Applied Mathematics and Applications of Mathematics

(AMAM, Nice, February 10-15, 2003)

In order to increase the place of Applied Mathematics in the EMS, its Council proposed to organize a conference on this subject, jointly with the French mathematical societies SMF and SMAI. This conference *Applied Mathematics and Applications of Mathematics* took place in February 2003 in Nice at the Palais des Congrès. The co-presidents of AMAM 2003 were Rolf Jeltsch (EMS), Michel Théra (SMAI) and Michel Waldschmidt (SMF). The Scientific Committee was co-chaired by Pierre Louis Lions (France) and Sergey Novikov (Russia), both Fields medalists. The Organizing Committee was co-chaired by Doina Cioranescu (SMAI) and Mireille Martin-Deschamps (SMF).

The Scientific Committee established the following list of topics:

1) Applications of number theory, including cryptography and coding.
2) Control theory, optimization, operations research and system theory.
3) Applications of mathematics in biology, including genomics, medical imaging, models in immunology, modeling and simulation of biological systems.
4) Scientific computation, including ab initio computation and molecular dynamics.
5) Meteorology and climate, including global change.
6) Financial engineering.
7) Signal and image processing.
8) Nonlinear dynamics.
9) Probability and statistics, inverse problems, fluid dynamics, material sciences and other applications.

The conference consisted of 9 plenary speakers, 38 mini-symposia, two round tables (Mathematics in developing countries, and Education) and two poster sessions (with 92 presentations). More than 500 mathematicians from 25 countries took part into the conference. Almost 20% of the total budget was dedicated to 30 grants which supported the participation of young researchers, students or mathematicians from East European countries, Asia and Africa.

The conference showed the unity of mathematics and their role in various fields of science and technology. It also emphasized the interest of the EMS in promoting Applied Mathematics in the community of mathematicians in general. It should be mentioned that more and more women are now choosing scientific careers. Among the participants, 27 % were women. The conference also exposed to young European students, various topics in mathematics.

In conclusion, AMAM 2003 reinforced the links between Pure and Applied Mathematics and presented new challenges and issues for mathematicians, arising from varied areas of science and technology. It also showed the unity of mathematics and their role within the modern world. (*taken from the report to the EMS Council on* http://www.math.ntnu.no/ems/council 04/uppsalapapers/Report_AMAM_typeset.pdf).

Inaugural Address

Sergey Novikov (University of Maryland, College Park, USA, and Landau Institute for Theoretical Physics, Moscow)

Dear Colleagues,

I apologize that for personal reasons I cannot attend this Conference. However, I would like to say a few words for the Opening Ceremony.

It was a great pleasure for me to work jointly with my co-chair, Professor P.-L. Lions, Scientific Secretary, Professor A. Damlamian and other members of the Committee, in selecting the main speakers. I remember it as a parade, demonstrating a series of great achievements in many different areas of applied mathematics, displaying many beautiful mathematical applications. It covers a broad spectrum of subjects including the practical use of mathematics in business and finance, practical cryptography, and the impressive development of computational and theoretical methods in the natural sciences. Many times I felt sorry that we were restricted in the number of invited talks. I believe we made extremely good choices and left many excellent candidates for future meetings.

The mathematicians who founded the European Mathematical Society over 10 years ago always believed in the unity of mathematics, artificially divided into pure and applied parts. It is the duty of mathematics to support its applied component. I always treated the opposing point of view as something non-serious, a sort of philosophy made from scientific weakness no matter how broad it became distributed.

Our unity is especially important now. Mathematical education has reached a state of terrible crisis in all civilized countries. What is going to happen to the most fundamental exact theoretical sciences of the past century like mathematics and theoretical physics? According to my observations, mathematics has a better chance at survival than theoretical physics, but our unity is necessary for that.

It was already obvious to everybody in the 1990s that biology had become the main candidate for the position of "Miss Science - XXIst Century". Unfortunately, we have also been witnesses to the decay of theoretical physics during the last decade. What does this mean for those of us who have dedicated their scientific activity to the interaction of mathematics with the natural sciences? Of course, we are happy to support all realistic and useful mathematically based investigations made for the needs of biology. Some of them are represented in this conference. No doubt we should help to increase their number.

However, the connection of mathe-

matics and physics was so deep that we should say a few words about today's crisis. In a sense, theoretical physics has always been considered as the mathematics of the real world, a main source of mathematical ideas since the XVII century, the main driving force for the development of 90% of mathematics, and the main road joining mathematics with other natural sciences. In the XXth Century, theoretical physics reached its highest level. It became a leading exact theoretical science. It was era of dinosaurs for physics. Its great leaders were capable of using and sometimes of creating very deep abstract mathematics when it was needed for the study of the real world. New fundamental laws of nature were discovered and they invented great new technology. It changed our world forever.

At the same time, there was a splitting of the communities of physicists and mathematicians. As a corollary, several important mathematical achievements made by physicists (such as quantum field theory, for example) remain, until now, outside the mathematics community. Mathematical education knew nothing about them even in the best times. Its language became incompatible with the mathematical language of physics of the early stages. Pure and applied mathematics have both lost contact with high-level modern physics in the past century. Mathematical language and the technique of theoretical physics were especially designed as the best mathematical tools for the solution of real world problems. In trying to replace them with something absolutely formal and rigorous, you make them useless. Therefore, pure mathematics alone will not be capable of adjusting itself to "physical mathematics".

We see now that the era of dinosaurs is probably over and theoretical physics is going down. Maybe it happened as a consequence of overdevelopment? Is it possible that some unexpected great achievement will return its momentum?

If not, let me ask the following question: Who is going to preserve this great knowledge? Certainly it will remain important for many engineering applications and it would be dangerous for humanity to forget it.

To my opinion, only the joint forces of pure and applied mathematics may help here. I do not know any other part of science capable of preserving this great mathematical knowledge.

I have no doubts that this conference is going to be very successful. I wish you great working days in Nice.

COMMITTE FOR DEVELOPING COUNTRIES: A SUMMARY OF WORK AND PLAN

(Chair: Herbert Fleishner; vice-chair: Tsou Sheung Tsun)

The following is a slightly edited version of a paper presented by Tsou Sheung Tsun to the IMU Developing Countries Strategy Group meeting, 16-17 October 2004, at ICTP, Trieste, Italy.

What are we doing?

We have active individual members working with their own programmes/organizations: CIMPA, ISP, Vietnam, etc. I hesitate to add China, as her status of being a developing country is unsure. We exchange experience and liaise closely.

We have a well-supported book/journal donation scheme, the shipping costs of which are almost entirely funded by ICTP. There is a vast source of books and journals, from retirees and libraries going electronic in the developed world.

We have a good network of distribution centres, particularly in Africa. These are departments or institutes, mostly where there is some personal contact with members of our committee so that we can make sure that the books and journals are used properly, e.g. made available to all mathematicians. If material is donated that a particular centre cannot use, or already have, they promise to send that to nearby institutions.

We have shipped about one and a half tonnes of such material, with a couple of 100kg being processed at the moment.

The recipients where we have contacts are well monitored: sub-Saharan Africa, Zimbabwe, and Vietnam.

Referees' honorarium donation: this is a scheme by which referees donate their honoraria from publishers, usually augmented if exchanged for books. Princeton University Press has donated some. Zentralblatt has donated twice, amounting to some 1500 euros. We have talked with John Ewing of the American Mathematical Society and we are currently devising some variant of the above scheme with him.

A good point about this programme is that the recipient, typically a department with a small active group of researchers, can choose the books they need, even though it is a small number of books.

This could involve the whole mathematical community, and would raise awareness about situations in the developing world.

What do we hope (in the short- and medium-term)?

Expand the book donation scheme: to include more distribution centres, particularly to have a wider geographical spread.

Lecture notes distribution: we have just started this scheme with the help of ICTP. The idea is to make a collection of undergraduate lecture notes and make them available to the developing world, in the form of a CD for example. I have already collected those available from Oxford. We hope to extend this scheme to other languages, e.g. French and Spanish. We shall be looking for good universities in these language groups in the developed world.

Organize short-term placements (say 3 months) for visitors from the developed world to give a lecture course in a developing country. This may interest mathematicians who have recently retired, or fresh PhDs.

Mobilize support for mathematicians in a developing country to attend conferences: I suppose this is done by the IMU-CDE.

Consolidate and expand existing MSc and PhD programmes in countries regularly visited by our members.

Closer liaison with IMU, ICTP, CIMPA, LMS, AMS, IMPA, AIMS, etc.

What do we need?

Continued support from ICTP for the book donation scheme.

Help to start and develop the lecture notes distribution in English, French and Spanish.

Funds for sending lecturers to developing countries for short periods. Subsistence can usually be provided locally.

Conference support for participants from developing countries.

What can we offer?

Good field knowledge and contacts in Africa, South East Asia, and some parts of Latin America, through personal experience and the contacts of our members.

Good network of book distribution, with monitoring.

Enthusiasm and some new ideas.

Finally, an appeal

We are in need of funds for our various activities and urge our colleagues in the developed world to help with donations, however small. Donations can be made directly to the EMS-CDC account:

Account number: 157230-381160
Nordea Bank Finland Plc
Swift: NDEAFIHH
IBAN: FI7815723000038116O