provide the students with exposure to South African scientific and technological developments as well as the history, culture and scenic beauty of their host country.

Excursions included visits to: Cape Point , iTemba LABS, Stellenbosch University's Africa Day, the South African Large Telescope (SALT) in Sutherland, Saldanha Steel Industries and Koeberg Nuclear Power Station, and the Robben Island Museum.

In the week before their graduation, 34 students were taken on a study tour to the Eastern Cape. The tour introduced the students and AIMS to the three universities of the Eastern Cape. Visits were made to the mathematics and physics departments of Rhodes, Fort Hare and Nelson Mandela Metropolitan Universities.

## 3.2 Graduation

The graduation ceremony for the Diploma students took place at AIMS on the 23rd June 2007. The diplomas were conferred on the students by the Vice Chancellors of the three local universities: Prof Russell Botman (Stellenbosch), Prof Brian O'Connell (University of the Western Cape) and Prof Njabulo Ndebele (University of Cape Town). The main speaker and guest of honour was Duncan Hindle, Director General of the South African Department of Education.

# 4 Post AIMS study

Many students who graduate from AIMS would like to complete a Master's degree but require financial assistance to do so. AIMS has been able to raise funding for half-bursary support for study at one of the South African Universities. Many of the students expand their AIMS essay into a Masters thesis under the same supervisor. This year 26 half-bursaries have been awarded with funding for the female students coming from Arcadia and funding for the male students from the Ford Foundation, SAAB and the Isle of Man Overseas Aid Committee. The table below lists the students who have received bursaries from AIMS and the institutions at which they are registered.

| Degree | Institution | Male | Female |
|---|---|---|---|
| Masters | Stellenbosch | Gashaw Adhera | Veronica Sitsofe Ahiati |
| | | Damian Kajunguri | Miangaly Gaelle Andriamaro |
| | | Tchilabalo Kpanzou | Victoria Onyeka Nwosu |
| | | Justin Mabiala | Dimbinirina Ramarimbahoaka |
| | | Andrianarivo Fabien Rabarison | |
| | | Joseph Ssebuliba | |
| | | Zelalem Nigussa Urgessa | |
| Masters | University of Kwazulu Natal | Abdoulkadri Chama | Margaret Kajotoni |
| | | Issa Karambal | |
| | | Eddy Kimba Phongi | |
| | | Narcisse Roland Loufoma Makala | |
| | | Ededias Musonda | |
| | | Jefta Sunzu | |
| | University of Cape Town | Alnadief Alfedeel | Buthaina Adam |
| | | Emmanuel Ohieku Jonah | Sarrah Nourain |
| | | Oluwole David Solana | |
| | University of Witwatersrand | Wolobah Sali | |
| | | Thibaut Zafack Takadong | |
| PhD | University of Kwazulu Natal | Jean Medard Tchoukouegno Ngnotchouye | |


AIMS

The following two tables show the current occupation of the 2006/7 and 2005/6 AIMS graduates. Their record of success in finding excellent placements after AIMS is remarkable.

## 4.1 AIMS Students 2005 / 06

| Surname, first name(s) | Country | University/ Workplace | Degree/ position |
|---|---|---|---|
| ABDELWAHAB, Mohamed Elshazli Sirelakhatim | Sudan | University of Cape Town | Masters |
| ABIODUN, Isaac Olukunle | Nigeria | Erasmus Masters in Spain | Masters |
| ABUBAKER, Eman Mohamed Nasr | Sudan | Lecturing in Sudan | Lecturer |
| ADESOKAN, Bolaji James | Nigeria | Erasmus Masters in Germany | Masters |
| AHMED, Hind Ali Mohmmed | Sudan | University of Cape Town | Masters |
| BASHEER, Ayoub Basheer Mohammed | Sudan | University of KwaZulu-Natal | Masters |
| CHONGO, Ambrose Chomba | Zambia | University of Cambridge | Part 3 Maths |
| EWAKE, Sorel Platini | Congo | University of Stellenbosch | Masters |
| FAREO, Adewunmi Gideon | Nigeria | University of the Witwatersrand | Masters |
| HOVE, Herbert | Zimbabwe | University of the Witwatersrand | Masters |
| KABUDULA, Chodziwadziwa Whiteson | Malawi | University of the Western Cape | Masters |
| KENGNI NCHEUGUIM, Emmanuel | Cameroon | Studying in New Mexico, US | PhD |
| MAHMOUD, Maissoun Abdalla Khalil | Sudan | University of Cape Town | Masters |
| MARIJANI, Theresia | Tanzania | University of Stellenbosch | Masters |
| MATANGI, Evidence Simbarashe | Zimbabwe | Masters in Zimbabwe | Masters |
| MATLI, Matlotlo Justice | Lesotho | Masters in Leeds, UK | Masters |
| MBAH, Henry Osita | Nigeria | New York, US | Planning to take MBA |
| MBIANDA NJENCHEU, Georgie | Cameroon | University of the Witwatersrand | Masters |
| MKANGO, Sara Beatus | Tanzania | University of Cape Town | Masters |
| MOGALE, Kobodi Coffart | South Africa | University of Stellenbosch | Masters |
| MOHAMED, Adam | Comores | University of Stellenbosch | Masters |
| MORETLO, Thabo Sylvester | South Africa | Planning to do Masters at UCT | Masters |
| MUAMBA MUKANYA, Felicien Jeje | DR Congo | University of Stellenbosch | Masters |
| MUZUNDU, Kelvin | Zambia | University of Stellenbosch | Masters |
| NAZIGA, Emmanuel Baribefe | Nigeria | UWC | Masters |
| NZUZI MBENZA, Lucien | DR Congo | University of Kwazulu-Natal | Masters |
| ODEGBILE, Olufemi Olusola | Nigeria | Erasmus Masters in Italy | Masters |
| OKEKE, Onyekwelu Uzodinma | Nigeria | University of the Witwatersrand | Masters |
| PHOOLO, Mokhantso Maria | Lesotho | University of KwaZulu-Natal | Masters |
| RAKOTONIAINA, Tahina | Madagascar | University of Stellenbosch | Masters |
| RAVELOMANANTSOA-RATSIMIHAH, Joel | Madagascar | University of Cape Town | Masters |
| SINGO, Thifhelimbilu Daphney | South Africa | University of Cape Town | Masters |
| TAHA, Mohamed Ahmed Mohamed Saeed | Sudan | University of Stellenbosch | Masters |
| TALLA NOBIBON, Fabrice | Cameroon | K.U.Leuven (Belgium) | Masters |
| TCHITEMBO GOMA, Franck Armel | Congo | University of the Witwatersrand | Masters |
| TCHOUALAG, Laurent | Cameroon | University of Cape Town | Masters |
| TEDLLA, Biniam Zerai | Ethiopia | Erasmus Masters in Germany | Masters |
| UNWUCHOLA, Attah Doomnull | Nigeria | University of the Witwatersrand | Masters |
| WAKWINJI, Inambao | Zambia | University of Cape Town | Masters |
| YENWONG, FAI, Alfred Sevidzem | Cameroon | University of the Witwatersrand | Masters |

## 4.2 AIMS Students 2006 / 07

| Surname, first name(s) | Country | University/ Workplace | Degree/ position |
|---|---|---|---|
| Abueldahab Sheima Mohammed Eldirdiri | Sudan | Khartoum University | Lecturer |
| Adam Buthaina Abdalla Suleiman | Sudan | UCT | Masters |
| Adera Gashaw Bekele | Ethiopia | Stellenbosch University | Masters |
| Ahiat Veronica Sitsofe | Ghana | Stellenbosch University | Masters |
| Akindeinde Saheed Ojo | Nigeria | Masters in Europe | Masters |
| Alfedeel Alnadhief Hamed Ahmed | Sudan | UCT | Masters |
| Andriamaro Miangaly Gaelle | Madagascar | Stellenbosch University | Masters |
| Banda Adson | Zambia | UKZN | Masters |
| Boulkaibet Ilyes | Algeria | Stellenbosch University | Masters |
| Chama Abdoulkadri | Niger | UKZN | Masters |
| Elamin Dalal Salah Mohammed Ali | Sudan | Computer company in Sudan | Employed |
| Gelaw Balew Getahun | Ethiopia | UCT | Masters |
| Jonah Emmanuel Ohieku | Nigeria | UCT | Masters |
| Kajotoni Margaret Modupe | Nigeria | UKZN | Masters |
| Kajunguri Damian | Uganda | Stellenbosch University | Masters |
| Kalala Mutombo Franck | DR Congo | University of Paris-Sud, Paris 11 Orsay | Masters |
| Karambal Issa | Chad | UKZN | Masters |
| Khabir Mohmed Hassan | Sudan | Khartoum University | Lecturer |
| Kimba Phongi Eddy | DRC | UKZN | Masters |
| Kpanzou Tchilabalo Abozou | Togo | Stellenbosch University | Masters |
| Loufouma Makala Narcisse Roland | Congo | UKZN | Masters |
| Mabiala Justin | Congo | Stellenbosch University | Masters |
| Mahlangu Alfred Tswinyane | SA | Computer Programme in UCT | Masters |
| Melesse Dessalegn Yizengaw | Ethiopia | Masters in Europe | Masters |
| Mohamed Hisham Anwer Saleh | Egypt | Cambridge | Part 3 Maths |
| Mosimanegape Irvin Montshiwa | SA | Online marketing, will start MBA | Employed |
| Musonda Ededias | Zambia | UKZN | Masters |
| Nartey Samuel | Ghana | Cambridge | Part 3 Maths |
| Nourain Sarrah Mirghani Billal | Sudan | Accepted for Masters at UCT | Masters |
| Nwosu Victoria Onyeka | Nigeria | Stellenbosch University | Masters |
| Okonkwo Joy Ukamaka | Nigeria | Europe | Masters |
| Okyere Eric | Ghana | University of Eindhoven | Masters |
| Olatayo Lois | Nigeria | Masters in Europe | Masters |
| Omaghali Ndubuisi Emmanuel Jude | Nigeria | Masters in Europe | Masters |
| Pougaza Doriano-Boris | CAR | University of Cergy Pontier Paris 6 | Masters |
| Rabarison Andrianarivo Fabien | Madagascar | Stellenbosch University | Masters |
| Ralaivaosaona Dimbinaina | Madagascar | Cambridge | Part 3 Maths |
| Ramarimbahoaka Dimbinirina | Madagascar | Stellenbosch University | Masters |
| Ranariboana Hajanirina Natacha | Madagascar | Strathclyde University | PhD |
| Sali Wolobah | Liberia | Wits | Masters |
| Solana Oluwole David | Nigeria | UCT | Masters |
| Ssebuliba Joseph | Uganda | Stellenbosch University | Masters |
| Sunzu Jefta | Tanzania | UKZN | Masters |
| Takam Takougang Eric-Martial | Cameroon | Simon Fraser University, Canada | PhD |
| Tambue Antoine | Cameroon | University of Edinburgh | PhD |
| Tchoukouegno Ngnotchouye Jean Medard | Cameroon | UKZN | PhD |
| Urgessa Zelalem Nigussa | Ethiopia | Stellenbosch University | Masters |
| Zafack Takadong Thibaut | Cameroon | Wits | Masters |

## 4.3 Integration with SA Universities and Industry

Very few applications were received for the Advanced Mathematical Sciences Programme (AMSP), an honours-level pre-AIMS course, this year. The few enrollments meant that the course would not be cost effective and it was decided to suspend the programme until enrollment figures improved.

To address the need to attract South African students, AIMS collaborated with SACEMA to host a special course on Mathematics in the Biological sciences to which 3rd year, Honours and Masters level South African students were invited. Many participants at the course expressed strong interest in the AMSP course for 2008, and it is likely that sufficient applications will be received to run the course next year. Honours level students also indicated that they would like to study at AIMS, but a separate diploma course was not attractive to them. They requested that the AIMS course be fully integrated into a Masters course which would run over two years. Efforts are currently underway to better integrate the AIMS programme with Masters programmes currently offered in South African Universities, to allow the students to progress to a Masters degree as efficiently as possible while remaining in Africa.

In order to reach more South African students AIMS has also begun to approach South African Industry with a view to developing programmes which accommodate the needs of industry. A consultant has been appointed to take these initiatives further.

## 4.4 Research Programme

Two researchers visited AIMS during this academic year. These visits were funded through a grant from the Ford Foundation.

Mr John Mulindwa Kitayimbwa from Makerere University, Kampala, Uganda visited AIMS during the month of January 2007. As a result of his experience at AIMS, he applied, and has been accepted, for a Masters in Computational Biology at the University of Cambridge. He is also actively involved in the plans to develop an AMI-Net Node at Makerere.

Dr Olufemi Adeyinka Adesina from the Department of Mathematics, Obafemi Awolowo University, Ife-Ife, Nigeria visited AIMS during March and April 2007. His research focused on qualitative behaviour of solutions of ordinary delay differential equations that are non-linear.

Research fellow Angelina Lutambi (a 2004/5 AIMS graduate) completed her Masters degree on the properties of models for populations with HIV/AIDS through the University of Stellenbosch in March this year. She graduated with a distinction. Her research was funded through a grant from Vodacom. During the year, Angelina participated in a number of conferences and exhibitions.

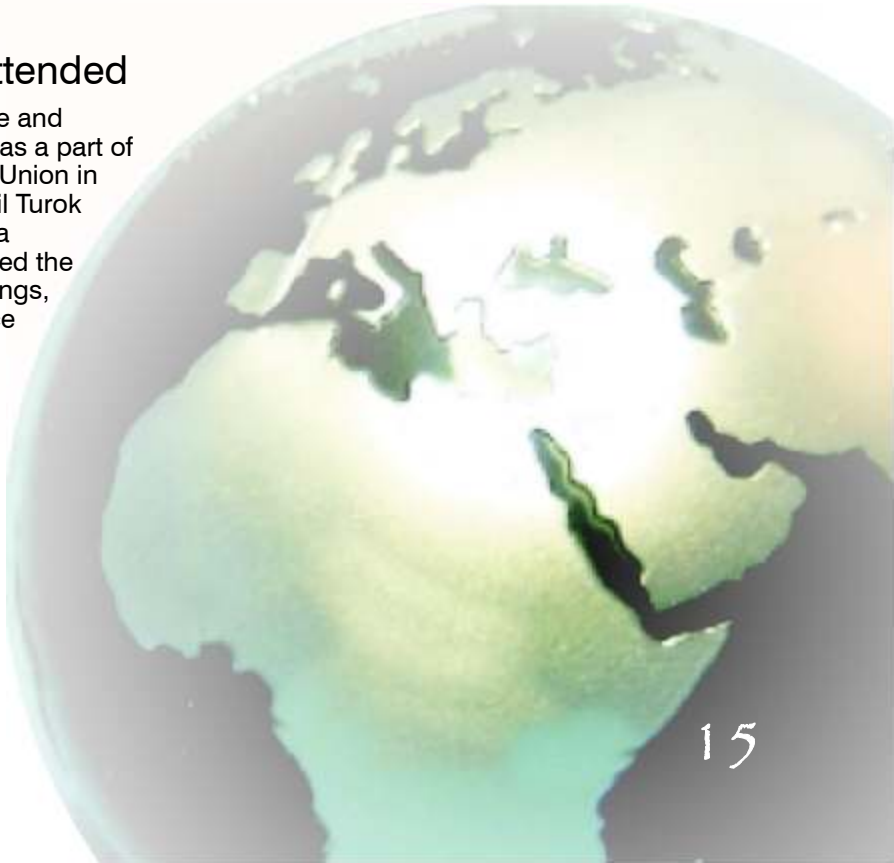
AIMS is currently finalising plans for a Pan-African Research Centre of Excellence. The establishment of this centre is likely to go ahead in April 2008. (For more on this development see future plans).

# 5 Networking

## 5. 1 Meetings and exhibitions attended

AIMS was invited by the NEPAD Science and Technology Office to present an exhibit as a part of their stand at the Summit of the African Union in Addis Ababa, in January 2007. Prof. Neil Turok and two former AIMS students (Angelina Lutambi and Nneoma Ogbonna) attended the Summit exhibition and many side meetings, focussed on the development of Science and Technology in Africa.

On the 25th of May 2007, AIMS participated in an exhibit in parliament on the occasion of the Department of Science and Technology's Budget Vote. AIMS staff and former and current students attended the exhibition and spoke to interested members of parliament and to the public in general about the work of AIMS.



## 5.2 Academic visits in Africa

These visits form part of the programme of capacity building at African universities. During Professor Jan Govaerts's stay in South Africa, AIMS funded his flight to Kinshasa where he presented lectures at the university there and mentored a PhD student.

Professor Vincent Rivasseau who lectured one of the review courses at AIMS, visited Benin where he lectured at the Institute in Cotonou.

## 5.3 Visitors

Visitors to AIMS during the past year included:

The South African Minister of Education, Naledi Pandor
Professor Luboobi, VC, Makerere University
Professor Valentin Gorenko, University of the Witwatersrand
Group of Deans from Universities in Malawi, Botswana, Uganda and Tanzania
Professor Laurent Lafforgue, 2002 Fields Prize Medalist Professor Laurent Lafforgue
Stephen Bourne, CEO of Cambridge University Press
Mr Sibusizo Manzini, Anati Canca and Dr Bethual Sehlapelo, Department of Science and Technology
Mr Mohamed Jaoua, INRIA
Prof Samuel Elmaleh, Attache for Science & Technology, Embassy of France in South Africa
Desmond Smith, businessman
Jussi Westergren, Chairman, Inhibox and the Atlas Foundation
Dr Zeblon Vilikazi, Ithemba Labs
Prof Jean Lubuma, University of Pretoria
The British High Commissioner, Paul Boateng
Donald Millwood and Victor Madiba, Chairman's Fund, Anglo American

# 6 AIMS Collaborations

## 6.1 Short courses

A short course entitled “Advanced Study Institute on Mathematical Modeling of Infectious Diseases in Africa” was held at AIMS from 11th to the 22nd of June 2007. This course was co-hosted by SACEMA, DIMACS and AIMS.

Mathematics in the Biological Sciences, 9th to the 13th of July 2007: this short course for South African students in their third or honours year in mathematics was a collaborative effort of AIMS and SACEMA.

The AIMS workshop on Volunteer Computing for Africa introduced participants to state-of-the-art open source software technologies behind distributed computing and cyber-volunteerism on the Internet. This short course was held at AIMS from 16th to the 22nd of July 2007 (see more under ICT, Workshops).

A CIMPA-UNESCO-SOUTH AFRICA School entitled “Multiple Scales Problems in Biomathematics, Mechanics, Physics and Numerics” was held at AIMS from the 6th to the 18th of August 2007.

## 6.2 Conferences, Seminars and Symposiums

A conference entitled TB and HIV Diseases and Epidemiological Modelling was co-hosted by AIMS, SACEMA and Ghent University, Belgium from 6th to the 8th of November 2006. 15 of the AIMS diploma students and 3 former AIMS students attended the conference.

The following seminars took place at AIMS and were attended by former and current AIMS students as well as other visitors.

| | |
|---|---|
| 7 December 2006 | David Gay, University of Cape Town<br>“The Projective Plane, Boy's surface, Everting the Sphere” (Part 1). |
| 11 December 2006 | Rob Kirby from University of California Berkeley<br>“ The Projective Plane, Boy's Surface, Everting the Sphere" (Part 2). |
| 13 December 2006 | Prof. Ben Turok, Economist<br>"The Economic Revival on Southern Africa”. |
| 14 December 2006 | Ruth M. Williams, University of Cambridge<br>"Building blocks for space and time.”. |
| 18 December 2006 | Jan Saxl, University of Cambridge<br>“Group, codes and graphs”. |
| 19 December 2006 | Mark Tadross, University of Cape Town<br>“Climate modelling”. |
| 14 February 2007 | Jan Govaerts, Catholic University of Louvain<br>“The problem of Mass”. |
| 19 April 2007 | Alet Roux, Tina Marquardt, Alon Cohen<br>“Second Mini-Symposium on Mathematical Finance”. |

# 7 African Mathematical Institutes Network (AMI-Net)

Work on the African Mathematical Institutes Network (AMI-Net) gained momentum during this year. AMI-Net was initially conceived at a meeting of AIMS and its partners across Africa in April 2004. It was formally established in October 2005. AMI-Net is governed by a Council, consisting of members from each of Africa's five major regions, as generally defined by the African Union (Southern Africa, East Africa, West Africa, Central Africa, and Northern Africa). AMI-Net is fully supported by NEPAD and the African Union and has been adopted as one of the five flagship platforms in their continent wide 'Action Plan for Science & Technology'. AIMS was asked to act as the Secretariat for AMI-Net handling all the operational aspects.

The mission of AMI-Net is to build a network of strong mathematical sciences institutes. It is envisaged that up to 15 Nodes will operate in partnership to build excellent teaching programmes and research collaborations across Africa. During the first half of 2007, the work of the AMI-Net Secretariat has been to start identifying the most promising centres across Africa for inclusion and possible upgrading into AMI-Net Nodes. Each Node will have a pan-African dimension and will serve a substantial local region (typically the whole country in which the Node is located, plus several neighbouring countries).

To begin the process of selecting the first group of Nodes, a call for pre-proposals was communicated via the NEPAD S&T website and via the AIMS Newsletter and Announcements. Contacts in all countries were alerted to the call and advised of the links to the website. Pre-proposals were to be submitted according to the specified format. The closing date for submissions was extended to the 30th of September in order to accommodate those applicants who had experienced difficulties accessing the information. In total, 15 pre-proposals were received, from 12 countries: Benin, Nigeria, Sudan, Senegal, Ethiopia, Uganda, Tanzania, Botswana, Ghana, Morocco, Malawi, and Madagascar.

All the proposals were subjected to a preliminary assessment process by the AMI-Net Secretariat. The main criteria used were: existing capacity within participating institutions in the selected area/research focus; potential for growth; and suitability of host institution and other partners. The proposals indicated a high level of enthusiasm for the AMI-Net concept, but many required further exploration and discussion. Feedback was provided to each applicant and a series of site visits were planned.

Site visits to six countries have taken place:

| Dates | Country | Host Institution |
|---|---|---|
| 7 - 8 December 2006 | Uganda | Makerere University |
| 10 - 11 December 2006 | Sudan | University of Khartoum |
| 10 - 11 January 2007 | Ghana | Institute of Mathematical Sciences |
| 13 - 14 January 2007 | Benin | 1. Institut de Mathematique et de Sciences Physiques (IMSP)<br>2. International Chair in Mathematical Physics and Applications (ICMPA) |
| 28 January 2007 | Ethiopia | Addis Ababa University |
| 26 - 27 March 2007 | Madagascar | University of Antananarivo |

Significant progress has been made in developing the Node proposals, and the applicants are now developing their detailed business plans. The AMI-Net Secretariat will make a recommendation to the AMI-Net Council for the final selection of the first group of Nodes, taking into consideration information gathered from site visits and the additional information provided in the business plans.

# 8 African Institute for Mathematical Sciences Schools Enrichment Centre (AIMSSEC)

The focus of AIMSSEC is outreach to schools, support for mathematics teaching and learning, curriculum development and research in mathematics education. All of this work has so far has been done by unpaid volunteers. Funding is now being sought to appoint a South African Director and staff to enable the expansion of AIMSSEC's activities.

To date AIMSSEC has run seven 10-day residential professional development courses followed by three months distance learning for a total of 285 teachers and subject advisers: (94 from the W. Cape, 86 from E.Cape, 50 from KZN, 34 from Limpopo, 9 from Gauteng, 5 from Mpumalanga, 4 from NW Province and 4 from the Free State). There is a long waiting list for this highly popular course.

AIMSSEC, in partnership with the University of Stellenbosch and the Mathematics Centre for Professional Teachers, is setting up a two year part time e-learning professional development course to train subject leaders in mathematics. The Chair of AIMSSEC, Toni Beardon, reports that there is a large international group of experienced teacher trainers who will teach with her on these residential courses and work collaboratively with the University of Stellenbosch in developing the new course. A selected group of educators will be enrolled for the new course which is designed as a continuation of the established AIMSSEC 3 month course. There will be a further residential course in the second year taught by visiting lecturers from all over the world. Teachers will also attend course sessions at one of the Stellenbosch University Interactive Telematic classrooms - a network which extends across South Africa.

The website www.aims.ac.za/aimssec offers a problems page, details of AIMSSEC courses and events and askAIMS, an Online Forum for mathematical discussions and answering questions from learners and teachers.

Merilyn Buchanan from the University of California is seen here discussing a problem from the website at an AIMSSEC course.

In a series of six practical AIMSSEC masterclasses on Statistics, video-linked to schools in the UK, Grade 8 and 9 learners from Heathfield, Malibu, Sithembele Matiso, Thandokhulu and Mondale High Schools exchanged data with their UK 'twin schools' relating to their own experiences, their local areas and their countries. The lessons were designed to be cross curricular and the students learnt how to collect, analyse and present data and how to interpret statistical data from books, newspapers and the internet. The calculation of lengths of flight paths for international air-routes was the subject of another series of interactive video-linked masterclasses involving Grade 11 learners from the Cape Academy of Mathematics Science and Technology, the Centre of Science and Technology, and Fairmount and Steenberg High Schools.

AIMSSEC continues to support local schools with workshops for teachers and learners. Some AIMS students and graduates have acted as volunteer tutors in the township schools. AIMSSEC is seeking funding to expand this programme following schemes elsewhere which have proved very successful in raising aspirations and attainment of young learners.

## 8.1 Sponsors of AIMSSEC:

Cambridge Colleges:
Churchill, Clare, Clare Hall, Girton, King's, Sidney Sussex, St John's, Trinity and Trinity Hall.

Oxford Colleges:
All Souls, Balliol, Christ Church, Exeter, Jesus, Nuffield, Oriel, St Hugh's, St John's and Wolfson.

The Millennium Mathematics Project, University of Cambridge.

The University of Cambridge Local Examinations Syndicate.

The Victor Rothschild Memorial Fund.

Private donations: P R Ledger
S M Precious
D E Townsend.

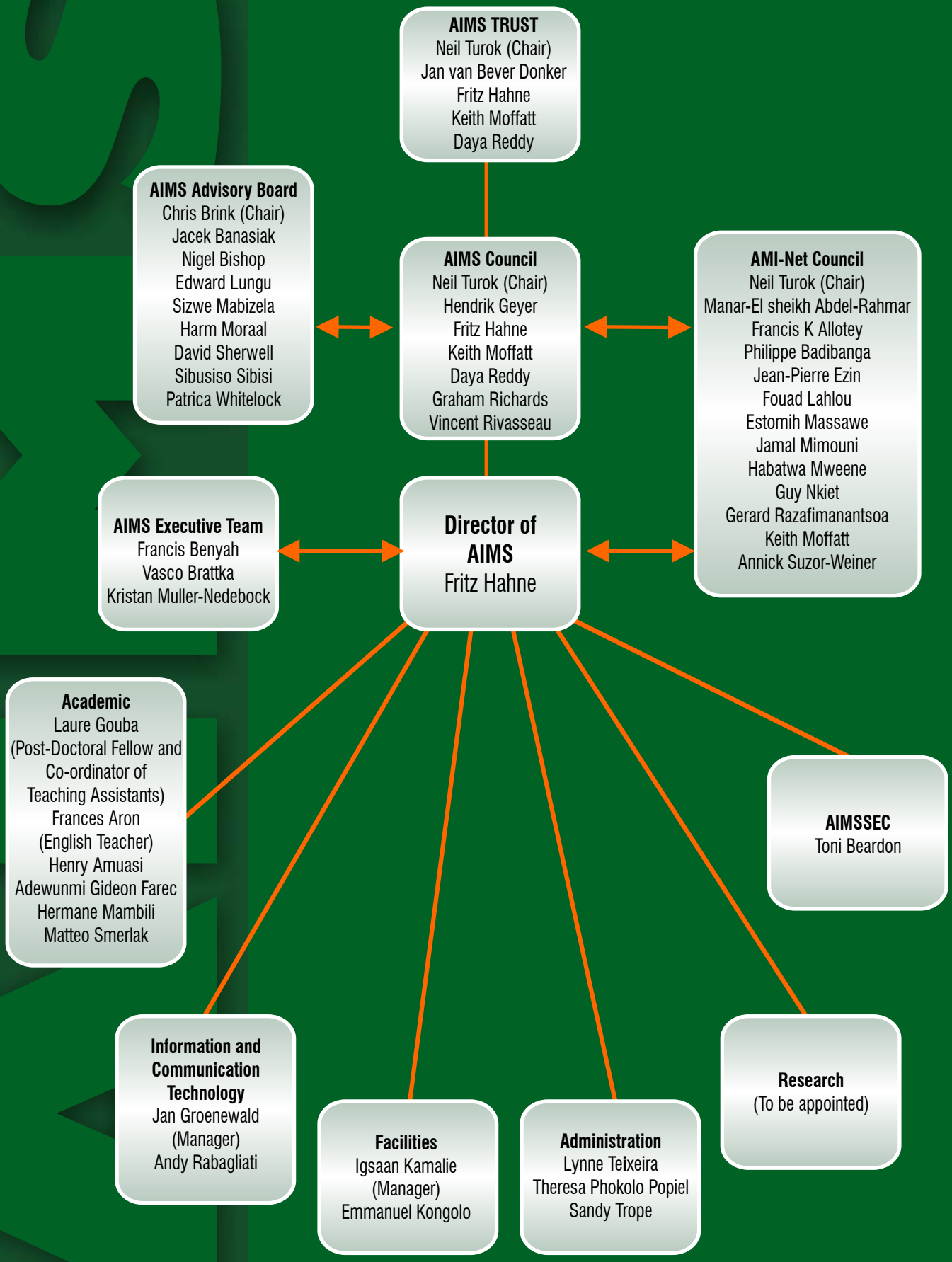
# 9 AIMS Governance and Infrastructure

## 9.1 The AIMS Council

The AIMS Council meets once a year to discuss and review academic progress, the financial statements and projected budget. The council last met in January 2007. It includes representatives of the six participating universities. The current members are: Jan van Bever Donker (University of the Western Cape), Hendrik Geyer (Stellenbosch University), Daya Reddy (University of Cape Town), Keith Moffatt (University of Cambridge), Graham Richards (Oxford University), Vincent Rivasseau (Universite de Paris Sud XI), Neil Turok, Chair (University of Cambridge) and Fritz Hahne (Director of AIMS).

The following council members are also Trustees of the AIMS Trust, a registered charitable trust: Jan van Bever Donker, Neil Turok, Fritz Hahne, Daya Reddy, and Keith Moffatt.

# Governance


AIMS TRUST
Neil Turok (Chair)
Jan van Bever Donker
Fritz Hahne
Keith Moffatt
Daya Reddy
AIMS Advisory Board
Chris Brink (Chair)
Jacek Banasiak
Nigel Bishop
Edward Lungu
Sizwe Mabizela
Harm Moraal
David Sherwell
Sibusiso Sibisi
Patrica Whitelock
AIMS Council
Neil Turok (Chair)
Hendrik Geyer
Fritz Hahne
Keith Moffatt
Daya Reddy
Graham Richards
Vincent Rivasseau
AMI-Net Council
Neil Turok (Chair)
Manar-El sheikh Abdel-Rahmar
Francis K Allotey
Philippe Badibanga
Jean-Pierre Ezin
Fouad Lahlou
Estomih Massawe
Jamal Mimouni
Habatwa Mweene
Guy Nkiet
Gerard Razafimanantsoa
Keith Moffatt
Annick Suzor-Weiner
AIMS Executive Team
Francis Benyah
Vasco Brattka
Kristan Muller-Nedebock
Director of AIMS
Fritz Hahne
Academic
Laure Gouba
(Post-Doctoral Fellow and Co-ordinator of Teaching Assistants)
Frances Aron
(English Teacher)
Henry Amuasi
Adewunmi Gideon Farec
Hermane Mambili
Matteo Smerlak
AIMSSEC
Toni Beardon
Information and Communication Technology
Jan Groenewald
(Manager)
Andy Rabagliati
Facilities
Igsaan Kamalie
(Manager)
Emmanuel Kongolo
Administration
Lynne Teixeira
Theresa Phokolo Popiel
Sandy Trope
Research
(To be appointed)

## 9.2 The Advisory Board

The AIMS Advisory Board advises on all academic aspects of the AIMS programme, particularly its integration with existing courses and research projects in South African and other African universities. Many of the members are active in the academic programme of the Institute. The current members are:

Chris Brink, University of Stellenbosch
Jacek Banasiak, University of Kwazulu Natal
Nigel Bishop, University of South Africa
Barry Green, University of Stellenbosch
Edward Lungu, University of Botswana
Siswe Mabizela, Rhodes University
Harm Moraal, Northwest University
David Sherwell, University of the Witwatersrand
Sibusiso Sibisi, Council for Scientific and Industrial Research, SA
Patricia Whitelock, South African Astronomical Observatory

## 9.3 The AIMS Executive Team

The AIMS executive team is chaired by the institutes's director Prof. Fritz Hahne and meets regularly to facilitate the relationship between AIMS and the three local universities. Members also assist with the selection of students for the Potsgraduate Diploma programme each year. The members currently are:

Professor Francis Benyah (University of the Western Cape)
Professor Kristian Muller-Nedebock, (University of Stellenbosch)
Professor Vasco Brattka, (University of Cape Town).

## 9.4 Staff

The AIMS staff complement was expanded this year with the appointment three new employees. Andy Rabagliati was employed as system administrator, focussing on creating an enabling computer environment for AMI-Net.

Lynne Teixeira joined Mirjam Miske in Administration in September 2006, and took over her duties when Mirjam resigned in March 2007. Theresa Phokolo Popiel was employed from November 2006 to assist with administration and reception.

Professor Fritz Hahne continued as Director of the Institute, Jan Groenewald as the Information Technology Manager, Igsaan Kamalie as Facility Manager and Emmanuel Kongolo as Assistant to the Facility Manager.

## 9.5 Tutors

Seven tutors assisted during this academic year. They were Laure Gouba (former AIMS research fellow from Burkina Faso), Sam Webster (United Kingdom), Henry Amuasi (former AIMS student from Ghana), Paul Razafimandimby (Madagascar), Jean-Marie Mirebeau (France), Christian Rivasseau (France) and Eman Nasr Mohamed Abubaker (former AIMS student from Sudan).

## 9.6 Facilities

The main building of the Institute (Melrose Rd) continues to be utilised at full capacity. In order to implement plans for the research centre of excellence, expansion of the current lecture hall, library and computer laboratories will be necessary.

Discussions are underway to purchase one or more of the neighbouring properties in Melrose Road, and significant funds have already been raised to be used for this purpose (see future plans).

Renovation of one of the flats in the Watson Rd building was completed this year and all four flats are now being used as accommodation for visiting lecturers and tutors.

## 9.7 ICT

Software

AIMS stays committed to Free and Open Source software as part of its commitment to build capacity to support African initiatives in technology. The Ubuntu Linux (http://www.ubuntulinux.org) software allows alumni to easily acquire user skills and the software itself at no additional cost.

AIMS is expanding the teaching of the popular programming language Python as a base skill in modelling and as a front end to various Free Software scientific tools. It allows for exceptionally clean and fast development and is a good tool for teaching as well. Visiting lecturers are also introduced to Python. We provide the latest stable packaged version of the scipy library on all desktops.

Other software include:

+ koctave (http://athlone.ath.cx/~matti/kde/koctave/a Matlab clone)
+ wxMaxima (http://wxmaxima.sourceforge.net/wiki/index.php/Main_Page General Algebraic Computation)
+ Singular (http://www.singular.uni-kl.de/ Polynomial Computation and Algebraic Geometry)
+ GAP (http://www.gap-system.org/ Group Theory)
+ Pari-GP (http://pari.math.u-bordeaux.fr/ Number Theory)
+ XPPAUT (http://www.math.pitt.edu/~bard/xpp/xpp.html ODE solver)
+ Freefem++ (http://www.freefem.org/ff++/ PDE solver)
+ Gnuplot (http://www.gnuplot.info/), Mayavi (http://mayavi.sourceforge.net/), and Matplotlib (http://matplotlib.sourceforge.net/), (visualization)
+ R-Project (http://www.r-project.org/ statistics)
+ SAGE (http://www.sagemath.org/ a python front end to many of the above tools)
+ C, C++, Fortran, Pascal, Java compilers and libraries (http://gcc.gnu.org/)
+ Kile and LaTeX (http://kile.sourceforge.net/ scientific report writing)
+ XFig (http://www.xfig.org/), Dia (http://www.gnome.org/projects/dia/), Inkscape (http://www.inkscape.org/), (diagrams and figures for reports)
+ various applications for more specialised use in Biology, Chemistry, Electronics, Astronomy, Physics, and more (https://help.ubuntu.com/community/UbuntuScience)

Like the desktop clients, the servers are now also running Ubuntu Linux, which quickly became the most popular Linux distribution in the world due to it's stability, regular release cycle, vast range of available software, Free Software principles, and excellent documentation and community support.

The security access tag system is in the process of being upgraded to run on the new server and client platform. This is the only proprietary software running on AIMS servers.

The poor support for the proprietary security camera recording software and phone logging software lead to these being discontinued. It is intended to research Free Software solutions to both these items.

### 9.7.1 Support

In addition to regular support for staff, support is provided for PGD lecturers to port existing code from proprietary or other platforms to run at AIMS during their courses.
Extensive support is provided for the Diploma students, ranging from introductory material, regular maintenance, and specific support for scientific modelling, and individual support during the essay phase on programming or report writing.
Comprehensive support is also provided to all visiting researchers. This ranges from teaching them to install Linux, add scientific software, to working on their specific codes and problems. Special attention is also paid to scientific report writing and the technical tools necessary for this, based around LaTeX software for mathematical typesetting. Some electronic support is given to AIMS alumni in their new locations.

### 9.7.2 Hardware

AIMS maintains 4 servers initially donated by SUN Microsystems, and these will be adequate for several years into the future. Additional services such as HPC or VoIP may require additional servers.

94 desktop PCs are maintained in the building, including a computer lab with 53 PCs and a research/AMSP lab with 12 PCs. The desktop PCs will reach their end-of-life around June 2008, and may have to be replaced all round. This will require significant budget, between R500,000 and R1,000,000. The creation of research groups and industry partnerships will increase the demand for hardware.

### 9.7.3 Bandwidth

The bandwidth available at AIMS via TENET has been increased by 35% to cope with the expansion of users in the Institute. This was done in parallel with new and improved bandwidth control techniques being introduced. Access to the Stellenbosch University financial system has been improved from modem access to regular internet access via TENET. Initial wireless access is in place but a comprehensive secure system will have to be developed for extended access.

### 9.7.4 AMI-Net

The appointment of Andy Rabagliati, Systems Administrator, in December 2006 has enabled the necessary updating and improvement of the network design, mail systems, authentication systems, print systems, bandwidth management, file server, and to increase the redundancy of all services. This process has been documented at http://wiki.aims.ac.za/mediawiki/index.php/NetworkSetup with a view to assisting the set-up process of AMI-Net sites. Special attention is paid to the File/Authentication servers and the client applications, seen as the minimum requirement for a AMI-Net Node's computer lab.

The Manager of Information Technology, Jan Groenewald, served as a ICT consultant during AMI-Net Secretariat site-visits to potential Nodes in Sudan, Uganda, Benin, Ghana, and Madagascar.

## 9.7.5 Workshops

Jan Groenewald assisted with co-ordination of the Africa@Home workshop on volunteer computing hosted by AIMS in July 2007. Participants from 18 African countries attended.

Volunteer computing is a technology that allows science projects to use idle computing cycles from millions of home computers around the world, offered by volunteers. This is made possible by open source software called BOINC (http://boinc.berkeley.edu). Most of the science projects, such as SETI@home (http://setiathome.berkeley.edu/)and ClimatePrediction.net (http://www.climateprediction.net), have been developed in Europe or North America. The workshop's main objective was to plant seeds in different universities and academic institutions around Africa to create poles of excellence for developing volunteer computing projects using BOINC, and applied, in particular, to the most pressing health issues, such as malaria, HIV/AIDS and tuberculosis research and modeling.

The AIMS Workshop on Volunteer Computing focussed on the most popular platform for volunteer computing today, BOINC, which stands for Berkeley Open Infrastructure for Network Computing. BOINC allows volunteer computers in homes and offices to run compute-intensive simulation programs such as malariacontrol.net (http://www.malariacontrol.net), developed by researchers at the Swiss Tropical Institute. This was made possible through the multi-stakeholder partnership called Africa@home (http://africa-at-home.web.cern.ch),

This workshop has already led to collaboration between Africa@Home, SACEMA (http://www.sacema.ac.za), where some AIMS alumni are studying, and UCT, where the computer science department (http://www.cs.uct.ac.za) may host the first African BOINC server.

## 9.7.6 Future Projects

A new website presence including close integration with an improved database needs to be researched. This could cater as a database of students, lecturers, researchers, events, institutions, and could automate part of the application process for the various programmes and workshops.

## 9.8 Administration

The increased number of collaborative activities, the plans to expand AIMS, and AIMS role as AMI-Net Secretariat, have placed significant additional administrative demands on the administrative staff of the Institute. While the University of Stellenbosch assists with many of the financial functions it is clear that the administrative staff capacity will need to be expanded further. In view of this a senior administrative officer will soon be appointed.

## 9.9 Publicity

AIMS has continued to receive exposure in a number of international journals. While the website continues to serve as the main point of reference, articles in the local newspaper, and the production and distribution of small pamphlets on AMI-Net and AIMS has assisted in raising awareness of the Institute. News and announcements about AIMS work are distributed via the AIMS Newsletter and the AIMS Announce mailing lists. Work has also begun on a database which will ultimately be used as a mailing list to raise the profile of AIMS internationally.

# 10 Financial Report

**STELLENBOSCH UNIVERSITY**

**AIMSSEC**

| **Financial Statement for the year ended** | **2006** | **2005** |
|---|---|---|
| **Income** | **383 984.01** | **211 051.70** |
| Donations: | | |
| Christ Church | - | 2 187.74 |
| Emmanuel College | - | 997.91 |
| Other | 8 099.59 | - |
| Nuffield College | - | 4 476.56 |
| Oriel College | - | 466.01 |
| Trinity College | - | 16 167.50 |
| University of Cambridge | 70 521.50 | 180 521.92 |
| Foreign Exchange Profit | 614.56 | - |
| Western Cape Education Department | 300 000.00 | - |
| Interest Received | 4 748.36 | 6 234.06 |
| **Expenses** | **362 701.23** | **216 713.76** |
| Catering | 2 539.58 | 1 014.43 |
| Copies and Printing | - | 1 557.30 |
| Foreign Exchange Loss | 687.56 | - |
| General Office Costs | 36 483.75 | - |
| Postage | 1 367.01 | 947.59 |
| Services | 5 050.00 | - |
| Stationary | 6 100.42 | 5 340.74 |
| Sundry Expenses | 167.64 | - |
| Travel & Accomodation | 310 305.27 | 207 853.70 |
| **OPERATING SURPLUS/(SHORTAGE)** | **21 282.78** | **(5 662.06)** |
| **TRANSFERS** | **-** | **130 243.21** |
| Transfer of funds to AIMSSEC | - | 130 243.21 |
| **NET SURPLUS** | 21 282.78 | 124 581.15 |
| **PLUS: ACCUMULATED FUNDS ON 01/01/2006** | 124 581.15 | - |
| **ACCUMULATED FUNDS ON 31/12/2006** | **145 863.93** | **124 581.15** |

**SIGNED**.....

**DATE** 21 June 2007

**Ms F Majiet**
**Head: Financial Services**

# STELLENBOSCH UNIVERSITY

## AIMS

| Financial Statement for the year ended | 31/12/2006 | 31/12/2005 |
|---|---|---|
| **INCOME** | **9 892 436.67** | **4 026 741.66** |
| All Souls College | - | 6 611.04 |
| AMMSI | 21 191.75 | - |
| Balliol College | - | 988.88 |
| Becker | - | 6 000.00 |
| Bglrton College | - | 1 534.28 |
| Cambridge University Press | 275 000.00 | - |
| Canon Collins Educational | 88 000.00 | 110 000.00 |
| Churchill College | - | 1 529.30 |
| CSIR | - | 100 000.00 |
| Department of Science & Technology | 2 747 200.00 | 602 000.00 |
| Ford Foundation | 1 280 215.00 | - |
| Gatsby Charitable Foundation | 1 617 556.08 | 841 787.88 |
| Interest Received | 398 410.98 | 388 607.76 |
| Institute of Physics | 271 637.50 | - |
| Inst Des Htes Etudes Tech | 124 087.00 | - |
| IUPAP | 61 254.00 | - |
| KAY | - | 20 000.00 |
| Miscellaneous Income | 57 280.76 | 52 836.72 |
| National Assembly | - | 5 000.00 |
| NRF | - | 280 000.00 |
| St Johns College | - | 2 621.80 |
| Stellenbosch University | 450 000.00 | 450 000.00 |
| Tenet | 64 188.59 | |
| UCT | 900 000.00 | - |
| UWC | 900 000.00 | |
| Victor Rothschild | - | 66 687.00 |
| Vodacom | - | 500 000.00 |
| Vodafone Group | 636 135.00 | 588 536.00 |
| **EXPENDITURES** | **6 012 813.21** | **6 668 674.79** |
| Advertising | 4 288.91 | 61 503.02 |
| Affiliation and Registration | 8 850.00 | 59 953.39 |
| AIMSSEC Transfer | - | 130 243.21 |
| Books | 7 846.22 | 16 133.46 |
| Building, Building refurbishment costs, Equipment and Furniture | 236 755.90 | 550 280.31 |
| Bursaries | 932 860.42 | 612 677.95 |
| Catering | 1 081 045.48 | 1 134 606.39 |
| Consultation Fees and Services | 125 298.53 | 30 972.09 |
| Consumables | 50 476.00 | 56 303.47 |
| Copying and Printing | 35 643.75 | 43 278.36 |
| Courses | 100 349.66 | 173 146.15 |
| Flowers and Gifts | 3 376.74 | 144.25 |
| General Office Expenses | 34 995.86 | 143 687.65 |
| Insurance | 42 924.43 | 39 814.84 |
| Internet | 183 326.21 | 149 842.35 |
| Maintenance of Equipment | 74 367.77 | 4 539.06 |
| Medical Expenses | 212 618.28 | 144 555.91 |
| Municipal Expenses | 182 666.61 | 186 142.04 |
| Postage | 2 578.43 | 3 271.54 |
| Remuneration | 1 430 176.15 | 1 531 679.43 |
| Rent of Equipment | 3 694.88 | 424.33 |
| Stationery | 23 063.27 | 22 842.13 |
| Stipendia | 372 073.40 | 418 590.00 |
| Telephone | 37 033.70 | 43 978.63 |
| Travel Expenses | 826 661.71 | 1 109 764.64 |
| **NET SURPLUS/(DEFICIT) FOR THE YEAR** | **3 879 623.46** | **(2 641 933.13)** |
| **ACCUMULATED FUNDS ON 01/01/2006** | **4 904 452.47** | **7 546 385.60** |
| **ACCUMULATED FUNDS ON 31/12/2006** | **8 784 075.93** | **4 904 452.47** |
| **LESS BALANCE SHEET ITEMS** | **(91 280.08)** | **(181 888.36)** |
| Creditors | (89 141.29) | (181 888.36) |
| Provision for Leave | (2 138.79) | - |
| **FUNDS AVAILABLE ON 31/12/2006** | **8 875 355.01** | **5 086 340.83** |

SIGNED.....

Ms F Majiet
Head: Financial Services

# 11 Notes on the financial statement

The financial statements reproduced above are official documents of the Stellenbosch University, who provide financial administration services to AIMS as a contribution in kind to the project.

1. The donation from Cambridge University Press is for 5 student bursaries.

2. Funding from Canon Collins Educational is a bursary for four SADC students to cover part of their expenses at AIMS.

3. The funds from the Dept of Science and Technology cover:

   3.1. Two payments for the start-up phase of AMI-Net
   3.2. A grant for African tutors and researchers
   3.3. A contribution to core funding

4. A grant for partial support to students continuing to study at South African universities after completing their diploma at AIMS.

5. The grant from the Ford Foundation covers the cost of 18 students studying at AIMS and a number of post AIMS students. The grant period is 2 years.

6. The funds received from the Gatsby Charitable Foundation represent the last two payments of a grant which was given for three years to cover part of the student bursaries for the diploma programme.

7. The new grant from the Institute of Physics supports six student bursaries.

8. The payment from Tenet is in support of a workshop held at AIMS.

9. Contributions in lieu of the state subsidy were paid by UCT (for 2005 and 2006), by UWC (for 2005 and 2006) and by Stellenbosch (for 2006).

10. The funds from Vodafone were granted as a contribution for the development of AMI-Net.

## 11.1 Expenses

Bursaries and stipendia, staff remuneration, meals for students, conferences and visitors, and travel costs (students and lecturers) comprise the largest portion of the expenses. Despite the increased student intake in August 2006, it was possible to keep the general expenses at a slightly lower level than the previous year.

## 11.2 Balance

The accumulated funds look better than the previous year, and AIMS does not have an immediate cash flow problem. However, in assessing the financial position, it needs to be kept in mind that a substantial portion of the balance represents funds which are earmarked for specific projects.

faces of the future

# 12 Sponsors of AIMS

- Department of Education, South Africa
- Department of Science and Technology, South Africa
- Arcadia
- The Ford Foundation
- The Avery-Tsui Foundation
- Cambridge University Press
- The Vodafone Group Foundation, UK
- Vodacom Foundation, South Africa
- Institute of Physics
- The London Mathematical Society
- Canon Collins Educational Trust for Southern Africa
- Africa Science Program, Institut des Hautes Etudes Scientifiques, France
- The Andrew W. Mellon Foundation
- The Gatsby Charitable Foundation, UK
- Trinity College, Cambridge
- PetroSA, South Africa
- Isle of Man Overseas Aid Committee
- The David and Elaine Potter Charitable Foundation
- The International Council of Scientific Unions (ICSU), with UNESCO and the US State Department
- The International Union of Theoretical and Applied Mechanics (IUTAM)
- Seardel Investment Corporation Limited, South Africa
- Cheryl Grunbock and Martin King
- National Research Foundation
- The University of Stellenbosch
- The University of Cambridge Local Examinations Syndicate
- The Daniel Iagolnitzer Foundation (Fondation De France)
- The Muizenberg Millenium Education Trust
- The Go Open Source Campaign
- SUN Microsystems
- Hyper-Interactive Teaching Technology
- The Victor Rothschild Memorial Fund
- The Ellison Medical Foundation
- Fred Turok
- Stella Innes
- OpenOffice
- British Airways, South Africa Offic
- Chicago State University
- European Mathematical Society Committee for Developing Countries
- Jonathan Leake, Sunday Times.

# 13 Future plans and funding

The success of AIMS is now widely recognised, both within Africa and internationally.

Plans are now underway to expand AIMS to include a Research Centre of Excellence focussed on areas of the mathematical sciences which are most relevant to African development. This centre will act as pilot and driver for the creation of similar research centres across Africa. The Research Centre would build on the current strengths of AIMS, retaining both the innovative and pan-African character of the Institute. The Research Centre will have mathematical modelling in a multi-disciplinary context as a common theme. The topics to be selected will vary over time, depending both on specific needs and opportunities.

Collaboration on research projects will be sought with African and South African universities, and other national and international institutions. The Research Centre will also support research in pure mathematics and physics where specific opportunities for excellent programmes arise. This is necessary to maintain a healthy balance between theory and interesting applications so that new developments in mathematics are translated rapidly into new applications, and new applications are properly constrained by mathematical rigour. AIMS hopes to be able to open this Centre in April 2008, once the necessary expansion of facilities has taken place.

Funding for the expansion of the facilities has been secured from a number of new funders: Arcadia and the Atlas Foundation who have each committed substantial sums towards the purchase of a new property. The Anglo American Chairman's Fund has engaged in discussions with AIMS around further capital requirements and planning for the longer term. An application to their Trustees for support is currently being prepared.

Arcadia and the Avery-Tsui Foundation have contributed significantly to the funds required for student bursaries. These will be described in the financial statements presented in the next annual report.

AIMS has also initiated discussions around a proposed umbrella programme called the AIMS Masters Programme, which would be a nationally recognised joint initiative of AIMS and a number of South African Universities. This programme would enable AIMS diploma students to proceed more rapidly, and at an earlier stage in the diploma programme, to register for a Masters. AIMS would continue to raise half bursary support for students continuing to Masters on this programme.

The German Academic Exchange Service (DAAD) has agreed to allocate 5 PhD bursaries per year for post AIMS students who would enrol at South African Universities. These bursaries will be for 3 year periods and the first allocation of bursaries will take place in February 2008.

# Contact details

AIMS can be contacted through its website at

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To keep abreast of developments and opportunities
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www.aims.ac.za/cgi-bin/mailman/listinfo.