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EUROPEAN MATHEMATICAL SOCIETY

NEWSLETTER No. 43
March 2002

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NOTICE FOR MATHEMATICAL SOCIETIES
Labels for the next issue will be prepared during the second half of May 2002.
Please send your updated lists before then to Ms Tiilikki Mäkeläinen, Department of Mathematics, P.O. Box 4, FIN-00014 University of Helsinki, Finland; e-mail: makelain@cc.helsinki.fi

INSTITUTIONAL SUBSCRIPTIONS FOR THE EMS NEWSLETTER
Institutes and libraries can order the EMS Newsletter by mail from the EMS Secretariat, Department of Mathematics, P. O. Box 4, FI-00014 University of Helsinki, Finland, or by e-mail: makelain@cc.helsinki.fi. Please include the name and full address (with postal code), telephone and fax number (with country code) and e-mail address. The annual subscription fee (including mailing) is 65 euros; an invoice will be sent with a sample copy of the Newsletter.

The views expressed in this Newsletter are those of the authors and do not necessarily represent those of the EMS or the Editorial team.
EMS News

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EMS Agenda

2002

19-21 April
EMS ‘brainstorming’ meeting at Berlingen (Switzerland)

22-26 April
EMS Lectures by Prof. Gianni Dal Maso (SISSA, Trieste, Italy):
Neumann problems in domains with cracks and applications to fracture mechanics
Max Planck Institute for Mathematics in the Sciences, Leipzig (Germany).
Contact: Prof. Stefan Müller, e-mail: sm@mis.mpg.de

13-17 May
EMS Lectures by Gianni Dal Maso (SISSA, Trieste, Italy):
Neumann problems in domains with cracks and applications to fracture mechanics
Laboratoire d’Analyse Numérique, Université Paris VI.
Contact: Prof. François Murat, e-mail: murat@ann.jussieu.fr

31 May
Executive Committee meeting in Oslo (Norway).

1-2 June
EMS Council Meeting, Oslo.

3-8 June
Abel Bicentennial Conference, Oslo.

21-26 June
EURESCO Conference:
Discrete Painlevé Equations and the Solvability of Difference Equations
in Giens, near Toulon (France)
webpage: http://www.esf.org/euresco/02/

1-5 July
Congrès de Mathématiques Appliquées à la mémoire de Jacques-Louis Lions
Collège de France, Paris (France)
e-mail: congres.jllions@ann.jussieu.fr
webpage: http://acm.emath.fr/congres-jllions

15 August
Deadline for submission of material for the September issue of the EMS Newsletter
Contact: Robin Wilson, e-mail: r.j.wilson@open.ac.uk

28-29 September
Executive Committee meeting in Stockholm, at the invitation of the Swedish Mathematical Society

31 December
Deadline for bids for the Fifth European Mathematical Congress, 5ecm, in 2008
Contact: EMS Secretariat, e-mail: mahelam@cc.helsinki.fi
Deadline for raising Public Awareness Article Competition
Contact: Vagn Lundsgaard Hansen, e-mail: v.l.hansen@mat.dtu.dk

2003

10-13 February
EMS-SMAI-SMF Meeting in Nice (France).
Mathématiques Appliquées - Applications des Mathématiques (Applied Mathematics - Applications of Mathematics)
Contacts: Doina Cioranescu, e-mail: cioran@ann.jussieu.fr
and Mireille Martin-Deschamps, e-mail: mmad@math.univ Nice.fr
webpage: http://acm. emath.fr/amsmai/

1 March
Deadline for proposals for 2004 EMS Lectures
Contact: David Brannan, e-mail: d.a.brannan@open.ac.uk
Editorial and AMAM 2003 Announcement
Doina Cioranescu and Mireille Martin-Deschamps

French mathematicians are grouped into two learned societies, the Société Mathématique de France (SMF) and the Société des Mathématiques Appliquées et Industrielles (SMAI).

The SMAI (http://smai.emath.fr) is a non-profit organisation, founded in 1872, whose purpose is to ‘defend and promote mathematics and mathematicians’. Today, its membership reaches 2000, with most of its members being in academics, but also including institutional members such as libraries and mathematics departments. Its headquarters are located within the Institut Henri Poincaré in Paris, and there is also an Annex in Marseille on the Campus of the University in Luminy, which deals with the storage and diffusion of the SMF’s publications.

The activities of the SMF include:
- publication of professional books and journals
- management of the CIRM (Centre International de Rencontres Mathématiques), located on the Luminy campus
- lobbying on behalf of mathematics with political authorities
- animation and reflection within the community concerning teaching and research in mathematics
- popularisation of Mathematics – for example, via the d’Alembert prize awarded every other year.

The SMAI (http://smai.emath.fr) was founded in the early 1980s, when a large portion of the applied mathematics community felt the need to have specific representation. Since then, the SMAI’s membership has risen to close to 1400, including institutional members, such as the research centres of some private or semi-public corporations, as well as the applied mathematics departments of several of the French Grandes Ecoles and universities. Aside from its lobbying on behalf of the applied mathematics community, the SMAI is involved in the publication of journals (ESAIM series with EPS Science Publishing) and a lecture notes series (Mathématiques et Applications with Springer), and in the organisation of many meetings, including the yearly Congrès d’Analyse Numérique and the SMAI Congress (every 4 years). It has four special interest groups (concerned with numerical analysis in industry; statistical methods and applied probability theory; optimisation and operational research; function approximation) which hold their own yearly meetings. Relations with other scientific societies such as the SMF, the Société Française de Statistiques and the Société Française de Physique are well developed. The SMAI was a founding member of the International Council for Industrial and Applied Mathematics, and organised the first ICIAM Congress in Paris in 1987.

The existence of the two societies does not split the mathematical community, as there are many joint members and the two societies have several joint projects and activities.

Both societies are involved in international collaboration, particularly at the European level, and they took part in the World Mathematical Year 2000 project, from its onset. On this occasion they launched the ACM.

The SMAI and the SMF were both instrumental in the creation of the EMS, of which they are both founding members. So, when the question was raised of how to increase the role of applied mathematics in the EMS, they acted jointly and took part in the ICIAM Congress in Paris in 1987.

In the recent past, mathematicians have become aware of the broad needs of mathematics in other sciences and in technology, and have responded positively. As applications have become more sophisticated and complex, they have required the input of many branches of mathematics, some until recently considered as very fundamental, thereby making the distinctions between pure and applied mathematics less sharp.

AMAM 2003

After the Berlingen meeting, the EMS proposed the organisation of a conference on this subject. They suggested that the conference be organised jointly by the SMF and the SMAI, to be held in Nice, and be called Applied Mathematics and Applications of Mathematics (AMAM 2003). It will be held at the Palais des Congrès in Nice from 10 to 15 February 2003.

The co-presidents of AMAM 2003 are Rolf Jeltsch, Michel Théra and Michel Waldschmidt. The scientific Committee is co-chaired by Pierre Louis Lions (France) and Sergey Novikov (Russia), and its members are Lucien Birgé (France), Jean-Michel Coron (France), Marie-Françoise Coste-Roy (France), Alain Damlamian (France), Nicole El Karoui (France), Antonio Fasano (Italy), Olivier Faugeras (France), András Frank (Hungary), François Golse (France), Michael Gromov (France), Eugene Ya. Khruslov (Ukraine), Peter Alexander Markovich (Austria), Michel Merle (France), Jean-François Mestre (France), Etienne Pardoux (France), Olivier Pironneau (France), Frédéric Poupaud (France), Dirk Roose (Belgium), Zeev Schuss (Israel), J.Trevor Stuart (UK), Eitan Tadmor (Israel and USA) and Vladimir V. Vasilen (Russia). The Organising Committee is co-chaired by Doina Cioranescu and Mireille Martin-Deschamps, and also contains Jacques Blum, Denise Chenais and Charles Walé from the University of Nice.

The conference is structured according to the following list of topics:
1. Applications of number theory, including cryptography and coding
2. Control theory, optimisation, operational research and system theory
3. Applications of mathematics in biology, including genomics, medical imaging, models in immunology, modelling 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. Non-linear dynamics
9. Other applications: probability and statistics, inverse problems, fluid dynamics and material sciences

There will be 12 plenary speakers, 30 mini-symposia, three round tables and two poster sessions. The following have already agreed to present a plenary lecture: Alfred M. Bruckstein (Israel), Robert S. Eisenberg (USA), Roland Glowinski (USA), Leslie Greengard (USA), Eugenia Kalnay (USA), Roland Keunings (Belgium), David Levermore (USA), Pascal Massart (France), Peter Alexander Markowich (Austria), Marek Musielia (UK), René Schoof (Italy) and Enrique Zuazua (Spain).

All EMS members are invited to participate in AMAM 2003: why not propose a minisymposium or a poster?

For information and registration please refer to our website: http://amam.emath.fr

Doina Cioranescu is Director of Research at CNRS, Laboratoire Jacques-Louis Lions, Université Pierre et Marie Curie, 175 rue du Chevaleret, 75013 Paris, France.

Mireille Martin-Deschamps is Professor at the Laboratoire de Mathématiques, Université de Versailles et Saint-Quentin, 45 avenue des États-Unis, 78035 Versailles Cedex, France.
The EMS Executive Committee Meeting
Brussels (Belgium), 9-10 February 2002

Present: Rolf Jeltsch (President, in the Chair), David Brannan, Bodil Branner, Victor Buchstaber, Doina Cioranescu, Luc Lemaire, Olli Martio, Marta Sanz-Solé, Mina Teicher. Apologies had been received from Renzo Piccinini.

In attendance by invitation: Carles Casacuberta (Publications Officer), Robin Wilson (Editor-in-Chief, Newsletter), David Salinger (Publicity Officer), Saul Abarbanel (Chair of the Applied Mathematics Committee), Ari Laptev (Chair of the Local Organising Committee of 4ecm), Thomas Hintermann (Managing Director of the EMS Publishing House), Sir John Kingman (nominee for EMS President for 2003-06), Helge Holden (nominee for EMS Secretary for 2003-06), and Tuulikki Mäkeläinen (Helsinki Secretariat).

The President thanked the Université Libre de Bruxelles and the Belgian Mathematical Society for their invitation and generous hospitality, and welcomed all participants.

Officers’ Reports
The President reported on the composition of the Scientific Committee of aman03, the By-Laws of the European Mathematical Foundation, MATHDI, the appointment of Manuel Castellet as Chair of ERCOM, extension of the time for the EMS-RPA competition, and on the EMS Summer Schools. He reported that at the EMS-SIAM conference in Berlin there had been 420 participants from 42 countries, including 36 European countries and all EU and Associated States.

The Zentralblatt Consultative Committee meeting on 6 November 2001 in Heidelberg had been business-like and routine. The EMS is now trying to further the drive to make ZentralblattMATH a truly European endeavour, starting with a brainstorming weekend in Berlingen on 19-21 April 2002.

Luc Lemaire and Rolf Jeltsch attended the following two events in Brussels: the Conference of the Belgian Presidency of the European Union’s Research Council Event (creation of the European Research Area) and a conference on International best practices in evaluation of research in public institutes and universities. On both occasions they were able to talk briefly to the spring 2002 it will include mathematics. AlphaGalileo is a collaboration between Finland, France, Germany, Greece, Portugal and the UK, with support from the ESF and other European bodies. It was agreed to make positive contact with its organisers.

On the Secretary’s suggestion, David Salinger was elected Publicity Officer for a further term of 2003-05.

The Helsinki Secretariat reported on some membership matters that would hopefully be ready for Council, and there was a brief discussion of the need to register mathematical societies in Russia at the moment. At the request of certain member societies in need, a reduction in their EMS dues for specific years was agreed.

Scientific Meetings
Mina Teicher reported on the Summer Schools in 2002 in Eilat and Craiova. Applications to the EU for summer schools in Spain, Porto and CIME had been submitted for future years. There was a view that the EMS should select subjects for summer schools and then ask societies or active people to organise the schools.

A call had been circulated for suggestions for the 2003 EMS Lecturer, preferably in a more pure field. Professor Gianni Dal Maso of SISSA, Trieste, was the EMS Lecturer for 2002, and would speak at the University of Paris VI and the Max Planck Institute in Leipzig.

The Diderot Mathematical Forum DMF5 on Mathematics and Telecommunication had taken place in Lausanne, Eindhoven and Helsinki. Much of the scientific programme had been excellent, and the video conferencing had been successful. There was a discussion of the future of the Diderot Mathematical Forums, and a feeling that the EMS should think afresh about the DMF concept, in order to maximise the value of Society activities.

Ari Laptev, President of the Organising Committee of the 2004 European Congress of Mathematics in Stockholm, reported on the progress made for the Congress. The 4ecm has now a home page at http://www.math.kth.se/~4ecm. Lennart Carleson (Stockholm) will be Chair of the Scientific Committee and Björn Engquist (Stockholm) its Vice-Chair; and other possible members of the Committee were discussed, including the need for balance in its composition. Only the Chair and Vice-Chair will be made public.

There was a stimulating discussion of the prize, and several recommendations will be put to Council:

1. Eligibility for an EMS Prize is open to any European mathematician who has not reached his/her 35th birthday on 30
June of the year of the congress. In the event of a possible candidate having had a broken career pattern, a corresponding increase in age will be acceptable at the discretion of the Prize Committee, up to a maximum of three additional years. By way of example only, this provision is intended to cover items such as military service, women having children, etc.

A mathematician is defined to be 'European' in the context of EMS Prizes if they are of a European nationality or their normal place of work is within Europe/substantial amount of their mathematical work done in Europe.

The Prize Committee will endeavour to ensure a fair balance of nominations, as regards the following criteria: speciality within mathematics, nationality, and geographical base.

4. Following the identification of the Chair of the Prize Committee, their name, address and e-mail address will be published in the EMS Newsletter, together with an invitation from the Chair to all mathematicians to send in suggestions with reasons and one or two names of people who could be contacted with further information on the nominee. The call should be published in the Newsletter, on EMS, sent to societies and mentioned on the Congress web page.

5. The 'place of work' in the rules is intended to include place of study.

6. Prizes are to be awarded for the scientific merit of the person's work.

7. The Chair of the Prize Committee will suggest the members of the Prize Committee for approval by the EMS Executive Committee. Their identities will not be made public until after the Prizes are awarded.

The Prize Committee for the Felix Klein Prize consists of three persons from the EMS, two from the Kaiserslautern Institute, and one from ECM.

A call for bids to hold the 2008 ECM appeared in the December Newsletter and will be repeated.

There will be a conference, amam03, in Nice on 25-27 June 2003 with the title Applied Mathematics - Applications of Mathematics, sponsored jointly with SMAI and SMF. It will be chaired by Rolf Jeltsch, Michel Thera and Michel Waldschmidt. The Scientific Committee Co-Chairs are Pierre-Louis Lions (Université Paris-Dauphine) and Sergei P. Novikov (University of Maryland and Moscow), and the Scientific Committee Coordinator is Alain Damlamian (Université Paris 12).

The Local Organising Committee consists of: Doina Cioranescu (Université Paris VI) (Chair), Mireille Martin-Deschamps (Université de Versailles) (Chair), Jacques Blum, Denise Chemais and Charles Walter (Université de Nice Sophia-Antipolis).

There will be a discounted conference fee for members of the EMS, SMAI and SMF.

The Congress web address is: http://www.amam.math.fr/amam03.

The EC agreed to give moral support to a conference Janos Bolyai Commemorating Year 2002 on 8-12 July 2002 in Chju.


Committee Reports will be written, with possibly a less formal oral representation at the meeting, followed by a question and answer session. Committee chairs will be invited to attend. There will be a presentation of 4ECM within the Council meeting.

The Executive Committee’s nominations for the President (Sir John Kingman), Vice-President (Luc Lemaire), Secretary (Helge Holden) and Treasurer (Olli Martio) had been decided earlier, and there was a discussion on nominations for the other vacancies. There was also a stimulating discussion of essentially technical changes to the Statutes and By-Laws that would be proposed to Council by the Executive Committee.

The President was arranging an ad hoc meeting Berlingen 2: Publishing, Meetings, Integrated Initiatives, on 19-21 April 2002. Among the topics would be Zentralblatt MATH, Digitalisation and EMS Publishing.

Society Committees

It was agreed to publish the remits of the committees of each EMS Society, with a Vice-Chair for each Committee, terms of office for all committee members, and an Executive Committee member as a contact for each Committee. There will be a meeting of the Chairs of Committees in Oslo on 2 June 2002 from 2-4 p.m., chaired by Rolf Jeltsch.

Saul Abarbanel reported his wish for the Advisory Mathematics Committee to meet annually. It was decided to reconsider the role and future of the Databases Committee in Berlingen. Manuel Castellet (2002-05) had succeeded Ole E. Barndoff-Nielsen (1998-2001) as Chair of ERCOM. Mina Teicher had become Acting Chair of the Summer Schools Committee during the absence abroad of Renzo Piccinini (2000-03); it was decided to dissolve this Committee, and to discuss the question of how to organise summer schools in future (possibly via the planned Meetings Committee) in Berlingen in April. It was also agreed to discuss the future of the Publications Committee (Carles Casacuberta, 1998-2001-02) in Berlingen. The Executive Committee reminded itself that it had agreed previously to set up a Meetings Committee, to be initially chaired by Luc Lemaire (2001-04).

The Education Committee had discussed with EU a possible follow-up to the Reference Levels Project for 16-year-olds, to cover the group up to 18-year-olds.

Publishing

The Board of Trustees of European Mathematical Foundation (EMF) had approved the final version of the EMF By-Laws, which will now be registered with the Chamber of Commerce in Zürich and with Berne, after which the EMF will become a legal body. The Statutes have been accepted by the Notary Public.

There was an important and lengthy discussion of the business of the EMS Publishing House, which (for commercial reasons) will not be set out here. EMSph business will be a topic for discussion at the Oslo Council meeting. The Committee agreed that, even simply by virtue of its existence, EMSph can encourage commercial publishers to ‘do a better job for mathematics’.

It was agreed that all EC members who knew of a good article for the EMS Newsletter should tell the Editor-in-Chief about it, and those not in English might be translated – subject of course to the author’s and publisher’s agreement. Robin Wilson was appointed to a second term of office (2002-04) as Newsletter Editor-in-Chief. It was again stressed that it was important to have the Newsletter of EMSph, with a time lag of about six months being appropriate.

The EC noted that Bernd Wegner, Editor-in-Chief of Zentralblatt, would reach his 60th birthday on 18 February 2002. It expressed its unanimous congratulations to him on this auspicious day, and wished him every happiness and many years to come! His contribution to mathematics for a quarter-century as Editor-in-Chief of Zentralblatt had been outstanding, and the EMS mathematical community world-wide was greatly indebted to him.

The Publications Officer reported on a number of volumes in various stages of the preparation and production process.
Relations with Mathematical Institutions

There was a concerned discussion of the lack of adequate representation of Mathematics at the European Science Foundation (ESF), and it was agreed to make strong representations to ESF on a more prominent position for mathematicians in ESF’s PESC (Physical and Engineering Sciences Standing Committee) and its working groups.

Rolf Jeltsch will represent the EMS at the IMU General Assembly – the EMS is an Affiliate Member of the IMU.

The EC had a stimulating and stimulated discussion of the Bologna Declaration. On the one hand it was agreed that the long-term autonomy of universities was important; on the other hand, that universities could not ignore that governments generally supply most university funding throughout Europe.

Any Other Business

The EC had a stimulating and stimulated discussion of the Bologna Declaration. On the one hand it was agreed that the long-term autonomy of universities was important; on the other hand, that universities could not ignore that governments generally supply most university funding throughout Europe.

Meeting of the EMS Council

Oslo: 1-2 June 2002

The EMS Council meets every second year. The next meeting will be held in Oslo, Norway, on 1-2 June 2002, before the Abel Bicentennial Meeting in Oslo which begins on 3 June. The first session of the Council meeting will start at 10 a.m. on 1 June, and will run all day with a break for lunch. The second session will probably start at 9 or 10 a.m. on 2 June, and may last most or all of the day with a break for lunch, depending on the volume and complexity of the business on the agenda.

Membership of the EMS Executive Committee

The Council is responsible for electing the President, Vice-Presidents, Secretary, Treasurer and other members of the Executive Committee. The present membership of the Executive Committee, together with their individual terms of office, is as follows.

President
Professor Rolf Jeltsch (1999-2002)
Vice-Presidents
Professor Luc Lemaire (1999-2002)
Professor Bodil Branner (2001-04)
Secretary
Professor David Brannan (1999-2002)
Treasurer
Professor Olli Martio (1999-2002)
Members
Professor Victor Buchstaber (2001-04)
Professor Doina Cioranescu (1999-2002)
Professor Renzo Piccinini (1999-2002)
Professor Marta Sanz-Solé (2001-04)
Professor Nina Teicher (2001-04)

The President may serve only one term of office, so Rolf Jeltsch cannot be re-elected as President. David Brannan and Renzo Piccinini have indicated that they do not wish to be re-elected. The Executive Committee proposes the names of Sir John Kingman (Cambridge) for President and Helge Holden (Trondheim) for Secretary.

Under Article 7 of the Statutes, members of the Executive Committee shall be elected for a period of 4 years. Committee members may be re-elected provided that consecutive service shall not exceed 8 years. No current member has served on the Executive Committee for 8 years, so all existing Committee members are in principle available for re-election.

The Council may, at its meeting in Oslo, add to the nominations received and set up a Nominations Committee, disjoint from the Executive Committee, to consider all candidates. After hearing the report by the Chair of the Nominations Committee (if there is such) or by the President. It is recommended that a statement of policy of the candidates nominated from the floor should be available.

Accommodation arrangements

Delegates to the Council meeting, who are planning to attend the Abel Centennial Meeting, are advised that their accommodation arrangements should be made through the normal Abel Centennial Meeting organisation arrangements. For delegates to the Council who are not attending the Abel Centennial Meeting, an address for accommodation arrangement will be provided later.

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And finally …

The EC participants expressed their heartfelt thanks to Luc Lemaire and his Université Libre de Bruxelles and Belgian Mathematical Society colleagues for a well-run meeting in a congenial atmosphere.

David A. Brannan
Fifth Diderot Mathematical Forum

Eindhoven, Helsinki, and Lausanne

22-23 November 2001

From a mathematical point of view, the topic chosen, Mathematics and Telecommunications: problems connected with cell phones, allowed the presentation of a very wide variety of mathematical approaches: from probability theory to harmonic analysis and algebra, several areas of mathematics play, and will continue to play an important role in the development of the subject. It is patent though, especially from what one heard during the Forum, that some of the mathematical tools needed are yet to be developed (certainly in the stochastics area and in algebraic coding, but somewhat more surprisingly in more mature areas of mathematics such as one-dimensional harmonic analysis), and that communications problems thus offer a very attractive area for mathematicians.

The organisers were Paul Urban (Philips Research Center Eindhoven), Olavi Nevanlinna (Helsinki University of Technology) and Gérard Ben Arous (École Polytechnique Fédérale de Lausanne).

The speakers were:

- For the lectures shared through the videolink:
  - (from Helsinki) Yrjö Neuvo (Helsinki): Mathematics for mobile communications.
  - (from Eindhoven) Joachim Hagenauer (Technische Universität München): Information and coding theory for mobile phones.
  - (from Lausanne) R. Urbanke (EPFL): Low density parity check codes.

- In the Eindhoven Workshop:
  - C.P.M. (Stan) Baggen (Philips Research, Eindhoven): Coding for informed decoders.
  - Marc Moonen (Katholieke Universiteit Leuven): Signal processing and mathematical modeling challenges in ADSL/VDSL high-speed telephone line modems.
  - Richard J. Boucher (University of Twente, Enschede): Mobility and channel borrowing in mobile communications networks.
  - Frans M.J. Willems (Eindhoven University of Technology): Embedding information in data-streams.
  - Joergen Bach Andersen (Aalborg University): Electromagnetics and wireless communications.
  - Alle-Jan van der Veen (University of Technology Delft): Use of factor analysis analysis in array signal processing.
  - Luc Vandendorpe (Université Catholique de Louvain): Signal processing aspects in CDMA systems.

- In the Lausanne Workshop:
  - Emre Telatar (EPFL): Application of random matrices in communications.
  - Alice Guionnet (CNRS-École Normale Supérieure de Lyon): Some mathematical aspects of random matrix theory in communications.
  - Marina Monsurro (EPFL): Algebraic-geometric codes.
  - Piyush Gupta (Bell Labs, Murray Hill, USA): The traffic-carrying capacity of ad hoc wireless networks.
  - François Baccelli (INRIA, École Normale Supérieure de Lyon): Some mathematical aspects of random matrix theory in communications.

- In the Helsinki Workshop:
  - Kaisa Nyberg (Nokia Research Center): Cryptography in UMTS.
  - Ioan Tabus (Tampere University of Technology): On the use of the Hadamard transform for index assignment over channels with memory.
  - Savo G. Glisic (University of Oulu): Modelling and analysis of code acquisition process by using signal flow graph theory.
  - Jyrki Lahtonen (University of Oulu): Algebraic geometry in error correcting codes.
  - Jyrri Hamalainen (Nokia Networks): TX diversity feedback modes as a function of FB bits.
  - Tapani Ristaniemi (University of Jyväskylä): Independent component analysis and CDMA.
  - Pirkko Kuusela (Helsinki University of Technology): Internet congestion control delay differential equation models.
  - Olli Tirkkonen (Nokia Research Center): Clifford algebras and space time codes.
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...
The First EMS-SIAM Conference (web page: http://www.zib.de/amcw01) took place on the attractive Science Campus of the Free University of Berlin. The local host institution was the Zuse Institute Berlin (ZIB), and the Co-Chairs were Rolf Jeltsch (ETH), Gil Strang (MIT) and Peter Deuflhard (ZIB); unfortunately, for sudden health reasons, Gil Strang was unable to attend. More than 400 participants from 42 countries (36 of them European) attended this event, with about 41% from Germany and 8% from the US. The majority of participants were quite young.

The idea of the Conference was to bring together applied mathematics from both sides of the Atlantic. As indicated by its title, the focus of the conference was on new areas where applied mathematics is a coming main player, with a strong impetus from applications.

Scientific programme

As is usual for such a large conference, the backbone was the invited plenary talks, and of the invited speakers half came from Europe and half from the US (see below).

One of the most recent areas where mathematics comes into play is genomics. Michael Waterman gave an excellent short glimpse on algorithms for understanding DNA sequences, where a lot of discrete mathematics is involved. The lecture of Pietro Perona showed that we can already do quite a bit using present mathematics, but still have a long way to go to make automatic visual recognition really possible.

Alfio Quarteroni demonstrated that when classical computational fluid dynamics meets medical applications, new challenges come up – such as modelling the cardiovascular system – for example, the interaction of the walls of arteries with the blood flow.

The challenges in the simulation of traffic throughout a whole country were impressively presented and discussed by Kai Nagel. With the help of his methods, one can directly observe the bottlenecks. Unfortunately, the need for this kind of simulation became apparent immediately after the Conference: He had, in fact, shown traffic flow simulations through Switzerland, with one or two pipes through the Gotthard tunnel, the location of a horrible accident shortly after.

The fact that new mathematics and simulation tools are needed in materials science was demonstrated in two rather different ways by Jon Chapman and Michael Griebel. Jon Chapman derived a thin-film model for superconducting materials by singular perturbation techniques.

Michael Griebel studied new nanotube properties of certain carbon materials, by applying Hilbert’s space-filling curve to the design of parallel adaptive multi-grid methods. It is here that mathematicians may co-author materials patents.

Global models for the atmosphere coupled with ocean dynamics are known to be too large for today’s computers: Andrew Majda investigated new mathematical possibilities of modelling such coupled PDE systems. The derived smaller models build bridges to the whole large-scale models, which are currently beyond our computability horizon.

Martin Grötschel demonstrated the difficulties of designing optimal telecommunication networks. Even though integer
programming is, in principle, well understood, the sheer size of the problems still needs a lot of mathematical intuition for the invention of good theoretically-based heuristics. The profit of such calculations goes into millions of euros.

Round table discussion with Martin Grötschel (Chair), Rolf Jeltsch, Tom Manteuffel, Joyce McLaughlin, Hilary Ockendon and Alfio Quarteroni.

Co-Chairs Peter Deuflhard and Rolf Jeltsch with Erlinda Körnig, the ‘engine’ of the conference office.

Tom Hou studied microscale singularities of three-dimensional vortex sheets, which may even be hard to detect in real life. The mathematical difficulty stems from Kelvin-Helmholtz instabilities that make the problem ill-posed.

For health reasons, Benoit Mandelbrot could not be physically present in Berlin to deliver his lecture, but the organisers established a direct real-time connection to IBM Yorktown Heights: this connection made it possible for Mandelbrot to deliver his lecture, which put the Black-Scholes formula under strong dispute. The impression was as though they were directly in the Berlin auditorium – certainly an interesting experience for all participants – and the satellite connection was so good that there was a lively discussion at the end of the lecture.

A second backbone structure was the organisation of 45 mini-symposia. Most of them lasted for two hours with four speakers presenting their results. The topics of the mini-symposia, which had been partly solicited and all reviewed before, were chosen from the same areas as the plenary lectures. In addition, researchers presented their latest results in 313 contributed papers and 44 posters. These sessions were arranged around the same topics as the mini-symposia, and were scheduled so that participants in the mini-symposia could also attend the corresponding sessions of contributed papers. The idea was that international speakers coming from different schools of thought could fruitfully interact with the contributors.

Social programme

A communication tent had been especially installed on the campus for the Conference. It turned out to be the participants’ favourite meeting place over a cup of coffee or tea or during lunch breaks. Since all lectures were within walking distance, most of the participants walked together in small groups to the communication tent to continue their discussions.

The evening before the conference, a get-together party took place in that tent, and after the Mandelbrot tele-lecture there was a Barbecue Party which was extremely well attended. The highlights of the party were the open-air Klezmer music from the balcony of the ZIB building that could be heard down in the BBQ area and an indoor classical string quartet (Beethoven) in the greenhouse interior of the beautiful computer science building.

For pictures, see the web page: http://www.zib.de/ems02/gallery/conf.html. Apart from these campus events, the ZIB staff was extremely helpful. A cultural e-guide was prepared and some footloose tours were organised, which allowed participants and their companions to enjoy Berlin and its surroundings.

Round-table discussion: Applied Mathematics in Europe

The round-table discussion was chaired by Martin Grötschel from ZIB. The panelists were Rolf Jeltsch (ETH Zürich, President of EMS), Tom Manteuffel (President of SIAM), Joyce McLaughlin (Rensselaer Polytechnical Institute), Hilary Ockendon (Oxford University and President of the European Consortium for Mathematics in Industry) and Alfio Quarteroni (Politecnico di Milano, Italy, and EPFL Switzerland).

The discussion mainly focused on three points:

– what research should be done in applied mathematics, trends and the future?
– how should education at university level cater for applied mathematics, inclusion in a general mathematical education, and special curricula for applied mathematics and also for computational science and engineering?
– the structure of learned societies in mathematics and applied mathematics in Europe

Not only did the panelists give excellent contributions, the discussion also benefited greatly from the competence of the audience which included many leading applied mathematicians in Europe, head of departments and presidents of societies. The EMS sponsored a reception after the round-table where the discussion continued on a more informal level.

During the Conference, the EMS and SIAM discussed future joint conferences that could focus on more specialised topics. The EMS recognised that conferences on the same level as the one in Berlin should continue, probably on a biannual basis, but maybe with varying partner societies. The EMS Executive Committee has already decided to organise the next conference with the two French societies, Société Mathématique de France (SMF) and Société de Mathématiques Appliquées et Industrielles (SMAI). The Conference will be held in Nice, 10-13 Feb 2003 and the topic will be Applied Mathematics – Applications des Mathématiques (for details, see page 3). The main idea is to give young researchers in applied mathematics an opportunity to get to know new topics in applied mathematics and applications of mathematics, and to give them a chance to network, exchange views and interact.

Queue during the BBQ party.
The 2002 EMS Lecturer will be Professor Gianni Dal Maso (e-mail: dalmaso@sissa.it) of the International School for Advanced Studies (SISSA) in Trieste, Italy.

He will visit two different locations in Europe to give the same series of lectures on Neumann problems in domains with cracks and applications to fracture mechanics to audiences in Leipzig and Paris (see details below), affording as many interested mathematicians as possible the opportunity to attend, and to discuss the topics with him.

An abstract of his lecture series is as follows:

The first part of the course is devoted to the study of solutions to non-linear elliptic equations in $\Omega - K$, where $\Omega$ is a two-dimensional smooth domain and $K$ is a compact one-dimensional subset of $\Omega$. The solutions are required to satisfy a homogeneous Neumann boundary condition on $K$ and a non-homogeneous Dirichlet condition on $\partial \Omega$. The main result is the continuous dependence of the solution on $K$, with respect to the Hausdorff metric, provided that the number of connected components of $K$ remains bounded. Classical examples show that the result is no longer true without this hypothesis.

Using this stability result, the second part of the course develops a rigorous mathematical formulation of a variational quasi-static model of the slow growth of brittle fractures, introduced by Francfort and Marigo. Starting from a discrete-time formulation, a more satisfactory continuous-time formulation is obtained, with full justification of the convergence arguments.

EMS members and others interested in attending one of these series of lectures are warmly welcomed to do so, and to talk informally with Professor Dal Maso on related topics. However attendees are strongly encouraged to contact the local organisers of the series that they plan to attend in advance, so that the necessary practical arrangements can be made (for example, having a lecture room of sufficient size for everyone coming).

Local arrangements

Location 1: Max Planck Institute for Mathematics in the Sciences, Leipzig

Dates of the lectures: 22-26 April 2002

Local contact: Prof. Stefan Müller, Max Planck Institute for Mathematics in the Sciences, Inselstr. 22-26, D-04103 Leipzig, Germany (e-mail: sm@mis.mpg.de)

Location 2: Université Paris VI, Laboratoire d’Analyse Numérique

Dates of the lectures: 13-17 May 2002

Local contact: Prof. François Murat, Université Paris VI, Laboratoire d’Analyse Numérique, Boîte courrier 187, 75252 PARIS Cedex 05, France (e-mail: murat@ann.jussieu.fr); telephone: +33-1-44274299; fax: +33-1-44277200

Brief biography

Professor Dal Maso was born in Vicenza in 1954; in 1955 his family moved to Trieste, where he had his basic education. He was a student of the Scuola Normale of Pisa from 1973 to 1977, and graduated in Mathematics from the University of Pisa in 1977, with Ennio De Giorgi as his advisor. He was then a graduate student of the Scuola Normale di Pisa from 1978 to 1981, working with Professor De Giorgi on many problems connected with the theory of gamma-convergence, that was developed in those years.

After serving as assistant professor of Mathematical Analysis in the Faculty of Engineering of the University of Udine from 1982 to 1985, he moved to the International School for Advanced Studies (SISSA) in Trieste. He worked there as associate professor of mathematical analysis from 1985 to 1987, and as full professor of calculus of variations since 1987. He was awarded the Caccioppoli Prize in 1991 and the ‘Medaglia dei XL per la Matematica’ of the Accademia Nazionale delle Scienze detta dei XL in 1996.

At SISSA he has developed his research interests on non-local approximation of Dirichlet problems, homogenisation theory, and free discontinuity problems, and has been the supervisor of 19 Ph.D. students working on these subjects. He currently serves as the head of the Sector of Functional Analysis and Applications of SISSA.

Research interests

Professor Dal Maso started his research work in Pisa while Ennio De Giorgi was developing the new notion of gamma-convergence. In a systematic way with the following kind of phenomena: the solutions of variational problems depending on a parameter may converge to the solution of a limit problem, even if the integrands of the functionals to be minimised do not converge in any reasonable sense, or converge to a limit integrand that is different from the integrand of the functional minimised by the limit of the solutions. Gamma-convergence is a very efficient tool to tackle these kinds of problems.

In his work in Pisa and Udine he studied several problems related to gamma-convergence. In particular he developed, with Giuseppe Buttazzo, several techniques for proving, under different hypotheses, that the gamma-limits of integral functionals are still integral functionals, and he studied, by gamma-convergence techniques, the asymptotic behaviour of solutions to minimum problems with strongly oscillating obstacles. Using the notion of capacity, he also gave a complete characterisation of the sequences of obstacle problems whose variational limit is still an obstacle problem.

He later used these techniques to study, with Umberto Mosco, the asymptotic behaviour of solutions of Dirichlet problems for the Laplace equation in perforated domains, and to determine the general form of their variational limits, as well as the fine properties of the solutions of these limit problems. These results have been extended, with different collaborators, to the case of other linear and non-linear equations and systems.

At present his main research interests are in free discontinuity problems. These are variational problems where the functional to be minimised depends on a function and on its discontinuity set, whose shape and location are not prescribed. In many cases the discontinuity set can be considered as the main unknown of the problem. Examples are given by the minimisation of the Mumford-Shah functional in image segmentation, and by the minimisation problems that appear in many variational models for fracture mechanics, where the unknown crack is represented as the discontinuity set of the displacement vector, and the functional to be minimised is the sum of the elastic energy and of an integral on the discontinuity set, which represents the work done to produce the crack.

Selected list of publications


For some years the European Mathematical Society has been running a successful series of EMS Lectures. In 2000 G. Papanicolaou gave a series of lectures on Time Reversed Acoustics at the University of Crete (Heraklion) and on Financial Mathematics at ETH in Zürich, and the 2001 EMS Lecturer, M. Vergne, spoke on Convex Polytopes at the University of Malta and at the Universita Degli Studi Roma, Tor Vergata. The 2002 Lecturer is G. Dal Maso (SISSA, Trieste), whose research interests include gamma-convergence, homogenisation theory, and free discontinuity problems.

The EMS Lectures may be in pure or applied mathematics, or may span both areas; however, for 2003 the Society would prefer to appoint at least one lecturer in pure mathematics, in order to retain a reasonable balance. With this activity, the Society aims to encourage European mathematicians (especially young ones) to meet and study together current developments in mathematics and its applications. The lectures should take place over several days (up to 5 days) in each of at least two locations, in order to give as many people as possible the opportunity to attend. The EMS will give some preference to lecturers who visit institutions that might not normally attract prominent lecturers or seminar speakers, and would prefer the geographical locations of the lectures to be significantly distant from each other (for example, North and South Europe, or East and West Europe), in order to maximise the impact of the lectures.

The costs of participation should be kept low, and (if possible) grants should be available to people from countries that cannot afford any financial support. The EMS will guarantee its moral support to the selected lecture series, and will pay for the lecturer’s travel costs and for posters advertising the lectures within the European mathematical community. It will also do its best to help the organisers to raise funds, and is likely to offer some financial support to organisers for participants who are young or come from European countries with financial difficulties.

Topics (which may be single or composite) for the lecture series, the sites, and the organisers of the schools will vary from year to year, to cover a wide range of the European mathematical community. It will also do its best to help the organisers to raise funds, and is likely to offer some financial support to organisers for participants who are young or come from European countries with financial difficulties.

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Last year the European Mathematical Society announced a competition to inspire the writing of articles with a mathematical theme addressing a general audience. The deadline for submissions was 31 December 2002. In response to comments, and to give more time for suggestions of a wider range of articles, the Society has decided to accept submissions in any European language and to extend the deadline for submission of articles to 31 December 2002.

The advertisement of the competition is repeated below, with the appropriate changes incorporated. Vagn Lundsgaard Hansen Chair, Raising Public Awareness of Mathematics Committee (RPA)

**Articles in many ways, math displays, says, the EMS committee of RPA: A competition surely may, inspire to the way, in which to pay, as we say, attention to public awareness!**

During World Mathematical Year 2000, many articles on mathematics addressing a general audience were published throughout the world, and many valuable ideas for articles popularising mathematics were generated. The Committee for Raising Public Awareness of Mathematics of the European Mathematical Society (acronym RPA) believes that it is vital that such articles be written. In order to inspire future articles with a mathematical theme and to collect valuable contributions, which deserve translation into many languages, the EMS wishes to encourage the submission of articles on mathematics for a general audience, through a competition. The EMS is convinced that such articles will contribute to raising public awareness of mathematics.

The RPA-committee of the EMS invites mathematicians, or others, to submit manuscripts for suitable articles on mathematics.

To be considered, an article must be published, or be about to be published, in a daily newspaper, or some other general magazine, in the country of the author, thereby providing some evidence that the article does catch the interest of a general audience. Articles for the competition shall be submitted both in the original language (the published version) and preferably also in an English translation.

Articles (translations) may, however, also be submitted in French, German, Italian or Spanish. The English (or alternative language) version should be submitted both on paper and electronically.

There will be prizes for the three best articles, of 200, 150 and 100 euros, and the winning articles will be published in the EMS Newsletter. Other articles from the competition may also be published, if space permits. Furthermore, it is planned to establish a web-site containing English versions of all articles from the competition approved by the RPA Committee.

By submitting an article for the competition, it is assumed that the author gives permission to translation of the article into other languages, and for possible inclusion in a web-site. Translations into other languages will be checked by persons appointed by relevant local mathematical societies and will be included on the web-site.

Articles should be sent before 31 December 2002 to the Chairman of the RPA Committee of the EMS:
Professor Vagn Lundsgaard Hansen, Department of Mathematics, Technical University of Denmark, Matematiktorvet, Building 303, DK-2800 Kongens Lyngby, Denmark. e-mail: v.l.hansen@mat.dtu.dk
Read the Masters! Read Abel!
Otto B. Bekken

It appears to me that if one wants to make progress in mathematics one should study the masters and not the pupils.

This quotation from Abel was presented by his first biographer Carl Anton Bjerknes in 1880 [5]. The extract above is from Edwards [6], who continues:

It is as good an idea to read the masters now as it was in Abel's time. The best mathematicians know this and do it all the time. Unfortunately, students of mathematics normally spend their early years ..., and make little or no reference to the primary literature of the subject. The students are left to discover on their own the wisdom of Abel's advice. In this they are being cheated [6, p.105].

Edwards further develops his answer to 'why should we read the masters?' He quotes André Weil as saying:

As a young normalien I had studied Riemann, and later Fermat. I was persuaded very early that diligent attention to the great mathematicians of the past is a source of inspiration ... Having had the benefit of such experience, I naturally found myself led to include historical commentaries to put in proper perspective the expositions, which were in danger of falling into excessive dogmatism ... [6, p.107]

We refer to Edwards for more details of his arguments on why we should listen to Abel's advice today. The full passage concerning this advice in Ore's biography of Abel reads:

I have bought what I believe we do not have at home, and still have more here, which I will send in the spring ... Among the books is the fifth volume of the Mecanique Celeste. Perhaps you will be good enough to deliver it to Hansteen with my regards ... anyone who has composed with satisfaction. "Abel confirms his great admiration for Laplace in a marginal observation in his mathematical notebook: "It is readily seen that any theory written by Laplace will be superior to all produced by mathematicians of a lower standing. It appears to me ..." [11, p.138].

Searching Abel's Paris notebook, we found the marginal comment in French [2, p.79]. Laplace himself, however, is quoted by Kline [8, p.436], saying:

'Read Euler, read Euler! He is the master of us all ...'

Euler certainly belonged among the masters that the young Abel had read diligently.

For the 'Nouvelle Edition' of Abel's Works, Weierstrass helped to obtain some material from Berlin. After its publication, in a letter to Sophus Lie from April 1882, we find:

... as I learned to know him from Crelle's Journal during my student years, this has become of the greatest importance to me ... The representation given by Abel ... became the first important mathematical problem ... which I luckily could solve. In the 7th semester of my original political science studies I became absorbed by it, and I decided to devote myself to mathematics ... [7, p.104].

Weierstrass's first publication was on 'Abelian functions'. He was very much a follower of Abel, and according to Mittag-Leffler [9] (see also [12]), he often gave the advice to his students:

'Read Abel, read Abel!'

For the Weierstrassian rigorous analysis of today, a good starting point is a detailed study of some of Abel's letters. We will return to this, but to get the appropriate setting we need some highlights on Abel's mathematical life.

Without Holmboe, no Abel!

Niels Henrik Abel was born on 5 August 1802 near Finnøy in Norway, but his mathematical life really started in 1818. After spending some school years without showing any particular distinction, he got a new mathematics teacher. The young Bernt Michael Holmboe, from 1815 also an assistant of Prof. Christoffer Hansteen at the University, was only seven years older than Abel. Through Holmboe's new approach to teaching, giving the pupils appropriate problems to work on in addition to the regular chores, Abel's creative talent was readily fired. Soon Holmboe had to give him more work. Together Abel and Holmboe worked through Euler's three books on the calculus, which were university texts. Library records show Abel borrowing Newton's Arithmetica Universalis and Principia Mathematica, Gauss's Disquisitiones Arithmeticae, Lagrange's Calcul de Fonctions, and other works of the masters. It is really amazing which books and journals were available at the University Library of this young institution, founded only in 1813. Abel himself commented upon this, comparing his library to those in Copenhagen and Berlin.

Holmboe continued to be his closest friend, to whom Abel opened up both mathematically and personally throughout his life. Mathematically, Abel moved at a pace that Holmboe, of course, could not follow – and neither could his university teachers, the professors Hansteen and Rasmussen.

Typical is the story of the quintic equation – to prove or disprove the existence of a general formula for solving polynomial equations of degree 5. Through his reading, Abel became acquainted with Cardano and Bombelli's presentation of formulas for cubic and quartic equations. He quickly started to make his own research notes, Mathematiske Udarbeidelser, his first notebook from 1818-20, where we find 'Equations of degree 5, with solutions (by Cardan)' (see [1, p.139]).

In 1821 he thought he had solved the problem of the quintic equation. Holmboe, Hansteen and Rasmussen could find no weakness in his methods, so a short paper was sent to Professor Degen in Copenhagen for publication as a Danish Science Academy memoir. Degen could not point to anything wrong either, but he asked Abel to elaborate it more by giving details of an example: $x^5 - 2x^4 + 3x^3 - 4x + 5 = 0$. As we know, Abel himself found his mistake.

In 1824 he published his first proof that it was generally impossible to solve equations of degree 5 in the Cardano-Bombelli manner. Problems involving equations continued to be his favorite theme, as Abel wrote to Holmboe from Paris in October 1826. Degen's reply contained further important advice for Abel '... to study elliptic transcendental'.

This started Abel on his second main contribution to mathematics. His work with integrals and elliptic functions, which led to the famous 'Paris Memoir' and the 'race with Jacobi'. The mathematical details of this area are no longer in current standard curriculas. Here we concentrate on the third area in which Abel was interested, and where he is often mentioned as a founder and forerunner of what was to come, the theory of analysis. But first we need a few more details on Abel's life.

To Berlin and Paris

The Bergen bishop Pavel met Professor Hansteen in the western part of Norway, and wrote in his diary for July 1821:

... told me about a son of the Pastor Abel of Gjerstad, who now goes to school in Christiania [Oslo], and who is one of the greatest mathematical geniuses. When he has passed his examen artium, we plan to put together a grant for him to travel abroad. We expect to see in him one of the world's best mathematicians ...'

The rumour spread. Holmboe, Hansteen and Rasmussen understood that they had a jewel in their custody, and they lived up to the responsibilities. On their strong recommendation, the young Norwegian university (opened 1813) and the Parliament (created 1814) gave Abel a two-year fellowship to go abroad.

Abel's first stop was Copenhagen, and
then, with recommendations from the Directors of the University of Christiania, went to August Leopold Crelle in Berlin. Crelle was a famous construction engineer of German railroads and highways, but was also very much up to date on current mathematical research. Meeting Crelle became a new turning point of Abel’s life, and they developed a life-long (sic!) intense friendship. As we know, Crelle and Abel created the first German Journal für die Reine und Angewandte Mathematik. Almost all Abel’s works were published here in the first years 1826-29 of the Journal’s existence (see [10, p.20]).

Abel stayed in Berlin for only five months – very important months for our story. Here he read Cauchy’s 1821 Analyse Algébrique, and developed further his strong admiration for Cauchy’s work. He had already used Cauchy’s results on permutations in his 1824 paper on the quintic. In July 1826 Abel arrived in Paris, his next mathematical stop. His tragic personal acquaintance with Cauchy is illustrated through a letter to Hansteen in August 1826:

Finally I have arrived at the focus of all my mathematical wishes, to Paris ... Above all I would like to have my memoir completed ... to be presented to the Institute ... I have the hope that the Academy will print it ... [7, p.39]; and in one to Holmboe in October 1826:

I showed it to Cauchy, but he scarcely would look at it. Without bragging I dare say it is good. I am curious to hear the verdict of the Institute. ... Cauchy is 'jou', and he is unapproachable, but he is the mathematician who these days best knows how to present mathematics. ... He is now publishing a series of memoirs entitled Exercises des Mathématiques. I buy them and read them diligently.

Abel’s Paris Memoir was later described by Jacobi as ‘the most important discoveries done in mathematics in this century’, by Legendre as ‘monumentum aere perennius’, and by Picard as ‘there is maybe in the history of science no such important a theorem reached through so simple considerations’ (see [7, p.63]). It was presented to the Academy on 30 October 1826. Cauchy should have read it and given his judgement to the Academy before printing, but he never did. A long and exciting story can be told about the Memoir, ending with the rediscovery of Abel’s original in 1955 in Biblioteca Moreniana in Florence by Viggo Brun (see [11]).

The fate of his greatest memoir troubled Abel for the rest of his life, until on 6 January 1829, from his sickbed at Froland he wrote a two-page note on his ‘addition theorem’. The note was published by Crelle in the Journal, and it made Jacobi ask for the Memoir, which was finally printed in 1841. Without this note from Froland it probably would have remained in Cauchy’s drawer. Abel also spent some happy days at Froland. From his notebook during his summer visit there in July-August 1828, we quote, as his ‘manifesto’:

... The situation was that one tried to solve the equations without knowing that this was possible at all ... and if it then was impossible, one would search for even without finding the solution. Instead of searching by trying or guessing how to integrate functions, one should rather investigate if it is at all possible to do so in some specified way. If the problem is posed in this way, it contains the seed for the solution. I have treated many branches of the analysis in this way, and even though I often have posed problems that have exhausted my abilities, I have obtained results throwing light on the nature of quantities which belong to the task of mathematics to study.

Epilogue

In November 1826 Abel returned to Berlin, and in June 1827 was back in Christiania without job or income. He had offers from Crelle to remain in Berlin, but he had to return home! Abel was in love with his country – always and everywhere thinking of how to serve his university and his friends at home. This is shown by many passages from his letters.

Abel had no job. He had a chance in 1825-26 when Rasmusen became Chief Cashier of The National Bank, but the job went to Holmboe. The University administration now wrote that they were extremely satisfied with the ‘easy-to-understand’ way with which he organises and presents his lectures ...

In the meantime, Abel advertised in the newspaper for pupils in mathematics – both for laggard students and for schoolboys preparing for the examen artium. After Abel’s death at Froland on 6 April 1829, one of these students wrote a beautiful obituary [11, p.242].

Many who have been tutored by Abel have declared that his presentation was very intelligible, and personally I have the same experience. After having tried in vain to profit from a not very gifted teacher’s lectures, I went to Abel and asked him, if possible, to overcome my aversion against mathematics which had resulted from my long and fruitless efforts. During a three months’ period he proceeded so far that I got into my head algebra, function theory, ... It is unnecessary to say that I found his instruction clear and his methods very useful. [11, p.243].

Thus, Abel was also worth listening to, as a teacher!

References

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What sort of background do you come from?
My father's family come from Somerset in the West of England, where his father was a coal miner. My grandfather was adamant that his two sons should not go down the mine, and my father got to the nearby University of Bristol and became a PhD in chemistry. He eventually moved to London to a scientific job with the Government and married my mother from a London family. My brother and I were brought up in the suburbs of London, where I attended a small grammar school. From there I won a scholarship to read mathematics at Pembroke College, Cambridge.

Were there any teachers at school or university whom you particularly remember?
I had several very good teachers at school, and received a lot of encouragement in my ambition to study mathematics. At Cambridge I had a number of lucky breaks. In my second year Michael Atiyah joined the College and supervised my pure mathematics: an education in itself. When I told him of my interest in probability and statistics, he arranged for me to be taught by Dennis Lindley, perhaps the best teacher of the subject of his generation. There were also a number of quite dreadful lecturers in Cambridge at that time, who had better remain nameless.

There was very little probability in the Cambridge course when you did it. How did you come to choose to work in probability theory?
In my summer vacations I worked in the Post Office Engineering Research Station on problems in what we would now call applied probability, especially on congestion in telephone systems. I was fascinated by the mathematical problems that arise from stochastic models. In those days Cambridge mathematics was rigidly divided between pure and traditional applied mathematics, and probability seemed to me to combine the best of deep pure mathematics and real-world applications.

Who did you do your PhD under?
I had planned to work with Lindley, but he left Cambridge just as I started PhD work in 1960 and I was supervised by Peter Whittle. After a year he left too, and suggested that rather than following him to Manchester I should go to Oxford to work with David Kendall. I spent a year in Oxford, at the end of which David was elected to a new chair in Cambridge, and I returned with him as a member of the teaching staff. So I never finished my PhD.

Did switching supervisors mean that you had to switch problems?
My work on queueing theory had led me to more fundamental problems in Markov chain theory, and to what became the theory of regenerative phenomena. There was certainly a change of emphasis, and I was very much influenced by David Kendall, in mathematical style and taste as well as in substance. Although I was no longer his student, I worked closely with him until I left Cambridge for the new University of Sussex in 1965.

Did you enjoy a new university untramelled by tradition?
Sussex in the 1960s was a very exciting place, alive with new ideas and opportunities. My wife was teaching history there, and we made many friends across the whole range of subjects.

In 2002 the new universities of the 1960s are often difficult to distinguish from their older brethren. Have they added anything permanent to the system?
All British universities were affected by the new departures taken by Sussex, Warwick and the other new universities. Many of the things we now take for granted in traditional universities were pioneered by these universities, especially in new subjects and interdisciplinary collaboration.

After four years at one of the newest universities you went as professor to the oldest in England. How did Oxford contrast?
Statistics in Oxford in 1969 was frankly a mess. There was no professor of statistics, the only statistician who held a chair was Maurice Bartlett, who was Professor of Biomathematics and was supposed to concentrate on advising biologists about their statistical and mathematical problems. I was appointed Professor of Mathematics to raise the profile of probability theory (but not statistics) in the Faculty of Mathematics. Of course, Maurice (and his successor Peter Armitage) and I conspired to persuade Oxford to
take statistics seriously, and now there is a proper statistics department teaching mathematicians and non-mathematicians.

The local problems in Oxford do reflect a more global problem in integrating mathematics and statistics. Statisticians often feel hard done by in traditional mathematics departments and press for separate departments, courses and degrees. What do you feel about this?

Remember that statistics is not a subset of mathematics, and calls for skills and judgement that are not exclusively mathematical. On the other hand, there is a large intersection between the two disciplines, statistical theory is serious mathematics, and most of the fundamental advances, even in applied statistics, have been made by mathematicians like R. A. Fisher. It is important to expose students of mathematics to statistics, which many will choose as a career. There is no easy way to achieve the right structure in a university, and no single optimal solution.

Which of your mathematical results are you proudest of?
The one that has given me most satisfaction, and which I think lies deepest, is the characterisation of diagonal Markov transition probabilities. It is part of the theory of regenerative phenomena which I introduced, although it was inspired by David Kendall, and which I think an important area of the theory of random processes.

The result which has been most influential is undoubtedly the subadditive ergodic theorem, conjectured by John Hammersley and Dominic Welsh. They rightly saw that it would have a wide range of applications, and I was lucky enough to find a proof.

In terms of applications outside mathematics, my early work on queues in heavy traffic is now a standard part of operational research. Some biologists believe that some of my results in population genetics, especially a Markov process on equivalence classes of finite sets called the coalescent, are important for the understanding of genetic diversity.

How did you move into administration?
I got involved in the peer review work of the Science and Engineering Research Council, first in mathematics and then more widely, and in 1981 was invited to become its Chairman. I enjoyed the problems of research funding across a broad range of subjects, and when in 1985 I was asked to head the University of Bristol I welcomed the opportunity to lead a great research university.

Most mathematicians claim both to despise administration and to be at bad at it. Why do you differ?
There are plenty of counterexamples to your assertion. In Britain alone Peter Sarnak and Dyer was in charge of the whole university system, and Michael Atiyah was a very successful President of the Royal Society. In my experience many mathematicians have proved good leaders, and I should be surprised if this were negatively correlated with mathematical ability. Of course, an affectation of incompetence can be a useful defence mechanism.

A modern vice-chancellor not only has to take a lot of hard decisions but acts as a focus of resentment for many members of the university. Did you find it hard to take the personal animosity?
It is no good becoming a vice-chancellor if you want to be loved. On the other hand, you can be respected as someone with the interests of the university at heart, and as someone whose decisions are seen to be fair and considered. In practice, I found it possible to get on well with people with whom I disagreed about important issues.

Which decisions that you took as vice-chancellor are you most satisfied with? Which do you most regret?
My best and my worst decisions had to do with the appointment of particular professors. It is the most important job of a vice-chancellor to appoint the best possible academic leaders: there can be no good university without good professors.

Was it possible for you to keep up your mathematical interests as vice-chancellor?
Yes, but not as much as I would have liked.

You have now moved to be Director of the Isaac Newton Institute for Mathematical Sciences. Is it an easier job?
A very different job, but very challenging. The success of the Institute depends on choosing the most exciting fields of pure and applied mathematics several years ahead, and then attracting the best mathematicians from all over the world. My predecessors Michael Atiyah and Keith Moffatt have set me a very high standard.

People sometimes fear that the mathematical world will become divided into an elite group of researchers jetting every six months from one research institute to another and a lumpenproletariat of teachers.

Do you think this is likely to happen?
No. If you look at the lists of visitors to the INI, you see that most of them are in university teaching positions to which they return mathematically refreshed.

Even if the Newton Institute works on an international scale does it work at a British level? Can ordinary lecturers at a British university really find the time and resources to join one of your programmes?
We have asked this question, and the evidence so far is that they can. If we find evidence to the contrary, we shall approach our funders to seek resources to improve the situation.

You are Chairman of the Statistics Commission set up by the UK Government to keep official statistics honest. Is this task necessary? Can the Commission succeed in it? And should this be its main task?
There is a job to be done, both in ensuring the integrity of Government statistics, and in countering widespread scepticism along the lines of the sneer (attributed by Mark Twain to Disraeli) “Lies, damned lies and statistics”. Only time will tell whether we can succeed, but I am hopeful.

Finally I would like to ask about the European Mathematical Society itself. Why do you think it is necessary?
Because we live in a world in which increasingly decisions affecting the mathematical community are made at a European level. There is a pressing need to raise the profile of mathematics with those who take these decisions. There is much else that the EMS can and will do, but its most important job is to argue the case that mathematics is essential and must be supported.

If we do not hang together, we shall hang separately.

Some people see the EMS as a child which will grow up to be something like the AMS. What do you think?
The American Mathematical Society is a very successful operation in the US context. The EMS can certainly learn from the AMS, but Europe is not America. For instance, many countries have their own successful mathematical societies which the EMS must complement, not try to replace.
Tell us about how you took your first steps into new areas.

The lack of serious interaction between mathematicians and mechanicians in modern theoretical physics was a failure of the Moscow State University Department of Mechanics and Mathematics in the 1950s and 1960s.

I had the opportunity to get acquainted with the foundations of mechanics and with the theory of incompressible fluid at seminars by friends of mine, and this was all I could get in this direction at the Department of Mechanics and Mathematics.

I heard in Gelfand's circle that quantum mechanics conceals beautiful mathematics. I also heard from my brother [the physicist Leonid Keldysh] that quantum field theory was of great importance.

In the mid-1960s, influenced by the progress in the theory of elementary particles, the community of physicists thirsted to study modern mathematics. In turn, I also had the desire to study these branches of theoretical physics.

I started with statistical mechanics and quantum field theory and quickly understood that no success can be achieved this way: it is necessary to learn the material step by step from simple ideas to complicated ones. In due time, this scheme was thought through by Landau. Together with Lifshits they wrote a series of textbooks forming a high road for studying theoretical physics (though it is useful to study some parts by using textbooks of other authors): it is necessary to begin with Mechanics, then to proceed with Field theory and Quantum mechanics, and only after that should one study Statistical mechanics and Quantum field theory. It is also good to learn Hydrodynamics, Elasticity theory, Physics of continuous media, and Kinetics.

Following this path for some years, I decided to begin an active interaction with physicists of the Landau school at the end of the 1960s. Experts in theoretical physics heard something about topology and wanted to get acquainted with it. After a period of study I faced the same problem as that at the end of the 1950s: how should I start?

What was your first work in these new areas?

I was interested in Einstein's general relativity. I was deeply impressed by the fundamental discovery in this area that our universe is far from being eternal, living only 10-20 billion years, while continuously expanding.

Khalatnikov asked me to give a careful perusal of their researches devoted to the state of the universe in the vicinity of a singularity. Together with my disciple Bogoyavlenskii, I wrote a series of papers devoted to anisotropic perturbations of the standard model of the universe. We managed successfully to apply the technical tools of working with many-dimensional dynamical systems: I took the ideas of these tools from my participation in the seminars of my friends at the Department of Mechanics and Mathematics in the 1960s. However, the mathematicians in our department chose only things that could be rigorously proved, while we had to extend these limits.

It soon became clear that it is senseless to consider the cycle of compression that preceded the current expansion because, after a small perturbation, an isotropic compression achieves a Belinskii-Lifshits-Khalatnikov complicated regime with a complicated singularity that cannot be extended anywhere. We found out that the observable isotropy of the expanding universe does not follow unambiguously from the laws of the Einstein classical general relativity, in any natural statistical setting with initial data at an early stage if the matter is in some state accessible to the understanding of modern physics.

However, modern astronomical observations lead to the conclusion that the universe had already become isotropic at a very early 'inflationary' stage in which the substance was in a mysterious condition. This certainly decreased the value of works devoted to non-isotropic cosmological models.

I stopped my work in this area, although friends and colleagues (Zel'dovich, Khalatnikov, I. D. Novikov, and others) invited me to turn to quantum gravity with them, because I could not believe that a quantisation of the Einstein gravity is really necessary: the scales at which this quantisation must take place are too fantastic and unattainable.

How did you change to soliton theory, where...
so many important results are due to you? Victor: Well, in 1974, I got acquainted with the remarkable mathematical ideas of soliton theory – namely, the method for the inverse scattering problem, which had been discovered as a result of the joint activity of experts in theoretical physics and mathematicians in the 1960s. This method worked successfully for solitons – that is, for solutions of the well-known KdV (Korteweg-de Vries) equation with rapidly decreasing initial data. Is it possible to develop the corresponding periodic analogue? Since 1974 I have devoted my energies to this very problem. My discovery consisted in the close unity between the following branches of mathematics: the spectral theory of operators with periodic coefficients on the line, the theory of completely integrable Hamiltonian systems, and analysis on Riemann surfaces (that is, algebraic geometry). The main role in the construction of exact solutions of the KdV equation is played by the Hill operators or Schrödinger operators on the line with the remarkable finite-zone property.

As I proved, this property of the spectrum follows from a purely algebraic assumption – that a periodic differential operator is ‘algebraic’: this means that there is another differential operator that commutes with the given one.

The theory of finite-zone operators was soon completed by me and my disciple Dubrovin, and also by Matveev and Its, who actively joined the development of these ideas after my first work on this topic. Soon, in 1975, a part of these ideas was independently found in USA by Lax, McKean, and van Moerbeke.

Already, by 1974, Shafarevich had brought my attention to the fact that these constructions lead to new results, even in algebraic geometry per se, giving an explicit rational realisation of the entire space of modules of hyperelliptic Jacobians. These methods can be transferred without any modification from the Korteweg-de Vries equation to all one-dimensional systems integrable by the method of solitons.

For spatially two-dimensional systems (such as the Kadomtsev-Petviashvili equation), the situation turns out to be very interesting. The development of this method, which was realised in this case by Krichever (1976-77), required the total algebraisation of the procedure to release it from both the Hamiltonian systems and the self-adjoint operators: you obtain solutions of the Kadomtsev—Petviashvili equation by using only data from algebraic geometry.

This was a decisive step in understanding the connections between solitons and complex algebraic geometry. At the same time, the method presents difficulties: we face the problem of singling out real solutions having physical sense: for example, for the famous sine Gordon equation, the problem of the theory of real periodic solutions have remained open. Problems of this kind can be solved readily and effectively only within the framework of the theory of self-adjoint operators, but this is not the case for the sine Gordon equations.

Later on, many works devoted to the development of these ideas were completed at my seminar. Krichever, Dubrovin, Veselov, Bogoyavlenskii, Taimanov and Grinevich and I are now making serious progress here.

What were the most fundamental directions that you developed here?

I would like to mention the following directions:

1. The inverse problem for a two-dimensional Schrödinger operator for a fixed energy. We started developing this direction with Manakov, Dubrovin, and Krichever in 1976, but the most interesting soliton systems were found by Veselov and me later on, in 1984 (the Novikov-Veselov hierarchy).

2. The problem of classifying the commuting operators with rank greater than 1 and the deformations of holomorphic bundles over algebraic curves (Krichever-Novikov equations and the solutions of the KP equation of high rank). This theory was created in 1978-80 in collaboration with Krichever, and Grinevich and Mokhov also took part in it. Difference analogues of this theory were developed quite recently by Krichever and me: by the way, Krichever has beautifully applied these ideas to the investigation and generalisation of the so-called Hitchin systems.

Universal approach to the Hamiltonian formalism of systems integrable by methods of algebraic geometry – that is, the so-called ‘algebraic geometric Poisson brackets’. This direction was developed by Veselov and me in 1982-84. As Krichever and Phong indicated several years ago, similar symplectic structures mysteriously arise in Seiberg and Witten’s works on the supersymmetric Yang-Mills theory (for N = 2).

Analogue of the Laurent-Fourier bases on Riemann surfaces – namely, Krichever-Novikov bases and algebras, and the operator quantisation of a bosonic string. This direction was developed by Krichever and me in 1986-90.

This is the list of directions in soliton theory that I developed with my disciples and in which methods of algebraic geometry were intensively applied.

What about your conjecture giving a solution of the classical Riemann—Schottky problem by soliton methods?

For some years in the late-1970s I closely examined the formulas of Its-Matveev type for solutions of the KdV equation and of Krichever type for solutions of the KP equation. They are of the form \( u(x, y, t) = 2 \text{det} \left( \log (A \partial_x + B) + W + Z; B \right) + \text{const} \). I asked myself: ‘Is this expression an effective formula, as is the case in classical analysis?’ I decided that it isn’t.

We do not know in which cases the matrix \( B \) is determined by a Riemann surface, and this is precisely the Riemann—Schottky problem. Moreover, the vectors \( U, V, \) and \( W \) must be connected with the matrix \( B \) by complicated relations that nobody understands.

How can you make such formulas efficient? My idea was that one should initially regard the matrix \( B \) and the vectors \( U, V, \) and \( W \) as independent variables. All relationships among them must follow from the requirement that the entire expression satisfies the classical KP equation. If this is the case, then we obtain a significant effectiveivisation of the \( \theta \) functional calculus and of the solution of the Riemann-Schottky problem.

The first important result in this direction was obtained by Dubrovin in 1981, it was considerably strengthened by Arbarello and De Concini (1984). My conjecture was completely proved by Shiota (1986). This approach, starting with Dubrovin, was repeatedly used in soliton theory for practical effectivization of \( \theta \) function formulas. An analogue of this conjecture was investigated by Taimanov for Prym \( \theta \)-functions. In this case the KP hierarchy must be replaced by the so-called Novikov-Veselov hierarchy related to a two-dimensional Schrödinger operator.

How about methods of Riemannian geometry in the theory of systems of hydrodynamic type? What are the Dubrovin-Novikov brackets?

Since the early 1980s, I was interested in Poisson brackets in hydrodynamics under the influence of a circle of Landau disciples, Dzyaloshinskii and Khalatnikov. It turned out that Landau already knew these brackets by 1940 when trying to quantise a fluid. Two directions of my scientific works actually arose from this source of ideas: the many-valued calculus of variations and the theory of systems of hydrodynamic type.

Quasi-linear homogeneous systems of first-order differential equations (systems of hydrodynamic type) have been studied since Riemann, in connection with hydrodynamics of compressible fluid. Dubrovin and I investigated the following problem: when is such a system Hamiltonian? However, when describing an inviscid fluid, and it is natural to expect that they must be Hamiltonian. (We should not mix up this problem with the possibility of represent-

Victor Buchstaber with Sergey P. Novikov
ing a system as a subsystem or quotient system of a Hamiltonian system, because this is always possible."

In 1983 we introduced a class of 'brackets' on a Poisson type which gives a natural answer to the question: these brackets are based on Riemannian geometry. For diverse reasons, our discovery had many consequences. Many new important systems of hydrodynamic type arose in the 1970s and 1980s from soliton theory – Whitham (1971), Flashe-Forest-McLoughlin (1980), etc. – to solve asymptotic problems by using the scheme of 'non-linear semi-classics', successfully applied by physicists (Gurevich-Pitaevskii, 1973). When proving my conjecture, the postgraduate Tsarev successfully applied our Hamiltonian formalism and constructed a scheme for exact integration of Hamiltonian systems of hydrodynamic type on the basis of differential geometry (1985). Later, in the second half of the 1980s, as a result of a numerical and analytical researches in which Avilov, Krichchev and Potemin worked with me, we combined this technique with analysis on Riemann surfaces and analytically exactly solved the problem of the dispersed analogue of a shock wave, whose study was begun by physicists in 1973.

In our works in the 1980s, a lot of beautiful mathematics appeared, both algebra and geometry, which was used by Dubrovin in the topological two-dimensional quantum field theory. These ideas have recently been successfully applied in the classical problem of orthogonal coordinates on flat spaces (Dubrovin, Zakharov, and Krichchev).

Very interesting non-local extensions of Poisson brackets, whose investigation was started by Mokhov and Ferapontov (also participants at my seminar) have increased the abilities of the method. These extensions still attract our attention. I note that, generally, the appearance of a lot of diverse important Poisson brackets, the knack of using them, and the understanding of their role in modern science are among the achievements of soliton theory. After this theory it became clear that the local Poisson structure is the major primary object in theoretical physics, while the symplectic structure is preferable in pure geometry.

What is the many-valued calculus of variations (the Morse-Novikov theory and the Novikov ring)? How is it related to the Wess-Zumino-Novikov-Witten quantum field model?

The many-valued calculus of variations is also rooted in my Hamiltonian researches. Examining textbooks in hydrodynamics, I observed in 1981 that the so-called 'Kirchhoff equation' for the free motion of a rigid body in an ideal incompressible fluid is a Hamiltonian system on the Lie algebra of the isometry group of three-dimensional Euclidean space.

Apparently, this fact was not mentioned earlier. Mechanics soon pointed out that the equations of motion of a top – that is, a rigid body in a gravity field with a fixed point – can also be represented in a similar form. I noted that this system can be reduced to the motion of a charged particle along the surface of the two-dimensional sphere (with some metric) in an external magnetic field with non-zero flow through the sphere. This situation is like a 'Dirac monopole!' Certainly, the physical magnetic field is absent here; however, mathematically, a magnetic field turns out to be equivalent to the correction of Poisson brackets (symplectic structure) that occurs in the reduction of the system.

Intending to develop something similar to Morse theory for finding periodic orbits on the sphere (that is, 2-tori of an initial system), I understood that the mechanical action of the above system on the sphere is not defined as a single-valued functional: only its variation is correctly defined as a closed 1-form on the space of closed paths. I was amazed by this simple fact, and immediately understood its fundamental role in mathematics and theoretical physics. Neither the calculus of variations nor field theory discussed this possibility. As a corollary, I came to the following conclusions:

1) In quantum mechanics and quantum field theory, a 'topological quantisation of the coupling constant' arises, based on the requirement that some 1-form, the so-called 'variation of action', defines an integral 1-cohomology class of the space of fields (under appropriate normalisation). This is necessary for the Feynman amplitude to be a single-valued functional. It is interesting that Dirac's idea was different: he started from the Schrödinger formalism and (in modern language) required that the magnetic field must be the Chern class of a bundle whose fibres give the Hilbert space of states. The new approach is much more convenient for generalising the Dirac monopole to quantum field theory. I gave a classification of all local Lagrangians of field theory that lead to non-trivial 1-forms. It later emerged that, when evaluating anomalies in the Yang-Mills theory several years earlier, Wess and Zumino had obtained a Lagrangian that was a special case of those above, but saw no analogy with the Dirac monopole and carried out no topological analysis. Some physicists – Deser, Jackiw, Templeton (1982), and Witten (1983) – arrived at related ideas in diverse examples soon after me.

2) It turned out that there is a many-valued analogue of Morse theory for closed 1-forms on finite-dimensional manifolds; however, instead of usual CW complexes, the gradient of a 1-form generates complexes over specific rings, which were later on called Novikov rings and used for the homology theory of Floer type, where the analysis is more complicated but the heart of the problem is the same – namely, 1-forms occur instead of functions.

3) In collaboration with my disciples (Taimanov and Ginevich), I also obtained a series of results on periodic orbits in a magnetic field. Some deeper observations are still insufficiently justified; here there are interesting mathematical problems.

What scientific and pedagogical ideas underlay the book series 'Modern geometry'?

Many years ago, in the 1960s, I formulated a plan to present 'modern' topology, created since the early 1950s, in the educational literature: in my opinion, this is a great achievement of 20th-century mathematics. Until the second half of the 1960s, the best achievements were reasonably presented in the original works, such as those by Pontryagin, Serre, Cartan, Thom, Milnor, Smale, Atiyah, Hirzebruch... I always tried to follow their example, to write large works that are as clear as possible. The topological achievements of that time could be learnt from these works.

However, a formalised abstract style that unnecessarily complicated the exposition for algebraic formalism had already appeared during this period. It is very difficult to understand the core of the subject from such texts. This style gradually began to appear in topology, and not only topology. Besides, starting from the late-1960s,
several of the best papers remained uncompleted by their authors, but this was not understood by a wide community – at least, no publicity was given to this fact. It became clear that it’s not possible to build a house starting from the tenth floor, but some people still do not apply this analogy to science. It is also absurd to try to present this totality of knowledge in a superficial formalised language, since the material would become too complicated that nobody could learn it.

For more than ten years (1985-96) you were President of the Moscow Mathematical Society, whose role in the creation of the famous Moscow mathematical school of the 20th century has been written about many times. What can you tell us about this, and what is the role of the Society now?

Yes, the Moscow Mathematical Society, which is the mathematical face of the Department of Mathematics and Mathematics, is the main scientific arena for the mathematicians of the Moscow school, whatever they work on.

Our society was founded in the 19th century, but it progressed as a consequence of the development of the Moscow mathematical school in the 1910s and 1920s, especially when the presidents were Zhukovskii and Egorov, the founders of outstanding schools of mechanicians and mathematicians. The Egorov-Luzin school became famous all over the world and determined the face of Moscow mathematicians. In the 20th century, all mathematical activity in the 1920s and 1930s was concentrated around the Society, being interrupted occasionally by periods of hunting by the Soviet system for intellectuals – for example, during 1929-33. So it was till the mid-1950s. Since the mid-1960s, after passing through a difficult period, the Society has won back its position as a central forum for Moscow mathematicians, and has successfully kept this ever since.


In the late Bolshievic period of the 1970s, marked by severe anti-Semitism as a state policy and persecution of liberal intellectuals, our Society faced great difficulties. In the 1980s, the connection with MGU was weakened, where an anti-scientific approach had prevailed, especially at the Department of Mechanics and Mathematics – the more so, since the leadership of MGU began unskillfully to prove Einstein’s general relativity, etc. However, we managed to keep our scientific face.

After the disintegration of the USSR in the early 1990s, we reorganised and strengthened our connection with the Steklov Institute, where a process of renascent proceeded; much was done by us at this time to create and stabilise the Independent University. This work has proceeded quite successfully in the last few years.
The Union of Czech Mathematicians and Physicists was one of the oldest learned societies in the Czech Republic. It will celebrate 140 years of its existence in 2002.

History
Let us start with a brief survey of the development of the activities in mathematics and physics in the region that is now occupied by the Czech Republic.

The eldest educational institution in the area is the Charles University, which was founded by the Holy Roman Emperor Charles IV in 1348. However, teaching of mathematics and physics of significance began only around the middle of the 18th century. At that time, polytechnic institutions were founded in Bohemia, and the so-called Royal Czech Learned Society was established. (We recall that Bohemia was an integral part of the Austrian – later Austro-Hungarian – Empire until 1918.)

Several outstanding scientists lived and worked in Prague in those times – in particular, Stanislav Vydra (1741-1804), Bernard Bolzano (1781-1848) and Christian Doppler (1803-54). With the growing interest in activities and teaching of mathematics and physics, demand increased for a society that would support the developments of research and teaching in these sciences, in particular among students. As a result, on 28 May 1862, the Society for Open Lectures in Mathematics and Physics in Prague was founded, and on this day our Union came into existence. Soon, the Union obtained support from university teachers, the most important of whom were Filip J. Kulik (1793-1863), Ernst Mach (1836-1916) and Augustin Seydler (1849-91).

In 1863, Professor Kulik donated to the Society a good part of his enormous mathematical library; the remaining part was inherited by the Society after his death. In 1868, Professor Mach offered the Society his lecture theatre for meetings and his laboratory for physical experiments. In 1869, the Austrian police headquarters registered the society (having by this time 69 members) under the new name Union of Czech Mathematicians.

In the first years of its existence the Union made a significant contribution to the creation of mathematical and physical terminology in the Czech language, and on 5-6 August 1870, it organised the first congress of Czech physicists and mathematicians.

In 1872, on the 10th anniversary of the establishment of the Society, the first number of a new journal was issued. The journal was called Èasopis pro pìstování matematiky a fysiky (Journal for the Cultivation of Mathematics and Physics), and was published continuously (with a forced break during World War II) until 1951, when it was split into Èasopis pro pìstování matematiky (Journal for the Cultivation of Mathematics – in 1991 renamed as Mathematica Bohemica) and Èeskoslovenský Èasopis pro fyziku (Czechoslovak Physics Journal).

In 1873 the Union began to publish textbooks in mathematics and physics, and in 1892, a Supplement for High-School Students, was included in the membership journal: at that time, this was quite an innovative idea.

At the beginning of the 20th century, there was a further blossoming of mathematics and physics. The Union was a centre for discussions, sparked by a strong movement towards the reform of education in mathematics and the other sciences. The number of Czech secondary schools began to grow in Bohemia and Moravia, and some of the founders of the Union gained recognition for this.

The Union’s branches outside Prague soon began to grow. The most important of these were those in Brno and Bratislava, established in 1913 and 1929, respectively.

In 1911, departments of theoretical physics were opened at both parts of the University, which since 1882 had been divided into Czech and German parts. Albert Einstein (1879-1955) was living and working in Prague during the years 1911-12.

After World War I the Union became practically the only publisher of textbooks, monographs and journals in mathematics, physics and related sciences. In 1919, the Union obtained a license for printing, publishing and selling books, purchased a printing house and established its own Publishing House and bookshop.

The establishment of Czechoslovakia in 1918 brought important changes in mathematics and physics. In 1921, the Faculty of Sciences separated from the Faculty of Humanities. The Prague Polytechnic was reorganised and called the Czech Technical University. In the same year, the Union changed its name to the one it bears today.

During the twenty years of independent...
Czechoslovakia, the number of members of the Union rapidly increased, as did the scope of its activities. In 1953, the Union’s Publishing House merged with Prometheus, the Publishing House of mining engineers, thereby establishing a publishing centre for technical literature. In 1955, the Union started to run a society for the production of tools for science and education. In 1958 the house in Žitná 25 was built, and the Union moved its headquarters there; the building currently houses the Mathematical Institute of the Academy of Sciences of the Czech Republic.

During World War II the Czech universities were closed by the Nazis. In this difficult period the Union did the best it could to convey information of new results to the younger generation by organising various courses and publishing monographs written in a generally understandable manner, even though the publication of the membership journal was forbidden by the Nazis.

In 1948, the Communist regime took over power in Czechoslovakia. One of its first steps was a forced ‘nationalisation’ – or rather, confiscation of all private property. As a result of this process, the Union lost its Publishing House, library and bookshop.

In the early 1950s the Czechoslovak Academy of Sciences was established, and the Union became a learned society attached to the Academy. The Union’s property was transferred to the Academy; in particular, the mathematical part of the Union library became the basis for the library of the Mathematical Institute of the Academy, where it has been taken care of ever since.

In 1962, the Union convened its Centenary Congress: a commemorative postage stamp was released by the Czechoslovak Mail on this occasion.

In 1968, the Physical Research Section was established, and through its representation the Union became a member of the European Physics Society.

In 1969 a federalisation process took place in Czechoslovakia. As a consequence, the Union of Slovak Mathematicians and Physicists began.

In 1987, the 125th anniversary of the Union was celebrated in Prague. The Czechoslovak Mail released three postage stamps, and the Union released a Commemorative Medal that has been used ever since.

In 1990 the Union became a foundation member of the European Mathematical Society. Through the representation of the Mathematical Research Section, and in 1992 the Union became a reciprocity member of the American Mathematical Society.

In 1995 the Union attempted (without success) to regain its confiscated property.

In 2000, the Mathematical Research Section organised a number of propaganda events commemorating the World Year of Mathematics 2000; another postage stamp was released by the Czech Mail.

Structure and organisation

The Union has about 2300 members, more than half of them being secondary school teachers. The supreme body of the Union is the Union Congress, which is convened every three years. In between Congresses, the activities are supervised by the Central Committee, headed by the President of the Union.

The Union is a member of important international organisations, including the European Mathematical Society, the European Physics Society, and is also a reciprocity member of the American Mathematical Society.

Present Activities

During the 140 years of its existence, the Union of Czech Mathematicians and Physicists has dedicated an enormous effort to maintain and improve the teaching and research in mathematics and physics in all types of educational and scientific institutions. In the field of science, either independently or jointly with other institutions of higher learning or research, it organises national and international conferences, symposia, seminars and various seasonal schools. It assists in the publication of textbooks and monographs, closely cooperates with the Publishing House Prometheus, Ltd., and takes part in the preparation of national basic research projects.

The Union publishes the journal Pokroky matematiky, fyziky a astronomie (Advances in Mathematics, Physics and Astronomy), specialising on survey papers from contemporary mathematics and physics, discussions of pedagogical topics, and information about current activities of the Union. Among the journals published by the Union we further find Matematika-fyzika-informatika (Mathematics-Physics-Information), aimed at the theory and practice of teaching of the three subjects, Většel matematiky (Teacher of Mathematics), dedicated to the didactic side of mathematical problems, Školská fyzika (Physics in School), devoted to the teaching of physics, and finally Esokoslonský Ėasopis pro fyziku (Czechoslovak Physics Journal) and Informace MSF (Mathematical Research Section Newsletter), providing information for members of the respective sections.

In the field of education the Union systematically studies the current state of the teaching of mathematics and physics and suggests ideas for its improvement.

For more than 40 years the Union has been organising various competitions for gifted young students at all levels – in particular, mathematics Olympiads, physics Olympiads or the Student Research Competition, traditionally attended in great numbers by the most brilliant students.

The Union awards a Commemorative Medal to outstanding scientists, both from the Czech Republic and abroad, usually to those who gained recognition for the development of mathematics or physics in the Czech Republic.

Most of the material presented in this article was taken from [1]. Up-to-date information was collected with the help of several colleagues – in particular, Jiří Rákos and Bartislav Novák.

Reference


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Address: Department of Mathematical Analysis, Faculty of Mathematics and Physics, Charles University, Sokolovská 83, 186 75 Praha 8, Czech Republic.
Mathematicians' Careers
Analysis of a Questionnaire
Ina Kersten and Emilia Mezzetti

The main issue of the EMS Committee for Women and Mathematics in the last two years has been to distribute in the European mathematical community a questionnaire on the careers of mathematicians and to try and analyse it. The questionnaire (which follows) contains questions about progression in the career (age, age of Ph.D., age of first permanent position, number of temporary positions, etc.), about family (job of parents and of partner, number of children, etc.), about scientific activity (age when wrote best paper, possible gaps in mathematical production, and reasons for these gaps). Our aim was to check whether it is true, and in what measure, that there are differences between the Curricula Vitae of men and women, and in particular whether it is true that the scientific career of women is generally slower, mainly because of family duties, especially children. Were these hypotheses confirmed, we would have a basis to start some concrete action, for instance against age limits in announcements for grants and prizes, which seem to be particularly discriminative to women.

The questionnaire
Are you male or female?
How old are you?
What is your nationality?
How many children do you have?
At what age did you complete your Ph.D.?
How many countries have you studied/worked in?
What is your mother’s job? What is your father’s job?
Do you have a permanent job?
How many years after your Ph.D. did you obtain your first permanent position?
How many temporary mathematical jobs have you had?
At what age did you write the paper of which you are most proud so far?
Have you had any gaps in your mathematical career?
If so, how long were those gaps?
In your opinion, what were the reasons for those gaps?
Comments:
In some versions, the following questions were added:
What is your partner’s job?
Did you choose your place of residence motivated by your career or by that of your partner?
Did the problem of the residence play a role in your professional life?

The questionnaire was distributed during the 3rd European Congress in Mathematics in Barcelona and its satellite meeting New women in mathematics. It was also published in the EMS Newsletter and the newsletters of some other mathematical associations in Europe, and personally distributed by members of the committee. We have collected 109 answers, 52 by women and 57 by men: not a big number. This shows, in our opinion, that unfortunately mathematicians have no wish to fill out questionnaires, and are not really very interested in the problem.

Almost one half of the respondents (45%) were from Norway: indeed the questionnaire was distributed in a capillary way in Norwegian mathematical departments, and the answers collected by secretaries. So the picture of the situation in Norway is rather faithful. Of the other respondents, 15 were German, 13 Italian, but other countries were still less represented. There were a few answers from Russia and Romania, but none from other East European countries.

Many respondents obtained a permanent job before completing their Ph.D.
On average, the female respondents are 6 years younger than the male respondents. This obviously affects the answers when the best paper was written: female age 32 and male age 36. The mean age of a Ph.D. is however the same for men and women.

Gaps in Mathematical Career
46 respondents (26 female and 20 male) said that they had gaps
in their mathematical career.

Frequency of reasons given by the respondents for gaps in their mathematical career:

<table>
<thead>
<tr>
<th>Reason</th>
<th>Female</th>
<th>Male</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Childcare</td>
<td>9</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>Professional, Academic</td>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Manager</td>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Family</td>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>No Problem, Difficulty</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

Number of respondents with a permanent job: 87/109 (female: 35/52, male: 52/57)

How many years after your Ph.D. did you obtain your first permanent job?

The question of possible gaps in the mathematical career had rather surprising answers: more women than men had gaps, but the percentage is high also among men: 36%. For women the more frequent reason is family, but there are also academic duties or personal problems as depression or stress. Among men, all these reasons appear and moreover military service.

Partner’s job
Answers to the question about job of partner and parents are rather interesting, but maybe not really related to our aim: the mother is often a housewife, the father an engineer, or a school or university professor, often in a scientific topic.

33 respondents (26 female and 7 male)

<table>
<thead>
<tr>
<th>Job</th>
<th>Female</th>
<th>Male</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematician</td>
<td>4</td>
<td>9</td>
<td>13</td>
</tr>
<tr>
<td>Computer scientist</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Professor</td>
<td>5</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>School teacher</td>
<td>5</td>
<td>4</td>
<td>9</td>
</tr>
</tbody>
</table>

Other questions, for example the one about number of temporary jobs, appear not relevant at all.

SUMMARY
In conclusion, we have to admit that the sample we have collected is too small to allow us to draw any meaningful conclusion.

The results of this questionnaire have been illustrated during the 10th international meeting of European Women in Mathematics (EWM) in Malta, 24-30 August 2001, where several members of our committee were present.

An interesting and lively discussion followed. Particularly interesting was the contribution of Doris Janshen, a sociologist from the University of Essen. She gave us several suggestions. We should start again from the beginning, with a new well-thought-out questionnaire, taking into account as a basis the results of the previous one. We should concentrate on a few countries only, and try and collect a representative sample, as in Norway last time. Before distributing the new questionnaire, we should make some samples, testing it on some selected EWM members, for example. This is what we plan to do.

For example, mathematicians of Eastern Europe did not show much interest in this kind of statistics, maybe because it is not difficult to obtain a permanent job after a Ph.D. in these countries. A group in Ukraine, coordinated by Polina Agranovich, has now prepared another series of questions and is currently distributing it in two universities in Kharkov. It is mainly devoted to understanding the reasons for choosing mathematics and possible gaps in the career.

To conclude, we quote three recent articles that are somehow related to our work.

The first one is a report, written by A. Abele, H. Neunzert, R. Tobias and J. Krüskens, about the interdisciplinary project entitled Women in mathematics: factors determining mathematical careers from a gender comparative perspective, and supported by the Volkswagen Foundation. The article appeared in the Newsletter of the German Mathematical Society, DMV-Mitteilungen, 2-2001, p.8-16. It has recently been translated into English and will appear in the EMS Newsletter. It contains several very interesting data and an analysis of the development of the situation of women mathematicians in Germany. Among other things, it confirms the sometimes questioned fact that women and men have the same potential capability of doing research. Women who succeed in concluding Ph.D. studies in Germany obtain completely satisfactory results and get the same marks as their male fellows.

The second article is by Michèle Audin (Sur les étudiantes en mathématiques, Gazette des mathématiciens 87 (2001), 41-49, Newsletter of Société Mathématique de France). She analysed the percentages of girls among first- and second-year students of mathematics in her university in the 1990s and compared the results of the exams. She concluded that girls choosing to study mathematics are much more motivated than boys and get better results. Once more, this convinces us that a stronger female presence would be of great advantage to the mathematical community, that could enjoy big unexploited potentialities.

The last one is a recent article by Reuben Hersh, published in...
FEATURE

The Mathematical Intelligencer: Mathematical menopause, or, a young man’s game? (Math. Intelligencer 23 No.3 (2001), 52-60). It deals with the theme of the presumed incapacity of doing research in mathematics after a certain age. On the basis of research carried out among his friends and acquaintances (about 65), the author concludes, among other things, that if it is true that creativity decreases with age, then it is replaced by experience and the capacity to coordinate the work of other people. So it is possible to continue a good level of scientific activity after having crossed the famous threshold of 40 years, sometimes considered as a limit age.

A short report on this questionnaire programme, by Ina Kersten and Emilia Mezzetti, will appear in the Proceedings of the EWM conference in Malta, to be published by World Scientific. Ina Kersten, Mathematisches Institut, Universität Göttingen, Bunsenstrasse 3-5, D-37073 Göttingen, Germany, e-mail: kersten@uni-math.gwdg.de Emilia Mezzetti, Dipartimento di Scienze Matematiche, Università degli Studi di Trieste, Via Valerio 12/1, 34127 Trieste, Italy, e-mail: mezzette@units.trieste.it

European Women in Maths Web-based Mentoring Scheme

In August the EU agreed to fund a project proposed by the organisation European Women in Mathematics to provide web-based mentoring to women in mathematical sciences in Europe. Recent reports have highlighted (yet again) the lack of women in higher positions in academia across scientific disciplines. The EU is committed to improving the human potential across Europe, and in particular, to realising the talent of the female population, so this project has been given the go-ahead as a step towards encouraging women to progress in their mathematical science careers. The funding period for the EU scheme is 2 years and the scheme will be operated from Oxford Brookes University in the UK.

Aim and scope of project

The aim of the web-based mentoring scheme is to enable new women mathematical scientists (for example, graduate students, those considering graduate work, postdoctoral students) to find mentors amongst the mathematical science community who can advise them on academic issues and also on issues such as how to apply for grants and how to prepare work for publication. Mentors can also advise on broader gender-related issues faced by women in a mainly male-dominated environment. Using the web to facilitate the mentoring scheme will enable women to form links with mentors across Europe.

Similar schemes are now starting up across the world – for example that run by the American Women in Mathematics organisation. We hope to link with them to provide mentors for European women, and also to provide US mentors for those considering studying in the US. We hope that schemes of this nature will contribute to the support network for women in mathematical sciences and encourage women to progress in their mathematical science careers.

Further information

If you are interested in joining the web-based mentoring project as a mentor, or if you would like to use the scheme to find your own mentor, please get in touch. We shall be actively seeking mentors soon and, when the project is up and running (later this year we hope), we will be inviting those who require mentors to visit the site.

Contact: Dr Cathy Hobbs, School of Computing and Mathematical Sciences, Oxford Brookes University, Gipsy Lane, Headington, Oxford OX3 0BP, UK.

e-mail: cahobbs@brookes.ac.uk

Addendum to Obituary of Jacques-Louis Lions

(issue 42)

In addition to the series that Jacques-Louis Lions edited, there is one more: Studies in Mathematics and its Applications (with H. Fujita, H.B. Keller and G. Papanicolaou), 30 vols., North-Holland, 1976-2001. The author’s contact details are: Philippe G. Ciarlet, Laboratoire d’Analyse Numérique, Université Pierre et Marie Curie, 4 Place Jussieu, F-75005 PARIS, France. e-mail: pcv@ann.jussieu.fr

tel: (33)1.44.27.51.13; fax: (33)1.44.27.72.00

Journal of the European Mathematical Society

The next issue of JEMS (Vol. 4, No. 1) contains just one paper of 114 pages: Andreas Knauf, The n-centre problem of celestial mechanics for large energies.
Norway Introduces Major International Prize

There is no Nobel Prize for Mathematics, but now The Abel Prize has come into being

Niels Henrik Abel (1802-29) is one of the world’s most notable mathematicians. He left deep tracks behind him in many fields. His points of view and his approaches were new and had decisive significance for the development of mathematics as a science. Abel solved problems that mathematicians had been struggling with for centuries, and he posed approaches to problems with which mathematicians are still working.

The year 2002 will be the 200th anniversary of the birth of Niels Henrik Abel, the leading man of science in the history of Norway. To mark this occasion the Government of Norway, at the suggestion of the Department of Mathematics at the University of Oslo has undertaken to establish an Abel Prize in Mathematics, following the model of the Nobel prizes.

The Abel Prize has been well received internationally, as attested to by The International Mathematical Union (IMU):

The Executive Committee of IMU in its recent annual meeting, that took place at the Institute for Advanced Study, in Princeton, considered the creation of the Abel Prize as the most important project in many years for the development of mathematics worldwide, in fact as capable of greatly changing the scenario within a few years of its establishment. Of course, the question of having an award similar to the Nobel Prize for Mathematics is a century old, and its lack is a perpetually discussed feature of the scientific work of our community.

Grant Programme for the Abel Bicentennial Conference
Oslo, 3-8 June 2002

The European Mathematical Society has been informed that the Norwegian Government has given a grant to cover travel and other expenses for a number of young mathematicians from Eastern Europe and the Former Soviet Union to attend the Abel Bicentennial Conference in Oslo from 3-8 June 2002. The Abel Bicentennial Conference will be the occasion to introduce the newly established Abel Prize to a wide international audience, and this Grant Programme is intended as a part of this launch of the Prize.

The EMS has been asked to nominate 15 young mathematicians for a travel grant to attend the Abel Bicentennial Conference. The EMS Executive Committee has decided that its Committee for the Support of Mathematicians from Eastern European Countries should make these nominations.

Applicants are hereby invited from among mathematicians from Eastern Europe and the Former Soviet Union, who are not older than 35 years.

Applications should include a short CV of the candidate (including contact details), brief information on their research interests, a list of their most important publications, and a letter of recommendation from an appropriate person (such as a senior colleague or collaborator).

Please send applications to the Chair of the Committee, preferably by electronic mail to the following address: ... or by mail to Professor Andrzej Pelczar, Instytut Matematyki, Jagiellonian University, Reymonta 4, 30-059 Krakow, Poland), together with an electronic copy addressed to Ms Tuulikki Makelainen in the EMS Secretariat (makelai@kantti.helsinki.fi).

Applications should be received not later than 20 April. Successful candidates will be informed as soon as possible (preferably by electronic mail), and hopefully by 6 May.

Andrzej Pelczar
PROBLEM CORNER

Problem Corner: Back to Normality

Paul Jainta

Croatian mathematics competitions at school
Croatia is recovering from the troubles of the 1990s – in particular, its educational set-up seems to have remained intact. Željko Hanjš, a lecturer at the Department of Mathematics, University of Zagreb, gives us a brief insight behind the scenes of mathematical talent spotting in Croatia. Hanjš was himself a contestant in the International Mathematical Olympiad in 1977, and later acted as the leader of the Croatian IMO team in 1985 and from 1993 till 1999. Here is his account.

Our country has about 5 million inhabitants and an area of 56000 km², so it is astonishing that mathematics competitions in this small area have survived for more than 40 years. Initially, they were aimed at students who attended secondary schools, but from 1965 on they have been expanded to primary schools too, including classes from ages 4 up to 8. The hierarchy of competitions that existed in Croatia unrevised since 1992 is as follows.

The first rather loose selection of mathematically gifted youngsters is carried out at school every January and February. The scene for this stage is thus provided by the intimate atmosphere of the educational institution before the competition jumps across school boundaries.

Municipal competition
Municipal competitions are organised in the larger towns with a total of about 8000 pupils in primary schools and approximately 2000 students in secondary schools. For the young participants these occasions represent stirring events, especially if they are involved for the first time. The municipal stage takes place at the beginning of March. The problems are chosen and prepared by separate subcommissions, responsible for entrants from primary school and secondary schools, respectively. These commissions are full of enthusiastic teachers and lecturers who pick all the questions with great care, and they grade the written papers and decide which students are permitted to enter the second stage.

District decision
Croatia is divided into 20 regions, with the capital Zagreb as a separate unit. The second stage includes all districts, and usually takes place in the middle of April. Again, each regional host town accommodates its own board to judge the results and pass them on to the national commission. The most successful competitors are awarded a price for the first time in the contest cycle.

National round
The members in the national board have the responsibility of deciding which contestants will be invited to attend the national competition. To this final stage only 7-formers from secondary schools and 8-formers from primary schools are admitted. The place of the final competition changes whenever possible. About 180 contestants and roughly 60 teachers and 40 members of the national contest board are travelling there separately. As a rule, this spectacle lasts for four days. On the second day when students are pondering on their solutions, lectures for the unoccupied teachers and coaches are given, split into subjects adequate for primary or secondary school curricula. Some topics sound good: the Euler and Fermat Theorem, the resolution of irrational equations, how can trigonometry help in solving algebraic problems? or an examination of a class of functions of the form $f_n(x) = \cos^n x + \sin^n x$. The third day is usually reserved for a picnic with the entrants.

Soon after the results have been announced, we have to choose the team that will represent our country at the International Mathematics Olympiad. If the final round does not produce clarity in the line-up of this national team, further examinations follow to give additional information about the individual mathematical abilities of supplementary candidates. This ‘screening’ is scheduled for the afternoon of the third day, and as a rule roughly 15-20 entrants have to undergo this extra ‘treatment’. Finally, the team is put together. In the evening of the same day the results are announced to the contestants. And in the morning of the day of departure, the assembled staff meet together to discuss how working with mathematically talented youngsters could be improved in future, or what topics the indigenous journals Matka, which is enjoyed by students at primary schools, and Matematičko- fizički, which attracts pupils from secondary schools, should pick up next.

Regional contest
Shortly after the final display is over, the time has come for students who visit fourth to sixth classes. They compete in regional contests that are organised in each of the four subregions of Croatia.
PROBLEM CORNER

Summer school for young mathematicians

In summer, ever since 1972, a summer school is offered for young mathematics adepts, and a similar institution for primary school students opened its doors a few years ago. Meanwhile, about 100 young ace mathematicians amuse themselves with geometrical figures and numbers year by year. All these enumerated measures are under the auspices of the Croatian Mathematical society with support of the Ministry of Education and Sports.

Our thanks go to Željko Hanjš, who acted from 1991 onwards as Editor-in-Chief of the secondary school students’ journal Matematički-fizički List and is thus a proficient reporter. The people of Croatia, especially the residents of Istria and Dalmatia, are traditionally growers of grapes or olives, or fishermen and seafarers. But in those regions, too, some ticklish maths problems are cultivated. Here is a sample.

134 Prove that there are at least 2000 triples of positive integers (a, b, c) such that \(a^{15} + b^{15} = c^{16}\).
(Municipal competition for secondary schools, 2000, II class)

135 Let a and b be real numbers that satisfy both \(a^3 - 3ab^2 = 44\) and \(b^3 - 3a^2b = 8\): determine \(a^2 + b^2\).
(County competition for secondary school students 2000, I class)

136 A given rectangle with sides a and b is circumscribed by another rectangle of area \(m^2\): determine all possible values of \(m\).
(County competition for secondary school students 1999, III class)

137 Given a right triangle with angles \(\alpha\) and \(\beta\), legs a and b and hypotenuse c.
Prove the inequality: \(\cos^2(\alpha - \beta)/2 \geq (2ab)/c^2\).
(County competition for secondary school students 2000, II class)

138 You have coins worth 1, 2, 5, 10, 20, 50 lipa and 1 kuna (= 100 lipa).
Prove that if you can pay a bill for \(M\) lipa with \(N\) coins, then you can pay another bill for \(N\) kuna with \(M\) coins.
(National competition 2000, I class)

139 A square is given in the plane with vertices \(T_1\) (1, 0), \(T_2\) (0, 1), \(T_3\) (–1, 0), \(T_4\) (0, –1).
For each \(n\), let \(T_{n+4}\) be the midpoint of the line segment \(T_nT_{n+1}\).
If the sequence of points \(\{T_n\}\) has a limit point, what are its coordinates?
(County competition for secondary school students 1999, IV class)

Solutions to some earlier problems

122 Let \(A_1A_2A_3A_4A_5A_6A_7\) be a regular heptagon. Prove that \(1/A_{12} = 1/A_{13} + 1/A_{14}\).

**Solution by Gerald A. Heuer, Concordia College, Moorhead (USA); also solved by Niels Bejlegaard, Copenhagen (Denmark); Pierre Bornsztein, Pontpoin (France); Knut Dale, Telemark College, Bø (Norway); Pietro Fanciulli, Porto S. Stefano (Italy); J.N. Lillington, Dorchester (UK); Dr Z Reut, London (UK).**

Since \(A_{12} = 2r \sin (\pi/7)\), \(A_{13} = 2r \sin (2\pi/7)\) and \(A_{14} = 2r \sin (3\pi/7)\), where \(r\) is the radius of the circumcircle, the equation to be proved is equivalent to \(1/\sin (\pi/7) = 1/\sin (2\pi/7) + 1/\sin (3\pi/7)\).

Adding the fractions on the right side of (1) and clearing of fractions, we obtain the equivalent equation
\[
\sin (\pi/7) \sin (3\pi/7) + \sin (2\pi/7) \sin (3\pi/7) = \sin (2\pi/7) \sin (3\pi/7).
\]
Using the formula \(\sin a \times \sin b = \frac{1}{2}[\cos (a - b) - \cos (a + b)]\), and simplifying, we find that (2) is equivalent to \(\cos (2\pi/7) + \cos (5\pi/7) = \cos (3\pi/7) + \cos (4\pi/7)\), which is obviously true because \(\cos (\pi - x) = -\cos x\).

123 The sequence \(\{x_n\}\) satisfies \(\sqrt{(x_{n+2} + 2)} \leq x_n \leq 2\) for all \(n \geq 1\). Find all possible values of \(x_{1986}\).

**Solution by Dr Z Reut, London.**

Assuming that the square root is positive, the sequence \(\{x_n\}\) is positive.
The system of inequalities: \((x_{n+2} + 2)^{1/2} \leq x_n \leq 2\), gives by successive elimination:
\[\ldots((x_{n+2m} + 2)^{1/2} + 2)^{1/2} + \ldots + 2)^{1/2} \leq x_n \leq 2,\]
where there are \(m\) nested square roots on the left-hand side.
If \(x_n = 2\), for all \(n\), the double inequality is satisfied.
Let us assume that the sequence \(\{x_n\}\) is decreasing, that is: \(0 < x_{n+2m} < x_n\) and the difference is:
\[\ldots(((x_{n+2m} + 2)^{1/2} + 2)^{1/2} + \ldots + 2)^{1/2} - x_{n+2m} < ((2^{1/2} + 2)^{1/2} + \ldots + 2)^{1/2},\]
PROBLEM CORNER

which is less than the difference \( 2 - x_{n+2m} \).

It follows that \( 0 < x_{n+2m} < 2 - \ldots (2^{1/2} + 2)^{1/2} + \ldots + 2^{1/2} = 0 \), on letting \( m \) go to infinity.

Thus the only possible value of \( x_{1986} \), which is obtained for \( n = 2, m = 992 \), is 0.

124 Find the real numbers \( x_1, x_2, \ldots, x_n \) satisfying

\[ \sqrt{(x_1 - 1^2)} + 2 \sqrt{(x_2 - 2^2)} + \ldots + n \sqrt{(x_n - n^2)} = (x_1 + x_2 + \ldots + x_n)/2. \]

The following is a combination of similar solutions by Pierre Bornsztein, Pontoise, (France) and Dr Ranjeet Kaur Sehmi, Dept. of Applied Sciences, Punjab Engg. College, Chandigarh (India); also solved by Niels Bejlegaard, Knut Dale, Gerald A. Heuer, J.N. Lillington and Dr Z Reut.

Let \( \sqrt{(x_i - i^2)} = y_i \) for each \( i \), so that \( x_i = y_i^2 + i^2 \) for each \( i \), and the given equation reduces to

\[ y_1 + 2y_2 + \ldots + ny_n = (y_1^2 + 1^2 + y_2^2 + 2^2 + \ldots + y_n^2 + n^2)/2 \]

or \( (y_1 - 1)^2 + (y_2 - 2)^2 + \ldots + (y_n - n)^2 = 0 \),

which is satisfied only when \( y_1 = 1, y_2 = 2, \ldots, y_n = n \).

That is, \( x_1 = 1^2 + 1^2 = 2 \times 1^2, x_2 = 2^2 + 2^2 = 2 \times 2^2, \ldots, x_n = 2n^2 \).

125 Prove that there is a perfect cube between \( n \) and \( 3n \), for any integer \( n \geq 10 \).

Solution by Pierre Bornsztein; also solved by Niels Bejlegaard, Knut Dale, Gerald A. Heuer, Oren Kolman, Jerusalem (Israel), Dr Ranjeet Kaur Sehmi, J. N. Lillington, and Dr Z Reut.

Suppose first that \( 10 \leq n < 27 \); then \( n \leq 3^3 \leq 3n \), trivially, and the result follows.

If \( n \geq 27 \), there exists a unique number \( x \geq 3 \) such that \( x^3 \leq n < (x+1)^3 \).

To get the conclusion, it suffices to prove that \( (x+1)^3 < 3n \).

Let \( n = x^3 + k \), where \( 0 \leq k \leq 3x^2 + 3x \).

Then \( 3n = 3x^3 + 3k = (x + 1)^3 + 2x^3 – 3x^2 – 3x – 1 + 3k \).

But one can easily see that the function \( f(x) = 2x^3 – 3x^2 – 3x – 1 \) is increasing and positive for \( x \geq 3 \).

Thus \( f(x) > 0 \), for every integer \( x \geq 3 \), and so \( 2x^3 – 3x^2 – 3x – 1 + 3k > 3k > 0 \).

It follows that \( n < (x+1)^3 < 3n \), as required.

126 Show that if \( \sqrt{7} - m/n > 0 \) for the positive integers \( m, n \), then \( \sqrt{7} - m/n > 1/mn \).

Solution by J. N. Lillington, Dorchester; also solved by Niels Bejlegaard, Pierre Bornsztein, Knut Dale, Gerald A. Heuer, Oren Kolman and Dr Z Reut.

If \( m = 1 \), then \( \sqrt{7} - 1/n > 2 – 1/n \geq 1/n \), and the result follows; so assume that \( m > 1 \).

Consider the congruences of \( m \equiv 0, 1, 2, 3, 4, 5, 6 \pmod{7} \); then \( m^2 \equiv 0, 1, 2, 4, 2, 2, 4, 1 \pmod{7} \).

Now given \( \sqrt{7} - m/n > 0 \leftrightarrow 7n^2 > m^2 \), we have \( 7n^2 \neq m^2 + 1, 7n^2 \neq m^2 + 2 \) and \( 7n^2 \geq m^2 + 3 \).

Then \( 7n^2 - (m^2 + 1) \geq m^2 - (m^2 + 1) = m^2 - 1 > 0 \).

This leads to \( \sqrt{7} > m/n + 1/mn \) or \( \sqrt{7} > m/n > 1/mn \).

127 Find all positive integers \( x, y, z \) satisfying \( 1 + 2^x 3^y = z^2 \).

Solution by Knut Dale, Bø; also solved by Niels Bejlegaard, Pierre Bornsztein, Pietro Fanciulli J. N. Lillington, Erich N. Gulliver, Schwäbisch Hall (Germany), Dr Z Reut, London.

Suppose that \( 1 + 2^x 3^y = z^2 \); then \( z \) must be odd, \( z = 2k+1 \), and we get \( 2^x 3^y = k(k+1) \).

With \( k = 1, 2, 3 \), we obtain the solutions \( (x, y, z) = (3, 0, 3), (3, 1, 5) \) and \( (4, 1, 7) \),

but the first one is not possible because \( y > 0 \).

The next value of \( k \) giving a solution is \( k = 8 \), leading to \( (x, y, z) = (5, 2, 7) \).

Now assume that \( k \geq 9 \) and let \( r = x-2 \).

Since \( k \) and \( k + 1 \) have no prime factors in common, we have to consider two cases:

(1) \( k = 2^r, k + 1 = 3^s \ (r \geq 4, y \geq 3) \).

If \( y = 2t \), then \( 2^r = 3^s - 1 = (3^3 - 1)(3^3 + 1) \).

The only powers of 2 differing by 2 are \( 3^3 - 1 = 2 \) and \( 3^3 + 1 = 4 \);

so \( t = 1 \) and \( y = 2 \), contradicting \( y \geq 3 \).

If \( y = 2t + 1 \), then \( 2^r = (2 + 1)^{2t+1} - 1 = 4a + 2(2t + 1) \), for some \( a \), by the binomial theorem.

But this is impossible, since \( r \geq 4 \).

(2) \( k = 3^r, k + 1 = 2^s \ (r \geq 4, y \geq 2) \).

If \( r = 2t \), then \( 3^r = 2^s - 1 = (2^s - 1)(2^s + 1) \).

The only powers of 3 differing by 2 are \( 2^s - 1 = 1 \) and \( 2^s + 1 = 3 \);

so \( t = 1 \) and \( r = 2 \), contradicting \( r \geq 4 \).

If \( r = 2t + 1 \), then \( 3^r = 2^s - 1 = (3 - 1)^{2t+1} - 1 = 3b–2 \), for some \( b \), by the binomial theorem.

But this is impossible, since \( y \geq 2 \).
April 2002

Main visitors:
Embrechts, D. Farmer, H. Follmer

Pisa, Italy
13-17: 34th Journées de Statistique, Brussels and Louvain-la-Neuve, Belgium
Information: web site: www.stat.ucl.ac.be/JSBL2002
[For details, see EMS Newsletter 42]

13-31: School and Conference on Probability Theory, Trieste, Italy
Scope: this School will concentrate on three areas of probability: particle systems, combinatorics and random environment. Different biological and physical systems can be modelled in terms of interacting particle systems and a study of some specific models is very rewarding. Scaling limits of large systems result in considerable simplification of the description of the systems as they evolve in time. The connection between probability and combinatorics is undergoing a revolution at the moment. Issues of conformal invariance of certain two-dimensional models are just beginning to be understood.

Percolation and random walks in a random environment provide examples of the complexities that can result from being in a stationary but random environment, whose spatial fluctuations can cause strange things to happen

Aim: the lecturers who have made significant contributions to the field. Their lectures will provide an opportunity for the participants to learn first-hand about some of the far-reaching recent developments in the field

Topics: interacting particle systems, scaling limits of particle systems, dimers and geometry, conformally invariant processes in the plane, percolation, random walks in random environment

Main speakers: include J. Fontes (Brazil), R. Kenyon (France), C. Landim (Brazil), G. Lawler (U.S.A.), T. Liggett (U.S.A.), V. Sidoravicius (Brazil), A.-S. Sznitman (Switzerland)

Programme: the first two weeks (13-24 May) will be devoted to expository lectures on the topics listed above, while in the last week (27-31 May) there will be a high-level conference, where current research and latest results and developments in the field will be presented by experts.

Organising committee: G. Lawler, C.M. Newman and S.R.S. Varadhan (all USA)
Location: the Abdus Salam International Centre for Theoretical Physics, Strada Costiera 11, Trieste.
Grants: a few financial grants are available for applicants from, and working in, developing countries

Deadline: already passed
Information: e-mail: smr1407@ictp.trieste.it
web site: http://www.ictp.trieste.it/week/users/maths/maths02.html

May 2002

13-17: 13th International Conference on Geometry and Quantum Physics
Location: Centro di Ricerca Matematica E. De Giorgi, Scuola Normale Superiore, Pisa
Information: web site: http://www.crm.sns.it

15-17: Fourth International Conference on Advances in Fluid Mechanics, Ghent, Belgium
Information: web site: http://www.wessext.ac.uk/conferences/2002/afm02/index.html
[For details, see EMS Newsletter 42]

22-24: Discrete Groups and Geometric Structures, with Applications (Crystallographic Groups and their Generalizations III), Kortrijk, Belgium
Information: web site: http://www.kuleuven.ac.be/workshop
[For details, see EMS Newsletter 42]

22-25: International Workshop on Visualization and Mathematics 2002 Berlin-Dahlem, Germany
Aim: to provide an active forum for mathematicians and computer graphics researchers on the fundamental problems of visualization techniques, on applications in mathematics and on mathematical concepts in visualization. It is the third symposium in a series of workshops bringing together mathematicians and experts from computer graphics

Topics: visualization in differential geometry and partial differential equations, algorithmic representation of mathematical structures, computational aspects of topology, discrete geometry of meshes, compression of large and time-dependent geometric models, virtual laboratories for mathematics and applications, on-line visualization and computational web services

Keynote speakers: Rida Farouki, Markus Gross, Alfonso Quereshi, Jürgen Richter-Gebert, Gabriel Taubin
Invited speakers: Phil Bowers, Mathieu Desbrun, Gerald Farin, Joel Hass, Ben Jansen, Chris Johnson, Ravi Malladi, Tom Wickham-Jones
Conference chair: Christian Hege and Konrad Polthier
Organisers: Sonderforschungsbereich Differential Geometry and Quantum Physics (SB 288) at the Technische Universität in Berlin, Department of Scientific Visualization at the Konrad-Zuse-Zentrum für Informationstechnik Berlin (ZIB)
Format: keynote lectures, invited talks and contributed presentations. The keynote presentations will include contributions from leading experts in the field, and will be followed by contributed talks on related topics. The kształt of the conference will be determined by the programme committee.
Call for papers: interested contributors are asked to submit a full paper for review by the programme committee. Articles by keynote lecturers, invited speakers and contributors will be published in the book series "Mathematics and Visualization". For preparation of papers please use the LaTeX templates for multi-authored books available from http://www.springer.de/math/authors/books/web-teX.html.
[For details, see EMS Newsletter 42]

Information: web site: http://cage.rug.ac.be/~acomen
[For details, see EMS Newsletter 42]

28-31: 1st Conference in Honour of Steven Kleiman's 60th Birthday, Oslo, Norway
Theme: algebraic geometry and commutative algebra
Topics: motivic cohomology, moduli problems, intersection theory, enumerative geometry
Speakers: Henning H. Andersen (Aarhus), Larry Breen (Paris 13), Herb Clemens (UCLA), Susan Colley (Oberlin), Dan Edidin (Missouri), Eduardo Esteves (IMPA/MIT), Dan Grayson (Illinois), Tony Iarrobino (Northeastern), Bernard Teissier (Paris 7), Israel Vainsencher (Universidade de São Paulo), Ravi Vakil (Stanford), Angelo Vistoli (Bologna)
Organising committee: Susan Colley (Oberlin), Dan Edidin (Missouri), Dan Grayson (UCLA), Ragni Piene (Oslo)
Sponsors: MIT Math Dept., Norwegian Academy of Sciences and Letters, Centre for Advanced Study (Oslo), Research Council of Norway, NORDAG (NorFA)
Location: Norwegian Academy of Science and Letters, Drammensveien 78, Oslo, Norway
Information: e-mail: ragnpi@math.uio.no
web site: http://www.math.uio.no/~danKleiman60
3-7: Conference dedicated to the 90th anniversary of B. V. Gnedenko, Kyiv, Ukraine

Theme: probability theory and its applications

Aim: The meeting will focus on the whole range of scientific interests of B.V. Gnedenko. The aim is two-fold: first, to highlight the contributions of B.V. Gnedenko in probability theory and its applications, history of mathematics, problems of education, and, second, to present the developments of his ideas as well as the current trends in the theory of probability and related fields.

Topics: limit theorems for independent random variables; control quality, reliability theory, queueing theory; extremal statistics, random sums; parametric statistics; test of hypotheses; asymptotics of stable processes; statistical change point analysis; issues in education; limit theorems for random fields; stockastics and mathematical physics; statistical methods with applications to insurance and finance; probabilistic number theory; discrete probabilistic models; stochastic analysis

Programme committee: A. Skorokhod (Ukraine) and Yu. V. Prokhorov (Russia) (co-Chair), O.D. Borysenko (Ukraine), V.V. Buldygin (Ukraine), S.M. Demidov (Russia), D.B. Gnedenko (Russia), I.A. Ibragimov (Ukraine), Yu.G. Kondratiev (Ukraine), Yu.S. Mishura (Ukraine), A.G. Kulik (Ukraine), K.-H. Indlekofer (Germany), I. Kati (Hungary)

Organising committee: V.S. Korolyuk (Ukraine) and Yu. V. Prokhorov (Russia) (co-Chair), O.D. Borysenko (Ukraine), V.V. Buldygin (Ukraine), S.M. Demidov (Russia), D.B. Gnedenko (Russia), I.A. Ibragimov (Ukraine), Yu.G. Kondratiev (Ukraine), Yu.S. Mishura (Ukraine), A.G. Kulik (Ukraine), K.-H. Indlekofer (Germany), I. Kati (Hungary)

Topics: abelian groups, algorithms and their representations, constructive rings, module theory, ring theory, topological algebraic structures

Main speakers: S. Bazzoni (Italy), A. Facchini (Italy), R. Farnsteiner (Germany), R. Gilmer (USA), R. Goebel (Germany), W. Heinzer (USA), H. Krause (Germany), K. Kunen (USA), I. Reiten (Norway), J. Trifaj (Czech Republic), C. Vinsonhaler (USA), R. Wiegand (USA)

Plenary speakers: R. Colpi (Italy), D. Herbera (Spain), S. Kajam (Poland), B. Olberding (USA), D. Shahshahani (Iran), D. Simson (Poland)

Scientific committee: D. Dikranian (Italy), A. Facchini (Italy), M. Fontana (Italy), L. Fuchs (USA), K. Fuller (USA), R. Göbel (Germany), W. Heinzer (USA), C. Ringel (Germany), D. Simson (Poland)

Organising committee: F. Barioli, S. Bazzoni, R. Colpi, S. Gabbelli, E. Gregorio, C. Metteli, L. Salce, F. Stumbo, A. Tonolo, P. Zarcolo (Italy)

Venue: Venice, International University, Island of San Servolo, Venice

Deadlines: registration and abstracts, 31 March

Programme: to bring together specialists of various fields to

3-8: Algebra Conference – Venezia 2002, Venice, Italy

Topics: abelian groups, algorithms and their representations, constructive rings, module theory, ring theory, topological algebraic structures

Main speakers: S. Bazzoni (Italy), A. Facchini (Italy), R. Farnsteiner (Germany), R. Gilmer (USA), R. Goebel (Germany), W. Heinzer (USA), H. Krause (Germany), K. Kunen (USA), I. Reiten (Norway), J. Trifaj (Czech Republic), C. Vinsonhaler (USA), R. Wiegand (USA)

Plenary speakers: R. Colpi (Italy), D. Herbera (Spain), S. Kajam (Poland), B. Olberding (USA), D. Shahshahani (Iran), D. Simson (Poland)

Scientific committee: D. Dikranian (Italy), A. Facchini (Italy), M. Fontana (Italy), L. Fuchs (USA), K. Fuller (USA), R. Göbel (Germany), W. Heinzer (USA), C. Ringel (Germany), D. Simson (Poland)

Organising committee: F. Barioli, S. Bazzoni, R. Colpi, S. Gabbelli, E. Gregorio, C. Metteli, L. Salce, F. Stumbo, A. Tonolo, P. Zarcolo (Italy)

Venue: Venice, International University, Island of San Servolo, Venice

Deadlines: registration and abstracts, 31 March

Programme: to bring together specialists of various fields to

3-9: BIOCOMP2002, Vietri sul Mare, Italy

Theme: mathematical biology and bioinformatics

Programme: invited lectures, selected contributed papers and round-table discussions

Aim: to bring together specialists of various fields to focus on the relevant problems of mathematical biology and bioinformatics at the beginning of the third millennium

Topics: biomathematics and molecular motors; pattern formation; spatial and non-linear dynamics in population biology and ecology; coding, computations and stochasticity in cell biology and other excitable media; biocomputing, bioinformatics and gene networks

Programme committee: S. Amari (Japan), J.J. Collins (USA), P.C. Cull (USA), I. Ethel (Israel), M. Iannelli (Italy), P. Léotard (Czech Republic), S.A. Levin (USA), Z. Ma (China), M. Mimura (Japan), R. Moreno-Diaz (Spain), K. Pakdaman (France), L. Petlić (Italy), F. Péchier (Austria), S. Sato (Japan), J.P. Segundo (USA), C.E. Smith (USA), A. Tesei (Italy), H.C. Tuckwell (Australia), F. Ventriglia (Italy), G. Viedossich (Italy), T. Yamaguchi (Japan)


Sponsors: University of Napoli Federico II, University of Osaka, Tel Aviv University

Location: Vietri sul Mare (near Naples)

Deadlines: abstracts, already passed; registrations, still open

Information: web site: http://biocomp.unina.it

4-13: 3rd Linear Algebra Workshop BLED 2002, Bled, Slovenia

Theme: modern problems of linear algebra and its applications

Topics: modern problems of linear algebra and its applications


Focus sessions: modern problems in biology, image processing, grain boundary formation, optimal design for free boundary problems, numerical aspects of free boundary problems, free boundary problems in biomathematics, modelling of crystal growth, transitions with applications

Poster session: open to contributions by all participants


Organising committee: P. Colli, G. Druzh, A. Fasano, K.-H. Hoffmann, J. Sprekels, C. Verdi, A. Vinistin (local organiser)

Sponsors: University of Firenze, University of Firenze, University of Firenze, University of Firenze, University of Firenze, University of Firenze, University of Firenze, University of Firenze, University of Firenze

5-9: Conference in Honour of Hans Wallin, Umeå, Sweden

Theme: modern problems of linear algebra and its applications

Sponsors: Umeå University

Information: web site: http://www.math.uu.se/~aktuellt/HWkonferens.htm

6-8: Abel Bicentennial Conference 2002, Oslo, Norway

Theme: modern problems of linear algebra and its applications

Main speakers: Karen Chandler (Notre Dame), Luca Chiari (Genoa), Alfredo Gimigliano (Bologna), Martin Kreuzer (Regensburg), Tony Iannario (Northeastern), Rosa Maria Miró-Roig (Barcelona), Uwe Nagel (Paderborn), Leslie Roberts (Queen’s), Rosario Strano (Catania), Bernd Ulrich (Purdue)

Organising committee: Eddy Campbell (Queen’s), Brian Harrbou (Nebraska), Juan Migliore (Notre Dame), Ferruccio Orecchia (Napoli), Alfiio Ragusa (Catania), Lorenzo Robbiano (Genova)

Grants: limited funding available for young researchers

Related conferences: the AAMS-UMI meeting in Pisa, 12-16 June (http://www.dm.unipi.it/~ecco2002/) has several special sessions in common with this conference and algebraic geometry, Current Trends in Commutative Algebra, Levico, 17-21 June, (http://www.dm.unipd.it/~rossin/Levico.html) is also of interest

Information: web site: http://cocoa.dm.unipi.it/conference/acireale/first.html

6-15: Fourth International Conference on Geometry, Integrability and Quantization, Varna, Bulgaria

Theme: modern problems of linear algebra and its applications


30
17:21: Advanced School and Workshop on Mathematical and Computational Modeling of Biological Systems

Theme: mathematical and computational modeling of biological systems

Aim and Format: to provide an updated overview of typical methods and tools used in mathematical and computational studies of biological tissues, organs and systems. The event has two components: Advanced Course and Workshop.

Main speakers:
- Gerhard Holzapfel (Austria)
- Peter Hunter (New Zealand)
- J. van Leeuwen (Netherlands)
- Clyde Martin (USA)
- Ofer Jensen (UK)

Programme: 18 hours of course lectures; 9 hours of Workshop paper presentations and discussions

Deadline: for paper submissions, 1 May 2022

Location: Centre of Instituto Superior Técnico, Av. Rovisco Pais, 1, 1049-001 Lisboa, Portugal

Information: call for papers, 1 May

17:22: The Barcelona Conference on Stochastic Inequalities and their Applications

Theme: stochastic inequalities.

Sponsors:
- Centre de Recerca Matemàtica, Barcelona, Spain
- European Research Centres on Mathematics (ERCM), Lisbon, Portugal
- University of Oulu, Finland

Organising committee: Helena Romão, ICIST, Dep. Eng. Civil e Arquitectura, Instituto, Superior Técnico, Av. Rovisco Pais, 1, 1049-001 Lisboa, Portugal (phone: (+351) 21 841 8401, fax: (+351) 21 849 7650)

Information: e-mail: bio.systems@ civil.ist.utl.pt

17:23: Advanced School and Workshop on Bone Mechanics: Mathematical and Mechanical Models for Analysis and Synthesis, Lisbon, Portugal

Main speakers:
- Martin P. Bendsoe (Denmark)
- Andrej Cherkaev (USA)
- Steven C. Cowin (USA)

Information: call for papers, 1 May

Location: Instituto Superior Tecnico, Av. Rovisco Pais, Lisboa, Portugal

Information: e-mail: Bone.Mechanics@dem.ist.utl.pt

17:24: EUROMECH Colloquium 437: Identification and Updating Methods of Mechanical Structures, Prague, Czech Republic

Location: Institute of Thermomechanics, Czech Academy of Sciences

Theme: mathematical modelling of mechanical structures

Topics: parametric identification in frequency and time domain, curve fitting of transfer functions, identification of vibrating systems with small non-linearity, spectral and modal sensitivity, updating methods of finite element models, tuning and vibro-diagnostics of mechanical structures, robustness of model-based decisions with respect to uncertainties and modal sensitivities.

Main speakers:
- G. Lallement (France)
- M. Balda (Czech Republic)

Call for papers: participants are invited to contribute papers on the above topics. Oral presentation should be in English (25 minutes including discussion).

Contributions should submit a one-page abstract via e-mail to the e-mail conference address: ec437@ist.cas.cz or euromech.437@ist.cas.cz, a one-page extended
CONFERENCES

abstract of their proposed paper including its title, author’s name, affiliation, full mail address and e-mail address. Details will be reviewed by the Scientific Committee; authors will be notified about acceptance by the end of April 2002. All accepted papers will be published in the Book of Abstracts of the EUROGEM Colloquium 437. The proceedings will be available for delegates attending the Colloquium. Selected papers from the Colloquium will be recommended for presentation in international journals for theoretical and applied mechanics

Preliminary scientific committee: Miroslav Balda (Czech Academy of Sciences), Vany Chukrin (Pridneprovsky National Academy of Sciences, Ukraine), Ivan Dobias (Czech Academy of Sciences), Jaromir Horacek (Czech Academy of Sciences), Jean Pirunda (University Francaise Comte), Ladislav Pust (Czech Academy of Sciences), Alexandru Valentin Radulescu (University Politehnica, Bucharest), Gu Zhengwei (Hunan University, P.R. China)

Chair: Gerard Lallement A.M., RC University Francaise Comte, Besancon, France, Jan Kozanek, Institute of Thermomechanics, Czech Academy of Sciences

Location: Institute of Thermomechanics, Czech Academy of Sciences, Dolejsova 5, 182 00 Prague 8, Czech Republic

Grants: some reduction of fees for young participants

Deadlines: for submission of extended abstracts, 29 March, deadline, 30 April; for payment, 10 May

Information: e-mail: ec437@it.cas.cz

eurochem.437@it-cas.cz

http://www.it.cas.cz/cp-437/

21-26: Symmetries and Integrability of Difference Equations: Equations, Discrete Painlevé Equations and the Solvability of Difference Equations, Giens (near Toulon), France

Topics: to include analytic and algebraic aspects of difference equations, difference Galois theory, the Painlevé property and singularity analysis, growth and branching phenomena in rational mappings, difference analogues of Painlevé equations, geometric deformations, theory, asymptotics of orthogonal polynomials, symmetries of difference equations, applications to numerical analysis

Main speakers: Mark J. Ablowitz (Boulder, USA); Alexander I. Its (Indianapolis, USA); Reinout Quispel (Bundooora, Australia); Claude Brezinski (Lille, France); Naotani Inoue (Adelaide, Australia); Alfred Randriam (Paris, France); Peter Clarkson (Canterbury, UK); Martin Kruskal (Rutgers, USA); Konstantin Makridis (Debra, Rumania); Robert Conte (Saclay, France); IPI Laine (Joensuu, Finland); F. Fehn (Dolejsova, Prague); Rod Hairdall (Laughborough, UK); Decio Levi (Rome, Italy); Jarkkila Satsumo (Tokyo, Japan); Peter E. Hydon (Surrey, UK); Jean-Marie Maillard (Paris, France); Walter Van Assche (Louvain, Belgium); Gertrauda Immink (Groningen, Netherlands); Frank Nijhoff (Leeds, UK); Alexander Veselov (Laughborough, UK); Astrid Iserles (Cambridge, UK); Vasillios Papageorgio (Patras, Greece); Pavel Winternitz (Montreal, Canada)

Programme: on line available

Chairs: Claude VIetel (CNRS Paris, France), Jarro Hietaranta (University of Turku, Finland)

Sponsors: European Commission, Research DG, Human Potential Programme, High-Level Scientific Conferences (Contract No: HPCF-CT-2001-00013), INTAS AS

Location: VVF Presqu’ile de Giens La Badine

Grants: available in particular for nationals from 35 or under from EU or associated states (Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Iceland, Israel, Latvia, Liechtenstein, Lithuania, Norway, Poland, Romania, Slovakia and Slovenia). Some support will also be available for nationals of 35 or under from the New Independent States of the former Soviet Union (NIS)

Deadline: for grants, 28 March

Information: contact Merzad Alibaghui (rdaghoughi@eif.org), Conference Organiser, European Scientific Foundation, Euresco Office, 1 guai Lezay- Marnesia, 67080 Strasbourg

http://www.eol.org/euresco/02/po-02185

24-27: International Workshop on Orthogonal Polynomials: Orthogonal Polynomials and Approximation Theory (IWOP'02), Leganes, Madrid, Spain

Topics: approximation theory, quadrature formulas, orthogonal polynomials

Main speakers: J.S. Geronimo (Atlanta, USA), P. González-Vera (Granada, Spain), V. Gorelik (Kiev, Ukraine), A.B.J. Kuijlaars (Leuven, Belgium), A. Martinez-Fikhenboner (Almeria, Spain), H. Stahl (Berlin, Germany)

Abstracts: if you wish to present an oral communication, submit your abstract (plain ASCII or LaTeX, up to two pages) via the web site

Scientific contact: Jesus Dehesa (Granada), Antonio Duran (Sevilla), Guillermo Lopez Lagomasino (Madrid), Marco Marcellan (Madrid), Walter Van Asche (Leuven)

Organising committee: Renato Alvarez-Nodarse (Sevilla: ran@us.es), Jorge Arvesu (Madrid: javessu@mat.uam.es) and Paco Marcellan (Madrid: pacomarc@ing.uclm.es)

Proceedings: a special volume of the proceedings is planned

Location: Escuela Politecnica Superior, Universidad Carlos III de Madrid, Leganes, Spain

Deadline: for abstracts, 30 April

Information: contact members of the organising committee

web site: http://mer.un.es/~renato/iwop02

24-28: Conference on Mathematical Modelling of Populations, Bédelów, Poland

Information: web site: http://www.math.us.edu.pl/cmmpd/

[For details, see EMS Newsletter 42]

25-28: International Conference dedicated to the 65th Anniversary of B. Padenko (1937-2000), Kyiv, Ukraine

Scope: optimisation, mathematical theory of control, dynamic game theory

Topics: necessary conditions for extremum, mathematical programming, computational methods of optimisation, convex analysis and theory of set-valued mappings, dynamic games, search for moving objects, mathematical theory of control, identification and minimax estimation of parameters, models of economic dynamics, decision making under uncertainty, optimisation problems of the charged particle beam dynamics, controlled processes simulation, applications in all areas

Main speakers: A. Azimov (Turkey), A.B. Kurbzhanskiy (Russia), Y.S. Ledyayev (Russia), A.G. Chentsov (Russia), A.A. Chikrii (Ukraine), V.S. Melnik (Ukraine), V.F. Demyanov (Russia), A. Ioffe (Israel), A. Rubinov (Australia), F.M. Kirilova (Belarus), V.M. Tikhomirov (Russia)

Call for papers: authors are invited to submit an electronic version of their paper (in text or LaTeX form to the session organisers. Selected papers presented at ACA 2002 will be available at the conference website: http://www.math.us.edu.pl/cmmpd/abstract.html

For more details see EMS Newsletter 42

organising committee: Steinberg Y., Goerke M.

Local arrangements committee: Thomas Kylindris, Yannis Parissis, Kordia D. Tsilika, Loukas Zachilas

Scientific committee: ACA Working Group, A.G. Akritas, (Greece), J. Calmet (Germany), V. Edneral (Russia), V. Ganzha (Germany), V. Gerdt (Russia), H. Hong (USA), E. Kaffof (USA), I.S. Kotsireas (Canada), B. Kutzler (Austria), R. Liska (Czeck Republic), B. Pletsch (USA), E. Rousen-Lozano (Spain), S. Steinberg (USA), Q. Tran (USA), N. Vassilev (Russia), M. Wester (USA)

Sponsors: Greek Ministry of Culture, Waterloo MAPLE. Greek telecommunications Organisation, Wilfrid Laurier University, University of Thessaly, Greek Railways, Ontario Research Centre For Computer Algebra, Alpha Bank, Texas Instruments, WILEY, IMACS, Cottupaxi, City of Volos

Proceedings: a volume with the abstracts of the papers presented at ACA 2002 will be available at the conference. Participants should submit their abstracts in text or LaTeX form to the session organisers. Selected full papers from those presented at the conference, as well as at ACA 2001, will be published in a special issue of the Journal of Symbolic Computation, entitled "Special Issue on Applications of Computer Algebra"

Deadline: for submissions of abstracts, 20 April; for submission of full papers, 1 May

Location: University of Thessaly, Department of Computer Engineering, Telecommunications and Networks

Information: phone: +30-4217-074886, e-mail: aca2002@uth.gr

http://www.orcca.on.ca/~ilias/aca2002.html

27-3: July: Fifth International Conference on Curves and Surfaces, Saint-Malo, France

Information: web site: http://www-lmc.imag.fr/~saint-malo/

For more details see EMS Newsletter 42

27-3: July: 19th International Conference on Operator Theory, Timisoara, Romania

Topics: operator theory, operator algebras and their applications: differential operators, complex functions,

EMS March 2002
Theoretical Physics (Kyoto, Japan)

Location: CAMPT: Center for Applied Mathematics and Theoretical Physics, University of Maribor Krekova 2, Maribor, Slovenia

Grants: limited financial support for participants from Eastern European and developing countries. Apply by e-mail to Christopher Farrel, for application for financial support, 18 April, for hotel reservation, 27 June

http://www.campt.uni-mb.si/chao2002/

July 2002

1-5: Congrès de mathématiques appliquées à la mémoire de Jacques-Louis Lions, Paris, France


Honour committee: H. Curien, H. Fujita, P. Lax, E. Magenes (Chair), G. Marchuk

Patronages: Physical Mathematical Union and Académie des Sciences de Paris Supported and sponsored by: Ministère de la Recherche, CNRS, CNEST, CNRPA, Collège de France, École Polytechnique, Université Pierre et Marie Curie (Paris VI), SMAI and SIFM

Location: Collège de France

Registration: free of charge: please register directly on the web site

Information: postal address: Laboratoire d'analyse numérique Université Pierre et Marie Curie Boîe courrier 187 75252 Paris cedex 05 France

fax: + 33 1 44 27 72 00, e-mail: congrès.jllions@ann.jussieu.fr

web site: http://www.acm.enfth.fr/congres/jllions/

1-6: Advanced Course on Mathematical Finance: Models, Bellaterra, Barcelona, Spain

Coordinating: Jordi Bartoll

Information: web site: http://www.crm.es/matfin

1-2: 2nd International Conference on the Teaching of Mathematics at Undergraduate Level, Chersonisos, Crete, Greece

Information: web site: http://www.math.uoc.gr/~ictm2

[For details, see EMS Newsletter #2]

1-6, 2002 Workshop on Wavelets and Applications, Barcelona, Spain

Topics: wavelet-based data compression, numerical analysis, probability theory, signal processing

Main speakers: C. Casazza (Politecnico di Torino), R. Gundy (Rutgers U.), T. Nguyen (U. California, San Diego), A. Tabacco (Politecnico di Torino), G. Weiss (Washington U.)

Intended audience: graduate students and young researchers

Organising committee: M.J. Caro, J. Cerda, J. Martin, J. Soria

Sponsors: Institute of Mathematics of the University of Barcelona (IMUB)

Location: University of Barcelona, Gran Via 585, 08007 Barcelona

Deadlines: for registration, 31 May

Information: http://www.imub.es/wavelets

2-6: 2002 Barcelona Conference on Algebraic Topology (a EuroConference), Barcelona, Spain

Information: web site: http://www.crm.es/2002cbcat

2-6: 5th Conference of the European Society of Theoretical Biologists and Mathematical Modelling and Computing in Biology and Medicine, Milano, Italy

Aim: to foster interdisciplinary collaboration between mathematicians and biologists and to act as the main forum for the exchange of recent research results and new directions research to the widest possible

community in theoretical biology and medicine in Europe and beyond

Topics: biotechnology and bioengineering, bioinformatics and computational biology, biomedical imaging, cardiovascular system, cell signalling, cellular organisation, ecology, environmental sciences, evolution, immunology, infection, individual based models, computational neuroscience, visualisation, regulatory gene networks

Main speakers: Marina Alexandersson (Sweden), Giuseppe Baselli (Italy), Tom Britton (Sweden), Klaus Dietz (Germany), Wuifgram Gerstner (Switzerland), Hans-Christian Hege (Germany), Claudia Neuhäuser (USA), A. Neumann (Institute for Quantum Theory), J. Schröter, J. Schnell (France), Daniel Tranchina (USA), Tamaki Umeda (Japan), Hans Westerhoff (Netherlands), Simon Wood (UK)

Programme: organised in sections, each comprising an invited speaker and 2-hour mini-symposia; posters can be presented in special sessions

ESMTB Board: V. Capasso (President), Z. Agor, A. Arino, M. Chaplain, M. Cynlenberg, J.P. Herbeek, M. Kaufmann, V. Krivan, A. Strevens, P. Traquici


Sponsors: European Union, Centro Nazionale delle Ricerche Universita' degli Studi di Milano, Politecnico of Milano, Milano Research Centre for Industrial and Applied Mathematics (MIAM/IMATI), Universita' degli Studi di Pavia, MURST-COFIN Project Stocastici a Struttura Spaziale, Domus Galilaeiana, STM Microelectronics Grants: more than 100 fellowships for eligible (less than 35 years and members of the Union or an Associated State) young researchers have been supported by the European Union. Probably some support will be available without the EU criteria

Deadlines: for applications for financial support, passed; for early registration, 1 April; for papers, 31 December

Information: e-mail: embtb@math.unimi.it

http://web.math.unimi.it/ebmtb

7-14: 6th WSEAS CSCC Multiconference on Control Systems: Concepts and Applications; Applied Informatics; Signal Processing and Computational Geometry and Vision; Scientific Computations and Soft Computing, Rethymno, Crete, Greece

Information: e-mail: manolis7@wseas.org

http://www.wseas.org/conferences/2002/crete

8-26: School and Conference on Algebraic K-theory and its Applications, Trieste, Italy

Theme: K-theory and related topics

Aim: to update information on recent developments in the field and to emphasise the multidisciplinary nature of K-theory and its usefulness in solving problems arising in several areas of mathematics

Topics: K-theory and algebraic topology; K-theory and non-commutative geometry; a survey of the developments of K-theory in the last 45 years; K-theory and arithmetic; K-theory and representation theory; K-theory and algebraic geometry

Main speakers: L. Barbieri-Viale (Italy), J. Berrick (Singapore), S. Bloch (USA), J. Cuntz (Germany), E. Friedlander (USA), H. Gillet (USA), L. Hesselholt (USA), N. Higson (USA), R. Jardine (Canada), B. Kahn (Germany), M. Karoubi (France), M. Kolster (Canada), A.O. Kuku (Italy), M. Levine (USA), S. Lichtenbaum (USA), N. Loeb (France), W. Lueck (Germany), P. May (USA), F. Morel (France), I. Panin (Russia), E. Pedersen (USA), C. Pedrini (Italy), U. Rehmann (Germany), J. Rosenberg (USA), S. Saito (Japan), V.P. Snaith (UK), K. Soh (France), V. Voevodsky (USA), C. Weibel (USA)

Programme: the first two weeks (8-19 July) will
CONFERENCES

4-6: 3rd International Conference on Mathematical and Computational Applications, Konya, Turkey
Theme: engineering sciences, computer science, applied mathematics, and computational techniques are necessary for solving specific problems

Scope: papers may be theoretical where mathematics is used in a non-trivial way or computational, or a combination of both; papers containing only experimental techniques and abstract mathematics without any sign of application are discouraged

Topics: papers will be submitted in two categories: (1) journal papers (only papers of the highest quality that contain original ideas and research will be published in the journal Mathematical and Computational Applications); (2) conference papers

Main speakers: see the web site

Information: e-mail: icmca2002@selcuk.edu.tr, web site: http://www.selcuk.edu.tr/icmca2002

June 6-9: 5th International Workshop on Deduction in Geometry, RISC-Linz, Hagenberg/Linz, Austria
Theme: automated deduction in geometry

Topics: polygonal algebra, invariant and coordinate-free methods, probabilistic, synthetic, and logic approaches, techniques for automated geometric reasoning from discrete mathematics, combinatorics, and numerics, symbolic and numeric methods for geometric computation, geometric constraint solving, automated generation/reasoning and manipulation with diagrams, design and implementation of geometric software, special-purpose tools, automated theorem provers, experimental studies, applications of ADG to mechanics, graphics, robotics and education

Main speakers: two invited talks: names of speakers to be announced shortly

Information: see the web site

Programme: e-mail: 02.03.2003@risc.uni-linz.ac.at

Main speakers: P. Corsini (Italy), Y. Sureau (France), I. Rosenberg (Canada), S. Comer (USA), J. Jantosciak (USA), J. Grezl (Czechoslovakia), G. R. Migliorato (Italy), V. Loorenu (Romania), M.M. Zadehi (Iran), M. Konstantinou-Serafimidou (Greece)

Call for papers: to present an oral communication, submit an abstract (type and centre the title, in capital, author’s name and affiliation in this order; restrict your text to 200 words) via aha2002@agro.duth.gr

Programme committee: P. Corsini (Italy), S. Comer (USA), J. Jantosciak (USA), M. Konstantinou-Serafimidou (Greece), G. R. Migliorato (Italy), I. Rosenberg (Canada), S. Spartalis (Greece), Y. Sureau (France), T. Vougouli (Greece)

Organising committee: T. Vougouli (Greece), S. Spartalis (Greece), H. Sakoidis (Greece)

Sponsors: Democritus University of Thrace, Hellenic Ministry of Education


For details, see EMS Newsletter 42

4-6: Fourth International Workshop on Automated Deduction in Geometry, RISC-Linz, Hagenberg/Linz, Austria
Theme: automated deduction in geometry

Topics: polygonal algebra, invariant and coordinate-free methods, probabilistic, synthetic, and logic approaches, techniques for automated geometric reasoning from discrete mathematics, combinatorics, and numerics, symbolic and numeric methods for geometric computation, geometric constraint solving, automated generation/reasoning and manipulation with diagrams, design and implementation of geometric software, special-purpose tools, automated theorem provers, experimental studies, applications of ADG to mechanics, graphics, robotics and education

Main speakers: two invited talks: names of speakers to be announced shortly

Information: see the web site

Programme: e-mail: 02.03.2003@risc.uni-linz.ac.at

Main speakers: P. Corsini (Italy), Y. Sureau (France), I. Rosenberg (Canada), S. Comer (USA), J. Jantosciak (USA), J. Grezl (Czechoslovakia), G. R. Migliorato (Italy), V. Loorenu (Romania), M.M. Zadehi (Iran), M. Konstantinou-Serafimidou (Greece)

Call for papers: to present an oral communication, submit an abstract (type and centre the title, in capital, author’s name and affiliation in this order; restrict your text to 200 words) via aha2002@agro.duth.gr

Programme committee: P. Corsini (Italy), S. Comer (USA), J. Jantosciak (USA), M. Konstantinou-Serafimou (Greece), G. R. Migliorato (Italy), I. Rosenberg (Canada), S. Spartalis (Greece), Y. Sureau (France), T. Vougouli (Greece)

Organising committee: T. Vougouli (Greece), S. Spartalis (Greece), H. Sakoidis (Greece)

Sponsors: Democritus University of Thrace, Hellenic Ministry of Education


For details, see EMS Newsletter 42


Information: e-mail: 02.03.2003@math.uw.edu.pl, web site: http://www.math.uw.edu.pl/algort/algort2003

For details, see EMS Newsletter 42

9-12: Conference on Harmonic Analysis, Luxembourg-Metz (Luxembourg-France)
Topics: non-commutative harmonic analysis, representation theory, real and complex analysis related to groups

Organisers: Bachir Bekka, Jean Ludwig, Carine Molitor-Braun, Norbert Pinczon, organised jointly by the Centre Universitaire de Luxembourg and the University of Metz

Location: Centre Universitaire de Luxembourg (9-10 September) and University of Metz (11-12 September)


Programme: in addition to the regular conference programme, communication sessions for participants to present their research in a 20-minute talk are planned

Proceedings: speakers may publish their contribution in a special issue of the journal Travaux mathématiques, Publications du Centre Universitaire

Grants: a limited number of grants will be available for young researchers

Sponsors: Fonds National de la Recherche Luxembourg, Centre Universitaire de Luxembourg, Université de Metz, Laboratoire de Mathématiques (MMAS) de l’Université de Metz

Information: e-mail: harmonic_analysis@ceu.lu, web site: http://www.eu.hy.harmonic_analysis

10-20: Advanced Course on Geometry 3-Manifolds, Bellaterra, Barcelona, Spain

Coordinator: Joan Porti

Information: web site: http://www.crm.es/geom-mani


Information: web site: http://www.uv.es/cmmse2002

For details, see EMS Newsletter 42

23-27: Ramification in Arithmetic and Geometry, Paris, France

Organisers: A. Abbes (Paris), B. Erez (Bordeaux), T. Saito (Tokyo)

Location: Institut Galilée, Université Paris 13

Information: web site: http://www.math.u-psud.fr/~ramification/

25-28: 2nd WSEAS International Conferences on: Simulation, Modelling and Applications, Signal, Speech and Image Processing: Multimedia, Internet and Video; Robotics, Distance Learning and Intelligent Communication Systems, Skiathos, Greece

Information: e-mail: skithios2002@wseas.org, web site: http://www.wseas.org/conferences/2002/skithios/skithios2002
Books submitted for review should be sent to the following address:
Ivan Netuka, MUUK, Sokolovská 83, 186 75 Praha 8, Czech Republic.


Each summer, there is a research programme and a graduate summer school organised by the IAS/ParkCity Mathematics Institute. In 1998, the topic chosen was Representation theory of reductive Lie groups. This book is a collection of the written versions of lectures presented there.

The lectures concentrate on the problem of understanding irreducible representations of reductive Lie groups. The lecture series by A. Knapp (delivered by F. Trapa) describes the Langlands classification of irreducible (admissible) representations of such groups. The lectures by R. Zierau and L. Barchini describe cohomologically induced families of unitary representations, which appear in harmonic analysis and the theory of automorphic forms. The lectures by D. Vogan describe geometrical constructions of unitary representations, using ideas of Kirillov and Kostant (the method of coadjoint orbits). The lectures by K.Yl-only use geometrical tools (constructible sheaves, semiglobal sets and derived categories). In particular, the global character of representations constructed by infinitesimal methods.

The last lecture in the book, by J.-S. Li, describes restrictions of a certain class of minimal representations to the so-called reductive dual pairs, introduced and studied by A. Weil and R. Howe.

Altogether, the volume brings a coherent description of an important and beautiful part of representation theory, which certainly will be of substantial use for postgraduate students and mathematicians interested in the area. (vs)


This volume is devoted to integration and to global analysis. Integration theory is developed along standard lines (measure spaces, measures, outer measures, integrability, Lebesgue measure, integrable functions, convergence theorem, Lebesgue spaces, Fubini’s theorem, change of variables) with one notable exception: the integration of Banach space-valued functions (the Bochner-Lebesgue integral) is introduced systematically. Much space is devoted to less traditional subjects: convolutions, the Fourier transform on Schwartz spaces, distributions, linear differential operators, weak derivatives, Sobolev spaces, the Hensenberg uncertainty relation.

The part on integration covers a half of the text, approximately 250 pages, and is accompanied by 194 problems associated with the individual sections.

In the second part of the volume, about 160 pages are devoted to manifolds in Euclidean spaces, multi-linear algebra, the theory of differential forms and Stokes’ theorem. In view of their applications, manifolds with a small singular part are allowed.

If we have a regular family of surfaces filling a domain in 3-dimensional Euclidean space in a nice way (without mutual intersections), we can introduce on this domain the field of unit normals to the surfaces under consideration. A great deal of mathematics is devoted to problems of the kind of families of surfaces can be described in terms of this normal field. Quite naturally, by the end of the nineteeenth century, the idea emerged of investigating in a similar way a unit vector field that does not arise from a family of surfaces. In such a situation one usually speaks about a non-holonomic vector field.

This monograph can be considered as an introduction to the subject. We find here many classical results that are proved in a new and modern way. It also contains plenty of recent results, and consequently represents an introduction to contemporary research in the field. It is divided into two chapters. The first chapter deals with domains in 3-dimensional Euclidean space and the vector fields on them, while the second passes to domains in higher-dimensional Euclidean spaces, or even in Riemannian manifolds. The authors also present interesting applications, mostly in the dynamics of mechanical systems with non-holonomic constraints, and in the geometry of velocity fields of fluid flow. Quite recently, there have been applications in the description of liquid crystals and ferromagnets.

The prerequisites required for reading are modest. Basic courses of analysis and classical differential geometry should suffice. (jpa)


The change of a millennium was an occasion to reflect on the state of mathematics and to try to see future perspectives. This book collects thirty articles by leading mathematicians (half of them recipients of the Fields Medal) on the occasion of the World Mathematical Year 2000.

Different articles are written with different aims. Some of them bring a list of problems in a chosen specific area, some are reviews of possible future developments, others bring more personal viewpoints. There are many articles showing how important has been the recent intersection between mathematics and theoretical physics for future mathematical developments. There are also articles on the connections between pure mathematics and certain areas of applied mathematics. The authors are M.F. Atiyah (physics), A. Bakre, P. Wilmshurst, L. Kauffman, J.-L. Bourgain, S.-S. Chern, A. Connes, S.K. Donaldson, W.T. Gowers, Y.F.R. Jones, D. Kazhdan, F. Kirwan, P.-L. Lions, A.J. Majda, Yu.I. Manin, G. Margulis, D. McDuff, S. Mori, D. Mumford, R. Penrose, K.F. Roth, D. Ruelle, P. Sarnak, S. Smale, R.P. Stanley, C. Vafa, A. Wiles, E. Witten, S.-T. Yau, V.L. Arnold, P.D. Lax and B. Mazur.

This book should be in the library of every working mathematician. (vs)


This volume is the proceedings of the conference on C0-semigroups and their applications, held at Newport Beach, California, December 1998. These proceedings consist of 35 contributions. Most of them are short (less than 10 pages), but a reviewer nevertheless get a good insight into the current research interests, both in theory and applications. Most frequently, the attention is paid to various aspects of stability and to analytic semigroups (including generation theorems on Lie groups and fractional powers of generators). Several papers are devoted to the interaction between stochastic analysis and semigroup theory (Feller semigroups), Applications of stochastic processes to problems in physics (fluid dynamics, aero-elasticity, Dirac equation and flutter of wings) and control theory (thermo-elastic plates). (jml)


This is a biography of Stephen Smale, written by a mathematician who declares himself as his academic grandson. To write this biography involved tremendous work, but the result is brilliant. It is designed to be accessible for nonmathematicians.

Smale is presented here first of all as a great mathematician, and together with his personality we gradually become familiar also with mathematical life in the United States. The author does not avoid describing Smale’s mathematical results, but having in mind the aim of the book, he introduces them in a way that can be understood by most readers. For readers closer to mathematics, but still non-mathematicians, four appendices are included, explaining his results in more detail. On the other hand, the author’s skilful presentation of Smale’s mathematical discoveries will surely attract the interest of professional mathematicians. Every mathematician knows Smale’s famous results (such as the higher-dimensional Poincaré conjecture), but not many of them know that he is also a respected mineral collector (and in this field he is as good as in mathematics), and a prominent photographer. The author also describes Smale’s political anti-war activities, and informs us also about his adventurous trips, such as sailing to the Marquesas.

This is the first biography written by S. Batterson, but in many respects it is a master-piece. (jpa)


The book is intended as an introduction to ergodic theory, with emphasis on two types of dynamical system. The geodesic flows on the unit tangent bundle of a locally symmetric space and unipotent actions on homogeneous spaces. The book is well organised and gradually develops the theory in six chapters. In Chapter-
I. An introduction and some classical examples and results from ergodic theory, including Weyl’s equidistribution theorem and Neumann’s ergodic theorem on strong mixing. Geodesic flows form the main topic of Chapter II: the chapter begins with a short section on hyperbolic geometry and geodesics, and the Riemannian structure is then studied. The various formulae of Hermann Moore is presented in Chapter III, together with Moore’s ergodicity theorem and mixing of all order. Chapter IV is devoted to the hyperbolic geometry. Horocycle flows in Chapter IV are studied for finite-area surfaces covered by the hyperbolic plane: Hedlund’s minimality theorem is a main result of this chapter. Chapter V introduces the application of geometric techniques in s-dimensional Euclidean spaces. In the last chapter, treating Oppenheim’s conjecture, there is an application to number theory.

This book can be used as a guide to modern ergodic theory and dynamics. It can be used by graduate students and by researchers in different areas, since the contents of the book range from elementary results to modern theories. The background needed to understand the book is a familiarity with elementary results from functional analysis, measure theory and Lie theory. (dhh)

RECENT BOOKS


This book describes many of the well-known and new results in the theory of anomalies, differential geometry for space curves, and its variants. The lectures by K.A. Ribet (written jointly with W.A. Stein) are devoted to Serre’s conjecture on the modularity of odd Galois representations ρ: Gal(Q) → GL2(Fp). The ‘weak’ Serre conjecture states that ρ comes from a modular form f, and the ‘strong’ conjecture specifies the exact weight and level of f. The lectures sketch proofs of various results of the form ‘weak conjecture implies strong one’ – the form, height optimisation (Edixhoven) and the level optimisation (Ribet et al.; this result provides a link between modularity of elliptic curves and Fermat’s last theorem). The lectures of J.P. Bourgain concentrate on modular elliptic curves – the arithmetic of elliptic curves, modular forms and Galois representations.


This book consists of lectures notes from the 1999 Graduate Summer School (and from the accompanying Mentoring Program for Women in Mathematics, MPWM) of the IAS/Park City Mathematics Institute. The lectures cover a variety of topics, including the theory of modular elliptic curves – the arithmetic of elliptic curves, modular forms and Galois representations.

B. Conrad provides an introduction to these topics, essentially without proofs. Those by A. Silverberg focus on open questions in the arithmetic of elliptic curves and abelian varieties (rational torsion points, ranks of groups of rational points, the conjecture of Birch and Swinnerton-Dyer, the ABC-conjecture and its variants). The lectures by K.A. Ribet (written jointly with W.A. Stein) are devoted to Serre’s conjecture on the modularity of odd Galois representations ρ: Gal(Q) → GL2(Fp). The ‘weak’ Serre conjecture states that ρ comes from a modular form f, and the ‘strong’ conjecture specifies the exact weight and level of f. The lectures sketch proofs of various results of the form ‘weak conjecture implies strong one’ – the form, height optimisation (Edixhoven) and the level optimisation (Ribet et al.; this result provides a link between modularity of elliptic curves and Fermat’s last theorem). The lectures of J.P. Bourgain concentrate on modular elliptic curves – the arithmetic of elliptic curves, modular forms and Galois representations. The first six lectures – inspired by B. Mazur’s earlier accounts – develop the general theory, while the remaining two lectures focus on the (still mysterious) p-adic families of modular forms. The lectures of R. Greenberg treat Iwasawa theory of elliptic curves, with emphasis on its algebraic aspects:
variations of Mordell-Weil groups and of analytic ranks in towers of number fields; Selmer groups of Mazur’s Main Conjecture. Two lectures by J. Tate summarise basic properties of Galois cohomology groups. Appendices by B. Conrad and K. Buzzard, and by M. Dickinson, J. Weston and M. Emerton, to the two chapters by Ribet and Serre contain several technical results alluded to in the main text. The articles by W.-C. W. Li and N. Yui are based on their lectures at MPIM. Li states basic results on modular forms, while Yui discusses the arithmetic of L-functions of Calabi-Yau 3-folds.

The book is aimed at PhD. students in number theory. It begins at a fairly introductory level, but gives a good overview of the subject and proceeds naturally to more technical aspects of the theory. An attractive feature of the book is the presence of many exercises for students. (jek)


This book is based on a second-year course on algebraic topology and the authors present material which, in their opinion, ‘every young topologist should know’. The second aim of the authors is to provide enough information from algebraic topology for people interested in geometric topology.

In order to make the book self-contained, the authors present three chapters on basic facts from homological algebra. The first chapter consists of a brief introduction to chain complexes, homology and cohomology, with applications to CW-complexes, simplicial and singular theory. The second chapter gives an overview of homological algebra, including universal coefficient theorems. Chapter 3 is devoted to products in the homology and cohomology, including the Künneth formulas and the Künneth formula for products in the homology and cohomology of spaces with local coefficients.

The main text is completed by two appendices, such as Killing spinors and twistor spinors. Attention is paid to eigenvalue estimates and to solution spaces of special spinorial field equations. One of the main topics of the book is a classification of spin structures on compact Riemannian manifolds, and an analytical part, devoted to the theory of spinors and Dirac operators on Riemannian manifolds. It consists of an algebraic part, introducing Clifford algebras, spin groups and spinors, a topological part, discussing existence and a classification of spin structures on compact Riemannian manifolds, and an analytical part, where the authors deal with spin operators and study their properties. The main text is completed by two appendices that are also of special interest and contain material that is needed earlier in the book. Appendix A contains a nicely written description of the Seiberg-Witten theory of invariants for 4-dimensional manifolds, one of the main topics in 4-dimensional manifold theory in recent years. Appendix B is devoted to the theory of principal bundles and connections, their reductions and holonomy theory. This book can be strongly recommended to anybody interested in the theory of Dirac and related operators. (jbu)


Since the last monograph on simplicial homotopy theory appeared more than twenty-five years ago, one of the aims of this monograph is to fill this gap, at least partially. Quillen’s work on closed model structures, which now belongs to the foundations of simplicial homotopy theory, is one of the main subjects of this monograph. However, the monograph starts from the very beginning, from the simplicial sets, and no prerequisites from simplicial homotopy theory are needed. More precisely, this book should be accessible to a second-year graduate student.

After so many years of intensive development, we cannot expect the monograph to cover all subjects in the field. It is oriented mostly towards algebraic topology, while other fields of algebraic topology, such as geometric and differential topology, geometry, number theory and algebraic K-theory are not included. Nonetheless, another aim of the book is to gather together old and recent results in other fields, intending to use simplicial homotopy theory in their own fields, with a necessary working knowledge of the theory. Having this in mind, the authors have prepared the list of references, such a very important component of the monograph. The main aim is to gather together old and new results and specialists in the field of simplicial homotopy theory. It is nice that old results are sometimes presented in a new form, with a deeper insight and surprising relations. The authors have decided not to include exercises or problems; instead, they saturate the text with many interesting and inspiring examples.

The whole monograph is carefully and naley written and for experts in algebraic topology, the whole will be a welcome addition to the bibliography. For its quality and importance it should be included in every mathematical library. (iva)


This book is an English translation of Grassmann’s Ausdehnungslehre, which was published in Berlin in 1862. The translation by Lloyd C. Kannenberg (who has also translated Peano’s Calcolo geometrico e alcune operazioni della logica deduttiva, Birkhäuser, Boston, 2000) is based on Hermann Grassmann’s Gesammelte mathematische und physikalische Werke (Teubner, Stuttgart, Leipzig, 1896).


This book contains Grassmann’s Extension Theory (325 pp.), the Editorial Notes (39 pp. from Grassmann’s Gesammelte Werke, 1896), Supplementary Notes (8 pp.) and Subject Index (15 pp.). Grassmann’s classical work can be warmly recommended to historians of mathematics as a source of Grassmann’s mathematical ideas. (jbe)


This is a nice little introduction to combinatorial rigidity theory by an experienced author. A very careful and accessible exposition (sometimes even a little slow for someone used to reading mathematics) starts from simple examples and ideas and proceeds to a theory of the rigidity of frameworks made of rods in dimen-
sions 1, 2, and 3. Several advanced theorems and their proofs are presented, or at least sketched, and further reading is suggested for the more advanced topics. The main theme is complemented by sections concerning history, geodesic domes, linkages and tensegraphy framework assemblies of rods and cables.

While some calculations and linear algebra are assumed, the basic notions and results of graph theory are carefully explained. (jmat)


The book divides into two parts. Part I consists of extended manuscripts of lectures given at a Working Week on Resolutions of Singularities, held in Eiró, Austria, in September 1997. It contains contributions by D. Abramovich and F. Oort (Alternations and resolution of singularities), J. M. Avroa (Reduction of geometric singularities to differential equations), P. Bundschuh (Puiseux solutions of singular differential equations) and S. Encinas and O. Villamayor (A course on constructive desingularisation and resolution).

Part II contains articles written especially for this volume: there are fifteen contributions altogether. We mention just a few, by G. Bodnar and J. Schicho (A computer program for the resolution of singularities), B. van Geemen and F. Oort (A compactification of fine moduli space of Curves), G. Muller (Resolution of weighted homogeneous surface singularities) and M. Vaquie (Valuations); in these articles, special related questions are discussed. There are also short communications describing the life and work of O. Zariski by J. Lipman, and an interesting historical account by H. Hauser on the resolution of singularities, in the period 1860-1999. (jbu)


The main topics in this book are covariant derivatives of spinor fields and their use in theoretical physics (Newtonian mechanics, electromagnetism, gravitation). The first two parts of the book present the necessary prerequisites.

In the first part, standard linear algebra tools (vector spaces and their duals, tensors, exterior algebra, Clifford algebras) are developed in detail. In the second part, basic notions of smooth manifolds, tangent spaces, vector fields, Lie derivatives, connections and covariant derivatives are treated, with special parts devoted to the Riemannian case, Lie groups and the corresponding Lie algebras. These notions are used for a description of fibre bundles and vector bundles, and connections and covariant derivatives on them. The main part of the book is devoted to a description of spinor fields on (pseudo)-Riemannian manifolds and covariant differential schemes acting on them (not necessarily compatible with the metric structure). Special attention is paid to the Minkowski case.

The book is clearly written for theoretical physicists, and is complemented by a standard course of free mathematical tools. The notation employed is a mixture of those used in mathematics and in physics, but should be understandable. The book will be useful for graduate and postgraduate students of theoretical physics. (vs)


This is a representative monograph (770 pages) on all aspects of the mathematical theory of the Feynman integral. The intuitive and formulaic treatment of the subject has attracted mathematicians from its very beginning, and several different approaches to the ‘rigorous mathematical theory of the Feynman integral’ have appeared in the course of the last few decades. The heuristic concept of ‘summation over all paths’ was formulated by R. Feynman in 1949. This book summarises all existing approaches and explains their mutual relations (and, often, their equivalence). Much of the original work on the subject is due to the authors of the book.

The book starts with an extensive and thorough introduction, as for the more specialised themes in the subsequent chapters. This makes the book accessible, even for beginners. In addition, many quotations of sayings by famous physicists who were influential in the development of the book (if applicable) coincide under reasonably general conditions. The second part of the book (Chapters 14-19) is devoted to a related subject: Feynman’s operational calculus for non-commuting variables; again, this subject is explained thoroughly from the very beginning.

To summarise, this book should serve as a standard reference for anyone interested in the mathematical theory of Feynman path integrals and the related operational calculus. (mzahr)


This volume contains selected contributions by 71 participants at a conference organised by the Rolf Nevanlinna Institute in honour of the founder of the Finnish number theory tradition, Kustaa Inkeri (1908-97). The papers cover a broad spectrum of elementary, analytic and algebraic number theory.

The reader will find many interesting contributions: the life and work of Inkeri (Metsänkylä and van der Poorten), Diophantine problems (Bugeaud and Frey, Mignotte), sieve methods (Frey, Iwaniec, Heath-Brown), elliptic functions (Haukkanen), Lucas and Pell numbers (L. Lucas, Katsurada), binary additive divisor problems (Meurman). The volume is carefully prepared. (lp)


This book is the second volume of a series of problem books in mathematical analysis: the first appeared a year ago and others will follow. This second volume contains three chapters: topics like limits, continuity, differentiation, and limits and series of functions. Numerous problems are worked out, with solutions, all of them are provided. The first chapter contains 212 problems, including some on functional equations (connected mostly with ‘elementary functions’) and continuity on metric spaces, while the second and third chapters contain 258 and 130 problems, respectively.

As with the first volume, the book is of great help for problem seminars and also for self-study. The authors mention some sources in the preface. Almost two-thirds of the volume are devoted to the presentation of solutions, usually in a relative straightforward manner; those who know the first volume will probably appreciate this continuation.

This book can be recommended for libraries and for students. (jive)


This collection of 23 papers presents a fairly representative picture of the current trends and likely future developments in computational group theory. While permutation groups and matrix groups remain in the focus of the researchers, the emphasis shifts discernibly towards the more general model of a black box group, introduced in 1984. The nature of this model calls for probabilistic algorithms (Monte Carlo, Las Vegas) and consequently appear throughout the volume.

The papers can be somewhat artificially divided into five categories (in order of frequency): (1) standard computation; (2) standard computation compared to classical group-theoretical problems, brief surveys of computational group theory, theoretical results concerning groups and algorithms, and software documentation. The concrete topics range from the recognition of finite special linear groups and experimentation with coset enumeration to a solution of the Andrews-Curtis conjecture and a classification of unsolvable groups. Many results are based on Aschbacher’s classification of maximal subgroups of classical groups. References to machine computation (implemented in GAP, MAGMA, MEATAXE) are omnipresent and form a vital part of many arguments. Although the tools for parallel computing have now been included in algebraic packages (such as ParGAP), most of the algorithms remain non-parallel – a certain target for the future.

Computational group theory evolves dramatically as it is caught up by the unusually high amount of cross-referencing among the contributions to this volume. Naturally, this phenomenon is a consequence of the close interaction of the group theorists with the authors, whose careful and precise work have made the papers look almost as chapters in a book written by one author. Their effort will be great-
ly appreciated by experts and readers with some knowledge of the area. Beginners, however, must look for the preliminaries elsewhere. (ad)


This book contains some very important tools for studying the dynamical aspects of objects modeled on self-similar fractals and builds the theory of ‘analysis on fractals’. This is a developing area of mathematics that focuses on the dynamical aspects of fractals, such as heat diffusion on fractals and the vibration of a material with fractal structure.

The book provides a self-contained intro-
duction to the subject, starting from the basic geometric and topological self-similar sets and going on to recent results, including the properties of eigenvalues and eigenfunctions of the Laplacians, and the asymptotic behaviour of heat kernels on self-similar sets.

Requiring only a basic knowledge of advanced analysis, general topology and mea-
ture theory, this book will be of value to graduate students and researchers in analysis and probability, will also be useful as a supplementary text for graduate courses cov-
ering fractals. Individual chapters contain such topics as the geometry of self-similar sets, analysis on self-similar sets, the construction of Laplacians on P.C.F. self-similar structures, eigenvalues and eigenfunctions of Laplacians and heat kernels. Some mathematical back-
ground (self-adjoint operators, quadratic forms, semigroups, Dirichlet forms, Nash inequality and the renewal theorem) is described in the Appendix. (pp)


The first edition of this book appeared in 1999, and a review can be found in this Newsletter, No. 39, March 2001, p.32. This is the second unchanged paperback edition of the book. (vs)


In this second edition, some material has been added (self-adjoint operators, quadratic forms, semigroups, Dirichlet forms, Nash inequality and the renewal theorem) is described in the Appendix. (pp)


This is a book on rigorous statistical physics. The author is one of the co-founders and lead-
ing figures of this important, and (after 40 years of development) still flourishing field of research. The subject of the book – the ‘theory of interacting multicomponent systems’ lies on the border between mathematics and other sci-
ces. The greatest impact came from physics, not only through phenomena like phase transi-
tions but also some important methods devel-
opment originally by theoretical physicists. These methods, like the method of expansions, were later converted (notably also by the author of this book) into powerful tools of pure mathematics. On the other hand, another important and traditional tool of mathematical statistical mechanics is probability theory.

In the second part, the author presents a concise introduction to the subject. In Part I he discusses basic concepts (phase space, dynamics, statistical ensembles) and basic examples (ideal gas, lattice gas) of the the-
ory. He then gives a concise explanation of important statistical ensembles (micro-canoni-
cal, canonical, grand-canonical) and of their mutual relations. He then explains, in Part II, the method of correlation functions (expans-
sions) based on the use of Kirkwood-Salsburg equations. Finally, he discusses various thermo-
dynamical potentials – entropy, pressure, free energy, etc. Part III deals with phase transi-
tions. The author explains the famous Peierls’ method of contours, not only for the simplest case of the Ising model, but also in detail for its more sophisticated form, the Pirogov-Sinai the-
ory. Finally, in an epilogue, he adds a short dis-
cussion of Wulff droplets and the roughening transition.

There is a vast journal literature on the sub-
ject of this book, but relatively few standard re-
ference texts. This new textbook will surely find its place among these (Ruelle, Sinai, Georgii, Simon, etc.) that do not usually cover every important topic or are directed towards a more specialised reader. (inzahr)


As the title indicates, this book is an eye-witness account of the events leading to the final solution of Fermat’s Last Theorem. The author attended each of the lectures that he did not label as milestones on the way leading to the correct solution of this problem, which became one of the most famous ones in mathematics. He took notes during the lectures, read and sum-
marised the reports in the newspapers and jour-
nal, and took more than thousand photographs during and after the lectures and the connected seminars.

This material forms the backbone of the report contained in the book. It is written in a lively style and is easy to read and as such, it can be recommended to the layman who were not lucky enough to have an opportunity to follow these events personally. With its many interesting facts, often unattainable to those not directly engaged in the story, its many personal quo-
tations, and pictures of personalities involved, the book will certainly be an important source for historical details surrounding the proof for contemporaries and those born later. (sp)


Many important results from number theory and geometry have their roots in the properties of algebraic curves. This book focuses on algebraic curves over finite fields and their function fields, with a special emphasis on applications.

The first three chapters cover the necessary background on algebraic number fields, class field theory and global function fields for the following core chapters. In the first two chapters the reader finds how to construct global function fields with many rational places, and meets results about the asymptotic behaviour of the number of rational places of global function fields.

The book mostly reflects recent results, and so the application chapters discuss methods of algebraic geometry in coding theory (Goppa, Knudsen, Wiman, Kohnen), and computational number theory. (šp)


This book is devoted to the theory of non-
absolutely convergent integrals in Euclidean spaces, and was written by one of the leading specialists in this field. It seems that he did not directly frame the book as a direct generalisation of the Denjoy-Petterson inte-
gral. However, in the last twenty years, several solutions have been found; they use the idea of ‘Riemann-Henstock’ (or ‘alternative’) defini-
tion of the Denjoy-Petterson integral.

The solution presented in this book is based on the theory of (finite) additive set functions,
defined on the family of all bounded BV sets in \( \mathbb{R}^d \); such set functions, which are continuous with respect to the vague topology, are called BV charges. In the book, a deep theory of derivates and variations of charges is presented. Using a type of variation, the important class of AC* charges is defined. The basic definition of the BV charge is one, and is based on the notion of the indefinite R-integral. Roughly speaking, the indefinite R-integral of \( f \) is defined as a function \( D(f) \) mapping an almost all \( x \) where \( D(f) \) is a suitable type of derivative. An equivalent ‘Riemann-type’ definition of the R-integral is also given (hence the letter \( R \)). Using the R-integral, a very general GCD theorems for AC* functions is to be proved, and its approximation for distribution on infinite-dimensional Banach spaces. Chapter III, written by J. Sundals, treats the asymptotic behaviour of sums of weakly dependent random variables and its approximation by the normal distribution. In Chapter IV, homogeneous Markov chains and their central limit theorem is studied, he speaks about his most important discovery, distribution theory, which has many applications in both pure and applied mathematics. Schwartz has been, however, not only a mathematician. Besides his scientific work and apart from his teaching activities, he was also very active in the social and political arena. He was a convinced Trotskyist. Thus, the reader will find in this book numerous references to the 20th century, mainly on both the world wars, on political development in the USSR, and so forth. Everything is based, if not on his personal memories, on documents and his numerous friends from all over the world. He has always fought for peace and has opposed localised wars, especially in Algeria and Vietnam, where he also lived for some time. Writing a book describing so many particular events precisely is witness to the author’s prodigious memory. He desirous of sharing his knowledge with the best students. The book is well organised and is written in a precise and lucid style. It can be recommended to anybody interested in the theory of self- absolutely convergent integrals, and has a solid background in graduate level analysis. (JH)


This book demonstrates the basic methods for solving classical linear problems in the mathematical physics of elliptic, parabolic and hyperbolic types. In particular, methods of conformal mappings, Fourier analysis and Green’s functions are considered, as well as the perturbation and integral transformation methods, among others. The theory contains concrete examples with a detailed analysis of their solution, and ends with problems for independent study and answers to them. This handbook is addressed to students of technology institutes where a course on mathematical physics of relatively reduced volume is offered, as well as to engineers and scientists. (kn)


This reference book is a collection of research-level surveys covering different results on certain topics of probability theory. All parts of the book are self-contained and each special topic can be studied independently.

The book consists of chapters on limit theorems in probability theory, written by leading researchers in the area. The classical part of limit theorems is presented by V. V. Petrov in Chapter I. Central limit theorems, laws of large numbers, the law of the iterated logarithm are covered in this chapter. V. Bentkus et al. wrote Chapter II, concerning Gaussian approximations for distribution on infinite-dimensional Banach spaces. Chapter III, written by J. Sundals, treats the asymptotic behaviour of sums of weakly dependent random variables and its approximation by the normal distribution. In Chapter IV, homogeneous Markov chains and their central limit theorem is studied, he speaks about his most important discovery, distribution theory, which has many applications in both pure and applied mathematics. Schwartz has been, however, not only a mathematician. Besides his scientific work and apart from his teaching activities, he was also very active in the social and political arena. He was a convinced Trotskyist. Thus, the reader will find in this book numerous references to the 20th century, mainly on both the world wars, on political development in the USSR, and so forth. Everything is based, if not on his personal memories, on documents and his numerous friends from all over the world. He has always fought for peace and has opposed localised wars, especially in Algeria and Vietnam, where he also lived for some time. Writing a book describing so many particular events precisely is witness to the author’s prodigious memory. He remarks that he made notes to refresh his memory, a patient reader can learn a lot, without having to leave the firm ground of set structures that are manipulated only in a way that makes it easy to keep in mind the role of individual elements. (ad)


This is the second and enlarged edition of a problem book for first-year Ph.D. students in mathematics. A review of the first edition can be found in this Newsletter, No. 30, Dec 1998, p.41. The new edition contains about 150 additional problems and 250 new solutions. (vs)


This is an English translation of the French edition, first published in 1997 as a volume in a university mathematics encyclopedia. The book contains 3500 titles, each of them limited to 128 pages; this limitation immediately implies bounds for such an extensive field as the theory of prime numbers. Nevertheless, the audience is encouraged in writing an interesting volume that can be recommended to students. The reader will find basic introductory elementary results such as the Chebyshev or Mertens theorem and Brun’s sieve applied to the twin prime conjecture. The book also contains a complete and self-contained elementary proof of the prime number theorem in Daboussi’s version of 1984. The middle chapter, on the stochastic distribution of prime numbers reflects the authors’ decision to describe various aspects of prime number theory from the point of view of randomness, giving to the book a specific charm. It also contains an introduction to Dirichlet and Siegel-Walfish theorems on primes in arithmetic progressions, Siegel zeros and a discussion of consequences of Cramer’s probabilistic model of the distribution of primes generated by the measure induced by the reciprocal of the Riemann zeta function. Any student who can find the basics of uniform distribution.

This book can be read by anyone with a minimal knowledge of number theory and some calculus skills. (sp)

G. Tian, Canonical Metrics in Kähler Geometry, Lectures in Mathematics ETH Zurich, Birkhäuser,
In recent years, uniformisation theory of canonical Kähler metrics in higher dimensions has been developed in complex differential geometry. One of its applications is the use of Calabi-Yau spaces in superstring theory. The presented monograph is a systematic and self-contained introduction into the theory of canonical Kähler metrics on complex manifolds. The following topics are described in the first part of the book: Kähler metrics and their curvature tensor, the space of Kähler metrics on a given manifold, the Calabi functional, and extremal metrics and uniformisation of Kähler-Einstein manifolds. In the second part a holomorphic invariant for Kähler manifolds (called the Calabi-Futaki invariant) is introduced and its properties are described. Special attention is paid to the scalar curvature of Kähler metrics in the corresponding symplectic geometry, and the Calabi-Yau theorem on the existence of the metric with given Ricci form is proved. Kähler-Einstein metrics with positive scalar curvature on a compact manifold with positive first Chern class are also discussed, and necessary and sufficient conditions for the existence of such a metric are presented. Examples of Kähler-Einstein metrics, especially on Fermat hypersurfaces are omitted or sketched. This is also due to a wish to include a lot of material in 140 small pages. Thus, the book will be very convenient for those who want to be acquainted with the topic in a short time, without going into many details (it works even better, if the book is complementary to lectures, as it was with the author’s lectures). Included in the text are a sufficient number of results, exercises and problems.


In the Preface the author warns that the book has many unusual features: this is why the book is so interesting. In the parts devoted to probability theory the results are precisely stated, but most of the proofs are omitted. The sections on statistics are nearly free from statements of technical conditions under which the theorems hold. The book describes mainly the motivation of probabilistic and statistical thinking. One of the sections is called ‘Sharpening our intuition’: it seems that this would be a better candidate for the title of the whole book. The author’s views are declared very sharply and very clearly and, maybe, some readers will not agree with them completely; for example, the sentence on p. 225 ‘A celebrated result, the Neyman-Pearson lemma (not discussed in this book), does prove that the LR Test is unquestionably best (most powerful) in a certain simple situation of little practical importance’ will be considered by many teachers as heretical – but practical statisticians may hold the same opinion as the author. Although the author asserts that the book covers a very limited area, many topics are discussed here, both classical and modern. The probabilistic parts contain, for example, the laws of large numbers, central limit theorems, the strong Markov principle, generating functions, martingales, etc. Among the statistical topics we find confidence intervals, Bayesian statistics, linear models and ANOVA. The author characterises statistics as follows (see p. 381): ‘I do apologize that I often tell you that something is a good idea only to have to say later that it does not work in many important cases. That is the way that Statistics is full of surprises and never dull... ’. The last chapter is devoted to quantum probability theory and quantum computing, which will probably be new to most readers.

The book is a rich and enjoyable source of ideas, motivations and examples, which can be used by teachers of probability and statistics.


This book is really exceptional: there are only a few books of this sort. Despite the fact that it contains a minimum of mathematics, it will be appreciated by many mathematicians, in particular by those interested in stamp collecting. The book shows nice pictures of 400 stamps without descriptions which are appreciated only by real collectors. The book contains chapters of various kind. Here are some examples: the Middle Ages (Pope Sylvester II, Albertus Magnus and Nicolas of Cusa), Globes, Nicolas Copernicus (stamps of Poland, GDR and Venezuela), Isaac Newton (stamps of GB, North Korea, Monaco and Nicaragua), France and the Enlightenment (d’Alembert, Condorcet, Lagrange and Laplace), Russia (Kolovenskyaya, Lyapunov, Oстроgradsky and Tchebychev), and much else besides. The book would be a nice present for anybody with interests in mathematics and stamp collecting as well.

At the Max Planck Institute for Mathematics in the Sciences (Leipzig, Germany), we have an open position for a postdoc in the field of Mathematical Modelling of Cognitive Systems.

Applicants should be able to build upon a solid education in mathematics or physics in order to develop and analyze formal models, for example neural networks, that lead to new insights about information processing and cognitive structures. The work will take place in an open interdisciplinary group at a research institute with a strong background in mathematics and with many and diverse international contacts. Collaborations with researchers at the University of Leipzig or other institutions are possible.

The position is offered for two years, with the possibility of an extension in case of mutual interest. The beginning date is flexible.

Handicapped applicants will be given preference in case of equal qualification. The Max Planck Society as the employer aims at increasing the number of female scientists in fields where underrepresented. Therefore, women are particularly encouraged to apply.

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