EUROPEAN MATHEMATICAL SOCIETY

NEWSLETTER No. 43

March 2002

Designed and printed by Armstrong Press Limited
Crosshouse Road, Southampton, Hampshire SO14 5GZ, UK
telephone: (+44) 23 8033 3132 fax: (+44) 23 8033 3134
Published by European Mathematical Society
ISSN 1027 - 488X

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 Tuulikki 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.

EMS Committee

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 Prof. 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*

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

19-31 May
EMS Summer School in Craiova (Romania):
Mathematical and numerical methods in computational quantum chemistry
Contact: Yvon Maday, *e-mail: maday@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: makelain@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: mmd@math.uvsq.fr*
webpage: http://acm.emath.fr/amam/

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

Doina Cioranescu

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

The SMF (*http://smf.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 Congres* (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 Societé Française de Statistics 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 Berlingen meeting in May 2001.

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, 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), Andras Frank (Hungary), François Golse (France), Michael Gromov (France), Eugene Ya. Khruslov (Ukraine), Peter Alexander Markowich (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. Vasin (Russia). The Organising Committee is co-chaired by Doina Cioranescu and Mireille Martin-Deschamps, and also contains Jacques Blum, Denise Chenais and Charles Walte 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), Marek Musiela (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://acm.emath.fr /amam/*

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Mireille Martin-Deschamps is Professor at the Laboratoire de Mathématiques, Université de Versailles et Saint-Quentin, 45 avenue des Etats-Unis, 78035 Versailles Cedex, France.

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 *amam03*, 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 Commissioner Ph. Busquin. The EMS had pointed out that no mathematicians were on his Scientific Advisory Board of 45 persons.

Rolf Jeltsch had attended an informal meeting on digitising (in a searchable way) mathematical literature during the Joint Mathematics Meeting of the AMS, MAA and SIAM in San Diego.

The *Treasurer* reported that the financial state of the EMS was sound. The Financial Statements for the year 2001 were accepted and signed by the Executive Committee members; it was noted that the Society currently has an Investment Fund of 70K euro, in shares and investment funds, together with some cash in hand. A budget proposal for 2003 and 2004 was agreed for presentation to the Council in Oslo. There was some discussion of presidential expenses, and the need not to limit the choice of President to people with their own sources of funding.

The *Publicity Officer* proposed that the EMS prepare a letter to go in corporate societies' mailings to their members, and this was agreed; electronic distribution could be considered. The EMS would share a booth with *Zentralblatt* at *ICM-2002* in Beijing, would have a booth at the *Abel Conference* in Oslo until the Tuesday, and would have a booth at *amam03* in Nice. It was agreed that contact should be made with member societies whose number of EMS members has not increased recently.

A new venture, the *AlphaGalileo Project*, is seeking to improve the communication of European research to the world's media (*http://www.alphagalileo.org*); from late 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 *EMS Prizes*, 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.

2. 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.
3. 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 *EMIS*, 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 ECMI.

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 Chenais and Charles Walter (Université de Nice Sophia-Antipolis). There will be a discounted conference fee for members of the EMS, SMF and SMAI. The Congress web address is: *http://www.acm.emath.fr/amam*.

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

The next *EMS Council meeting* will be on 1-2 June 2002, starting on Saturday 1 June at 10 a.m., in Auditorium 2 of Georg Sverdrups Hus, on the University of Oslo campus. The delegates representing individual members are: Giuseppe Anichini (1996-99-03), Vasile Berinde (2000-03), Giorgio Bolondi (1996-99-03), Alberto Conte (2000-03), Chris Dodson (2000-03), jean-Pierre Francoise (2000-03), Salvador S. Gomis (2000-03), Laurent Guillopé (2000-03), Klaus Habetha (1996-99-03), Willi Jaeger (2000-03), Tapani Kuusalo (1996-99-03), Marina R. Marchisio (1998-2001-05), Vitali Milman (1998-2001-05), László Márki (1996-99-03), Andrzej Pelczar (2000-03), Zéev Rudnick (2000-03), Gérard Tronel (2000-03), Robin Wilson (2002-05), and Sebastià Xambó-Descamps (2002-05).

Committee Reports will be written, with possibly a few minutes 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 on EMIS, to have 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 *Applied 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. Barndorff-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* should 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* on EMIS, 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 whole mathematical community worldwide 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 EMS EC thanked the Norwegian Academy of Sciences and Letters for creating the *Abel Prize* for Mathematics, recognising it as a major event for mathematics. There are no restrictions on the subject area or age of prize-winners, and the selection process will be very open. There will be an Abel Prize Committee as well as a Scientific Advisory Panel working to support the Prize Committee.

It was agreed to publish a notice for the *J.-L. Lions Commemorating Conference* in July in the EMS *Newsletter*.

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.

It was agreed to draft a policy statement on the Bologna Declaration, which should be discussed at Council in Oslo – this should be phrased in terms of the underlying principles to be supported by the EMS, rather than get involved in details that would vary from country to country.

Future EC/Council Meetings
There will be an *EC Meeting in Oslo* on 31 May 2002, to finalise preparations for the Council meeting starting the following day. The meeting will be preceded by a meeting of the *EMF Board of Trustees*.

There will be a *Council Meeting in Oslo* on 1-2 June 2002, in Auditorium 2, in Georg Sverdrups Hus. This building is the new University Library, located on the Oslo University Campus. The meeting will be followed by a meeting of the *EMS Chairs of Committees*.

At the invitation of the Swedish Mathematical Society, an EC meeting will be held on 28-29 September 2002 in *Stockholm*. The Local Organising Committee of *amam2003* have invited the EC to meet in *Nice* on 9-10 February 2003.

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

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 Mina 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 one has been set up), the Council will proceed to the elections to the Executive Committee posts.

If a nomination comes from the floor during the Council meeting, there must be a written declaration of the willingness of the person to serve, or his/her oral statement must be secured by the chair of the Nominating 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 arrangements will be provided later.

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Fifth Diderot Mathematical Forum

MATHEMATICS AND TELECOMMUNICATIONS

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 Urbach (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) Yrjo 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, Lausanne): *Low density parity check codes*

In the Helsinki Workshop:
Samuli Aalto (Helsinki University of Technology): *Teletraffic analysis of multicast networks*

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 Turku): *Algebraic geometry in error correcting codes*

Jyri Hämäläinen (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*

Olav Tirkkonen (Nokia Research Center): *Clifford algebras and space time codes*

Ilkka Norros (VTT Information Technology): *Internet traffic as a stochastic process*

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*

Jean-Paul M.G. Linnartz (Philips Research, Eindhoven): *A mathematical framework for resource management in wireless networks*

Philippe Godlewski (ENST, Paris): *Models, achievable performance and capacities in cellular mobile networks*

Richard J. Boucherie (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*

A.J.E.M. (Guido) Janssen (Philips Research, Eindhoven): *Gabor systems and communication theory*

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): *Algebrico-geometric codes*

Piyush Gupta (Bell Labs, Murray Hill, USA), *The traffic-carrying capacity of ad hoc wireless networks*

François Baccelli (INRIA, École Normale Supérieure): *Stochastic networks and topical maps*

Patrick Thiran (EPFL): *Connectivity in ad-hoc networks*

Jean-Yves Le Boudec (EPFL): *Network calculus*

Hans-Andrea Loeliger (ETH Zürich): *Graphical models and signal processing*

Martin Hasler (EPFL): *Communications using chaos*

Martin Vetterli (EPFL and UCB): *Sampling signals with finite rate of innovation*

Presentations
Some of the presentations are available on the following web sites:

for Helsinki: *www.math.hut.fi/diderot2001*

for Eindhoven: *www.research.philips.com /diderot2001*

for Lausanne: *mawww.epfl.ch/benarous /Recherche/diderot.html*

Video-conferencing technology
The three cities were connected to each other using a star network, with external centre node located in the University of Oulu, Finland. Lausanne and Eindhoven were connected to Oulu using 384 kbps ISDN lines. Helsinki was connected to Oulu through Internet (over the 2.5 Gbps FUNET backbone network).

It was interesting to share presentations between the sites, although this required a relatively long broadcasting time. Some expected better technical quality in the videolinks.

From Helsinki
There were 50 registered participants (including the 11 invited speakers). On the first conference day, there were approximately 50 additional non-registered people attending the lectures given by Neuvo, Hagenauer, and Urbanke. The main speaker, Dr Yrjö Neuvo, reported that he had been contacted afterwards by scientists both from Finland and from abroad and that this feedback had been rewarding.

From Eindhoven
There were approximately 85 registrations for the Eindhoven site: not everybody showed up on both days, but all lectures were well attended. The emphasis in Eindhoven was on signal processing and coding theory, but there was also a lecture on electromagnetics for wireless communications, by Bach Andersen. The level of the presentations was well above average. Many who attended were very enthusiastic about the quality of the lectures and have asked the lectures to be placed on the web, which has been done (see above).

From Lausanne
Attendance was reasonably large (40). The conference was opened from there by the EMS President, Rolf Jeltsch. Most participants were obviously pleased by the quality and diversity of the talks, as well as the depth of the mathematical problems underlying the future progress of this important area of engineering.

The forum was a true success on the scientific side, and an exciting event on the social side. Being jointly organised by people in communications (M. Hasler, M. Vetterli) and in mathematics (G. Ben Arous), its scientific programme could really draw from both sides and show a very broad spectrum of the possible interfaces of maths and telecoms. There were sessions on Stochastic methods in communications, Networking, and Signals and Systems.

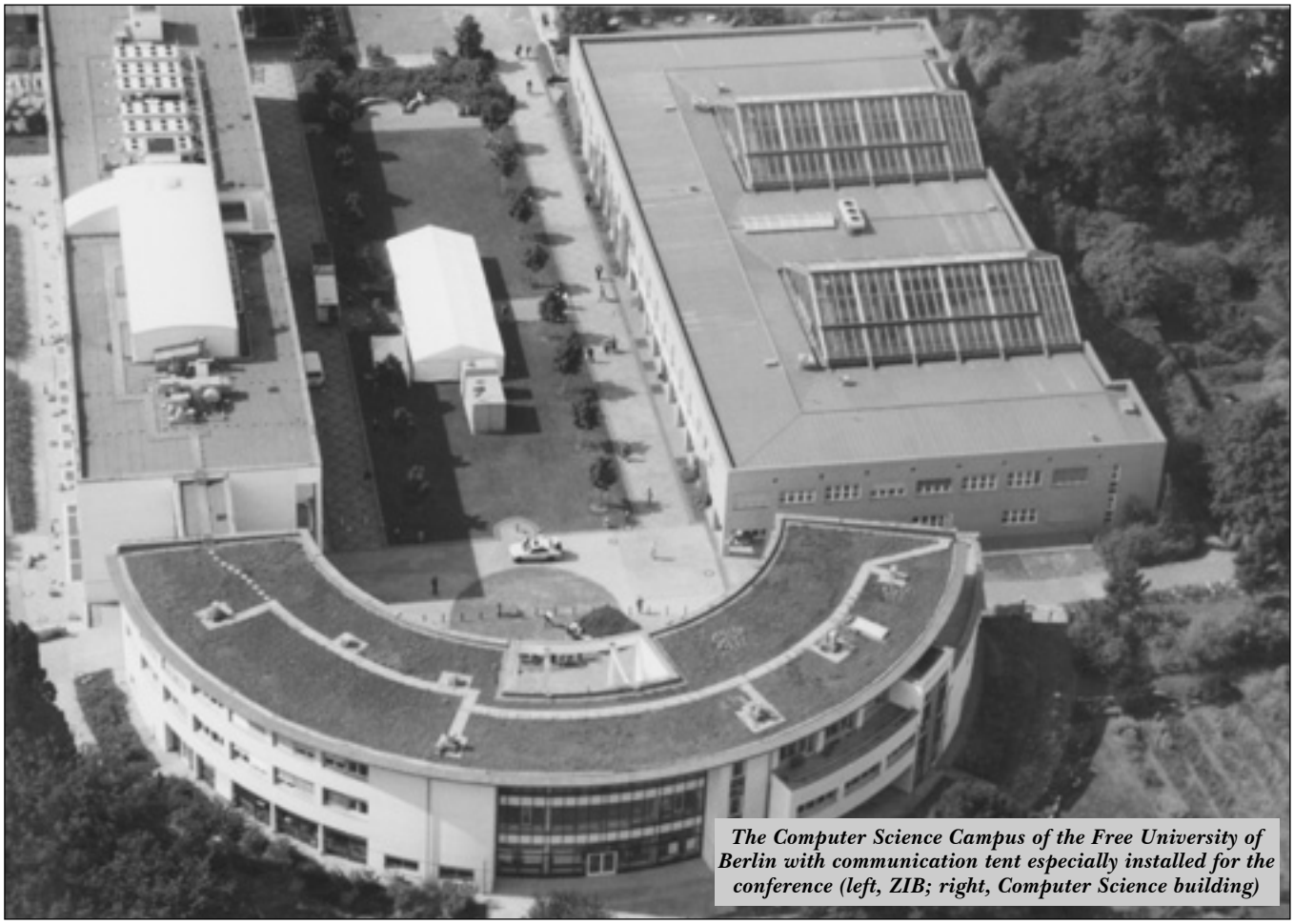
Suggestion
It may be a good idea for the future to organise a poster session. This would give young people the opportunity to present their work, and would make the conference more lively. Of course, it would inevitably cause more work for the organisers.

Jean-Pierre Bourguignon

Applied Mathematics in our Changing World

First EMS-SIAM Conference in Berlin, 2-6 September 2001

Peter Deuflhard and Rolf Jeltsch



The Computer Science Campus of the Free University of Berlin with communication tent especially installed for the conference (left, ZIB; right, Computer Science building)

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

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

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.

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 he 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/amcw01/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 panellists 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.

EMS Lecturer 2002: Gianni Dal Maso

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 Ω is a two-dimensional smooth domain and K is a compact one-dimensional subset of Ω. The solutions are required to satisfy a homogeneous Neumann boundary condition on K and a non-homogeneous Dirichlet condition on $\delta\Omega$. 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, Boite 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 gamma-convergence, 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 to deal 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 the 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 minimum 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

An introduction to gamma-convergence, Birkhäuser, Boston, 1993.

Integral representation on BV(Ω) of Γ-limits of variational integrals, *Manuscripta Math.* **30** (1980), 387-416.

Asymptotic behaviour of minimum problems with bilateral obstacles, *Ann. Mat. Pura Appl. (4)* **129** (1981), 327-366.

Some necessary and sufficient conditions for the convergence of sequences of unilateral convex sets. *J. Funct. Anal.* **62** (1985), 119-159.

(with U. Mosco) Wiener criteria and energy decay for relaxed Dirichlet problems, *Arch. Rational Mech. Anal.* **95** (1986), 345-387.

(with G. Buttazzo) Shape optimization for Dirichlet problems: relaxed formulation and optimality conditions, *Appl. Math. Optim.* **23** (1991), 17-49.

(with J. M. Morel and S. Solimini) A variational method in image segmentation: existence and approximation results, *Acta Math.* **168** (1992), 89-151.

(with A. Garroni) New results on the asymptotic behaviour of Dirichlet problems in perforated domains. *Math. Mod. Meth. Appl. Sci.* **3** (1994), 373-407.

(with L. Ambrosio and A. Coscia) Fine properties of functions with bounded deformation, *Arch. Rational Mech. Anal.* **139** (1997), 201-238.

(with F. Murat) Asymptotic behaviour and correctors for Dirichlet problems in perforated domains with homogeneous monotone operators, *Ann. Scuola Norm. Sup. Pisa Cl. Sci. (4)* **24** (1997), 239-290.

(with A. Braides) Non-local approximation of the Mumford-Shah functional, *Calc. Var. Partial Differential Equations* **5** (1997), 293-322.

(with F. Murat, L. Orsina and A. Prignet) Renormalized solutions of elliptic equations with general measure data, *Ann. Scuola Norm. Sup. Pisa Cl. Sci. (4)* **28** (1999), 741-808.

(with G. Alberti and G. Bouchitte) The calibration method for the Mumford-Shah functional, *C. R. Acad. Sci. Paris Ser. I Math.* **329** (1999), 249-254.

(with R. Toader) A model for the quasi-static growth of brittle fractures: existence and approximation results, *Arch. Rational Mech. Anal.*, to appear.

EMS lectures for 2003
Call for proposals

For some years the European Mathematical Society has been running a successful series of EMS Lectures. In 2000 G. Papanicolau 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 subject.

The Society now invites proposals for at least one Lecture Series for 2003. Proposals should contain *at least* the topic (title and short description), the name of the proposed lecturer, the sites, the timing at each site, conditions for participants, and the name and address of the organiser submitting the proposal. Some preference will be given to applications that involve the writing-up of the Lecture Notes into a volume suitable for publication.

Please send proposals for series of EMS Lectures in 2003, to:
Professor D. A. Brannan, Faculty of Mathematics and Computing, The Open University, Walton Hall, Milton Keynes MK7 6AA, UK.
Fax: +44 1908 652140; e-mail: d.a.brannan@open.ac.uk

Please send your proposals by 30 September 2002 if possible; the Society would hope to decide on proposals within a month or so.

David A. Brannan, Secretary

New deadline for Article Competition

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 originally set as 31 December 2001. 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 submissions 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 Mécanique Céleste. Perhaps you will be good enough to deliver it to Hansteen with my regards ... anyone who has composed such a work can look back upon his scientific career 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 really fired. Soon Holmboe had to give him more.

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 Rasmusen.

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 third degree and solutions (by Cardan)' (see [**1**, p.139]).

In 1821 he thought he had solved the problem of the quintic equation. Holmboe, Hansteen and Rasmusen 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: $x^5 - 2x^4 + 3x^2 - 4x + 5 = 0$. 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 transcendentals'.

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 Rasmusen 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

Vigeland Sculpture of Abel in Oslo

then, with recommendations from the Danish Professor von Schmidten, he 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 'fou', 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 1953 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 ever 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 wrote (see [**7**, p.43]):

he was not considered so easily able to adjust himself to the students' ability.

In 1828 he finally got to substitute for Hansteen, when Hansteen went to Siberia to research on magnetism. 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!

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Interview with Sir John Kingman

Interviewer: Tom Körner (Cambridge)

Sir John Kingman is the Director of the Isaac Newton Institute for Mathematical Sciences. A Cambridge graduate, he was, successively, Professor at the new University of Sussex, Wallis Professor in Mathematics at Oxford University. In 1985 he became Vice-Chancellor of Bristol University, where he stayed until 2001. He has been Chair of the Science and Engineering Research Council, President of the London Mathematical Society, and President of the Royal Statistical Society.
He is the EMS Executive Committee's nominee for EMS President from 2003-06.

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 untrammelled 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 chair having been abolished some years before. 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 is 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 bad at it. Why do you differ?
There are plenty of counterexamples to your assertion. In Britain alone Peter Swinnerton 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 in Cambridge. 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 élite 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.

Isaac Newton Institute for Mathematical Sciences

Interview with Sergey P. Novikov (part 2)

Interviewer: Victor M. Buchstaber (Moscow)

Part 1 of this interview appeared in the previous issue.

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.

S.P. Nonikov

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

Victor Buchstaber with Sergey P. Novikov

so many important results are due to you?
Working in a circle of physicists in 1973, I got acquainted with the remarkable mathematical ideas of soliton theory – namely, with 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 equation. Grinevich and I are now making serious progress here.

Later on, many works devoted to the development of these ideas were completed at my seminar. Krichever, Dubrovin, Veselov, Bogoyavlenskii, Taimanov and Grinevich took part in it.

What were the most fundamental directions that you developed here?
I would like to mention the following directions:
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).
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 'algebro-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 $N = 2$).
Analogues 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 $u(x, y, t) = 2\,\partial^2/\partial x^2 \log \theta(\mathbf{U}x + \mathbf{V}y + \mathbf{W}t + Z; \mathbf{B}) + \text{const}$. 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 one can 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 simple universal KP equation. If this is the case, then we obtain a significant effectivisation of the θ-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 θ-function formulas. An analogue of this conjecture was investigated by Taimanov for Prym θ-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? Physical systems of this kind usually arise 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-

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 of hydrodynamic 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), Flashke-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, Krichever 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 1990s 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 Krichever).

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. Mechanicians 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 Grinevich), 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?'. Is this programme complete, or do you plan a further development of this series?

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,

Sir Michael Atiyah and S.P. Novikov

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 there can be no serious development in an area that cannot be learnt, and in which one cannot separate known facts from unknown ones.

For many years, I brought up good disciples. They developed in seminars at which training problems were solved and the key ideas of topology were investigated. I gave a series of courses whose material was carefully repeated. Besides, my joint work with mechanicians and physicists in the 1970s, and the study of these areas, induced me to think deeply about the creation of courses that could serve both communities, mathematicians and experts in theoretical physics. Fomenko helped me to introduce the elements of geometry and topology to mechanicians. I drew up a plan for a series of books whose beginnings we had already, and also recruited Dubrovin. In collaboration, we wrote a series of books *Modern Geometry* in three parts. According to the plan, Part I (geometry to topology) should accustom mathematicians to the elements of natural sciences, create bridges with theoretical physics, and accustom them to geometry and the ideas of field theory. Part II (the differential approach to topology) should be an understandable and useful course of topology, both for physicists and mathematicians working in different areas of analysis, and a unification of topology with a world of other areas of science that are less abstract. Part III contained the elements of modern algebraic topology. The series should have been continued, and Part IV should be written to fulfil the plan, but we had neither strength nor time to do so.

Later on, it turned out that the community of topologists and geometers was not too much interested in unification with the natural sciences: Part I was spread insufficiently widely among mathematicians. Taimanov and I are now writing a new textbook that greatly modernises the ideas of *Modern Geometry I*. I hope it's a good time for this topic to be studied by a broad community of mathematicians. Part II was more successful, and quite broad collections of mathematicians, experts in mathematical physics, and students have studied this book. As to Part III, it should be noted that education in the area of 'high' topology had generally declined badly in the last thirty years, and currently the potential readers of Part III form a rather limited community of very particular experts.

With Fomenko, I also wrote an elementary textbook, and an encyclopaedic book *Topology I* (English translation in the *Encyclopaedia of Mathematical Sciences*, Vol. 12, Springer, 1996), which, in my opinion, transparently and clearly presents the entire cycle of ideas of classical topology up to the early 1970s. My other educational books (*Soliton Theory*, written with a group of physicists, and a volume of the *Encyclopedia* under the title *Dynamical Systems, Integrable Systems, and Symplectic Geometry* (English translation in the *Encyclopaedia*, Vol. 4) are devoted to other areas; their major problem is a rather broad introduction into a new technique developed with my disciples: the solution of periodic problems of soliton theory and the spectral theory of operators that comes from the analysis on Riemann surfaces and algebraic geometry is one of the main examples. Algebraic geometers aspire to convert it into something abstract, while scientists who effectively use classical analysis cannot study it without difficulty, and thus the process of assimilation is very complicated.

What are your views on contemporary physics and mathematics education? Many people have heard that you speak about a crisis of physical and mathematical community.

My experience, my long-term connection with education, tells me that an active process of reducing the level of physics and mathematics education began in the last

decade (and possibly earlier). Such an education no longer produces scientists with a broad profile. The process gears up. I wrote some papers on the subject. It is possible to speak even about a deep crisis in our areas of science. Recently I wrote a new paper (in Russian) about this crisis: it is not published yet, but can be found on the internet.

It is a very serious problem that cannot be elucidated in two words. Theoretical physics declines most rapidly. Pure mathematics turns out to be steadier for now: though it also declines, it has more chances to survive and stay at the same high level. It is possible that some fundamental achievements of the second half of the 20th century that are mathematical in essence and made by experts in theoretical physics – for example, modern quantum field theory – will be saved for the future as parts of mathematics. However, mathematicians must at first study these achievements.

Based on this assumption, I would like to write manuals to prepare mathematicians in the elements of this area. However, the study of this subject requires very serious preparation, and one shouldn't begin with it. Many people do not understand this rule: everybody knows, for instance, that it's impossible 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 superformal algebraised language, since the material would become so 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 can 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 Mechanics 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 mathematics in the 20th century. In Moscow, all mathematical activity in the 1920s and 1930s was concentrated around the Society, being interrupted sometimes 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.

Let me list some recent Presidents: P. Aleksandrov (1933-64), Kolmogorov (1964-66 and 1973-85), Gelfand (1966-70), Shafarevich (1970-73), Novikov (1985-96) and Arnold (1996-…).

In the late Bolshevic 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 unskilfully to disprove 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 renascence took place; 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

Luboš Pick

The Union of Czech Mathematicians and Physicists is 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. Kulík (1793-1863), Ernst Mach (1836-1916) and Augustin Seydler (1849-91).

The house in Žitná Street 25, bought by the Union in 1930. At the rear, the Union erected a modern building, housing the bookshop and later the library of the Union. The house now has one more floor (built in the early 1990s) and is occupied by the Mathematical Institute of the Academy of Sciences of the Czech Republic.

In 1863, Professor Kulík 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 logo of the Union.

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

Postage stamps released in 1962, 1987 and 2000.

Czechoslovakia, the number of members of the Union rapidly increased, as did the scope of its activities. In 1933, the Union's Publishing House merged with *Prometheus*, the Publishing House of mining engineers, thereby establishing a publishing centre for technical literature. In 1935, the Union started to run a society for the production of tools for science and education. In 1938 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

Jaroslav Kurzweil

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 1993 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 2500 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 past presidents of the Union have been significant scientists and important personalities in Czech or Slovak scientific life, including Bohumil Bydžovský, Vladimír Koáínek, František Záviška, Miroslav Valouch, Josef Novák and Ivan Úlehla, to name just a few. The current President of the Union is a distinguished Czech mathematician, Professor Jaroslav Kurzweil.

The Union has 15 branches in all regions of the Czech Republic. Aside from the branches, the Union is divided into four sections – the Mathematical Research Section, the Physical Research Section, the Mathematical Pedagogical Section and the Physical Pedagogical Section. Each section has its own structure and bodies, and also its own membership bulletin providing the members (and others) with information about the life of the section, as well as information about new developments in the respective sciences.

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-Informatics), aimed at the theory and practice of teaching of the three subjects, *Uèitel 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 *Èeskoslovenský Èasopis pro fyziku* (Czechoslovak Physics Journal) and *Informace MVS* (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.

Two sides of the Commemorative Medal, released at the occasion of the Union's 125th anniversary in 1987.

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, Jiøí Rákosník and Bøetislav Novák.

Reference

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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 discriminating 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 PhD did you obtain your first permanent job?

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.

Here are some tables summarising the answers.

Nationality	Female	Male	Total
British	2		2
French	5	1	6
German	11	4	15
Italian	11	2	13
Norwegian	8	41	49
Romanian	2		2
Russian	4	1	5
Spanish	2		2
USA		2	2
Other	7	6	13
Grand Total	52	57	109

Age	26 - 29	30 - 39	40 - 49	50 - 59	60 - 69
Frequency	5	34	42	18	10
Female	4	21	20	5	2
Male	1	13	22	13	8

No. of Children	Female	Male	Total
0	13	12	25
1	12	12	24
2	19	14	33
3	5	14	19
4	2	4	6
6		1	1

Age when Completed Ph.D. and when Wrote Best Paper

	Respondents	Female	Male
Mean Age when Completed Ph.D.	33.88	30.74	36.78
	29.29	29.16	29.38
when Wrote Best Paper	34.56	32.56	36.34

Age	when Completed Ph.D.	when Wrote Best Paper
22-23		Female 2 Male
24-26	Female 8 Male 15	Female 3 Male 3
27-29	Female 17 Male 13	Female 12 Male 7
30-32	Female 8 Male 12	Female 11 Male 10
33-35	Female 3 Male 3	Female 6 Male 11
36-39	Female Male 5	Female 5 Male 8
40-42	Female 1 Male 1	Female 1 Male 4
43-46	Female 1 Male	Female 2 Male 2
52-56		Female 1 Male 4
62-63		Female Male 2
	No Ph.D.	No Answer
	Female 14 Male 3	Female 3 Male 3

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

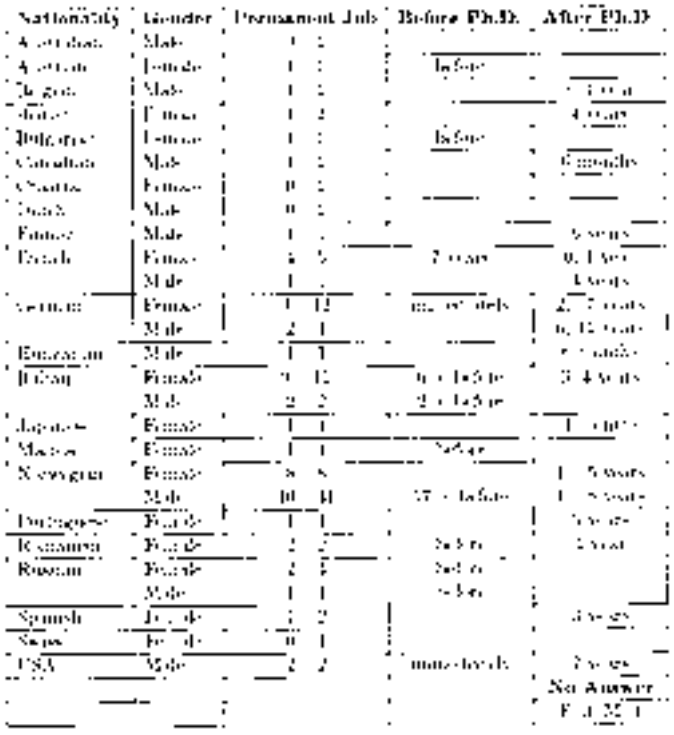
in their mathematical career.

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

Reason	Female	Male	Total
Children/ Family	15	4	19
Personal Problems	6	3	9
Administration/ Management	3	2	5
Military Service		5	5
Teaching	2	1	3
Temporary Job	1	2	3
No Professor to Difficult Problems to adopt	2	1	3
Bad Universities Job Market	1	2	2
New Research Area	1	1	2
Writing Books	1	1	2
Other Interests	1	1	2
Career Considerations	1		1

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)

Job	Female	Male	Total
Mathematician	9	-	9
Computer scientist	2	2	4
Professor	5	-	5
School teacher	3	4	0

Mother's job

Job	Female	Male	Total
Housewife	16	23	39
Clerk	8	3	10
School teacher	7	8	15
Secretary	2	8	10
Professor	2	-	2

Father's job

Job	Female	Male	Total
Engineer	9	8	17
School teacher	5	6	11
Professor (*)	7	6	12
Clerk	6	3	9

(*) mathematician in several cases

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.Tobies and J. Krüsken, 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

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 reasearch 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.

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The Human Frontier Science Program

The *Human Frontier Science Program* promotes world-scale research in the life sciences through Research Grants, Fellowships and Workshops.

The aim of the HFSP is to support basic research focused on complex mechanisms of living organisms; fields supported range from brain functions to biological functions at the molecular level. Particular emphasis is placed on bringing scientists from fields such as physics, mathematics, chemistry, computer science and engineering together with biologists, to open up new approaches to understanding complex biological systems.

HFSP previously supported two scientific programmes focused on neuroscience and molecular biology. With the dissolving of boundaries separating traditional biological fields, and the need to involve disciplines outside biology in life science research, these separate programmes have been unified into a single scientific program by the HFSP Board of Trustees. Henceforth, a single committee will review all grant applications, while a second committee will review all long-term fellowship applications. Both committees are composed of leading international scientists.

Research grants are awarded for projects that involve extensive collaboration among teams of scientists working in different countries. The emphasis is on novel collaborations that bring together scientists from different disciplines. Fellowships are available to scientists who wish to work in foreign laboratories, with emphasis on individuals early in their careers.

Further information can be found on the web site: *http://www.hfsp.org*

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*

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.
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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:pgc@ann.jussieu.fr*
tel: (33)1.44.27.51.13; *fax:* (33)1.44.27.72.00

Norway Introduces Major International Prize

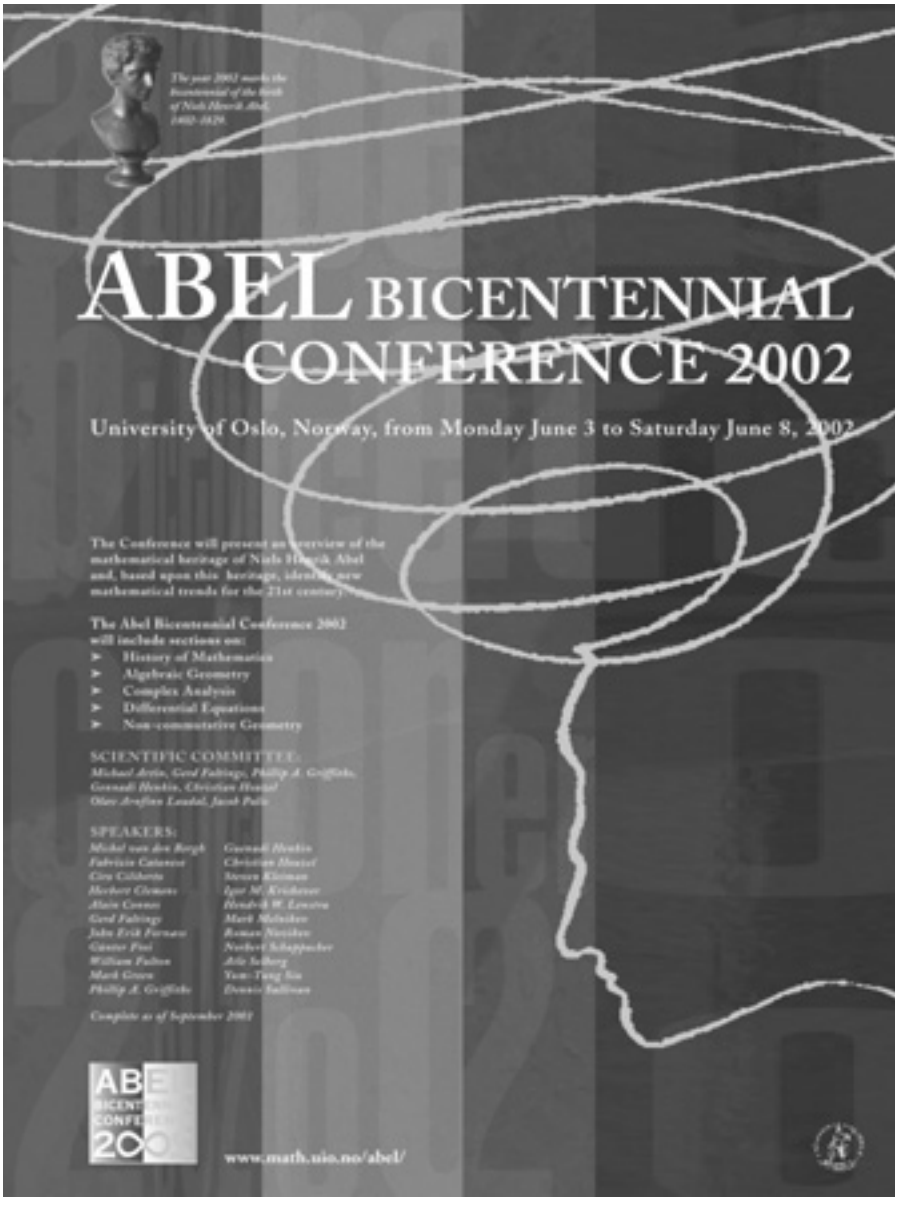
There is no Nobel Prize for Mathematics, but now
The Abel Prize has come into being

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 Makelienen in the EMS Secretariat (*makelain@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: 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 Olympia 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 km^2, 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 *Matematičk- 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 α and β, 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 $1/A_1A_2 = 1/A_1A_3 + 1/A_1A_4$.

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

Since $A_1A_2 = 2r \sin(\pi/7)$, $A_1A_3 = 2r \sin(2\pi/7)$ and $A_1A_4 = 2r \sin(3\pi/7)$, where r is the radius of the circumcircle, the equation to be proved is equivalent to $1/\sin(\pi/7) = 1/\sin(2\pi/7) + 1/\sin(3\pi/7)$. (1)

Adding the fractions on the right side of (1) and clearing of fractions, we obtain the equivalent equation

$$\sin(\pi/7)\sin(3\pi/7) + \sin(\pi/7)\sin(2\pi/7) = \sin(2\pi/7)\sin(3\pi/7). \quad (2)$$

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:

$$(\ldots(((x_{n+2m} + 2)^{1/2} + 2)^{1/2} + \ldots + 2)^{1/2} - x_{n+2m} < (\ldots(2^{1/2} + 2)^{1/2} + \ldots + 2)^{1/2},$$

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 $(y_1^2 - 2y_1 + 1^2) + (y_2^2 - 4y_2 + 2^2) + \ldots + (y_n^2 - 2ny_n + n^2) = 0$
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, $x_1 = 1^2 + 1^2 = 2\times1^2$, $x_2 = 2^2 + 2^2 = 2\times2^2$, $\ldots$, $x_n = 2n^2$.

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 $\sqrt{7} - 1/n > 2 - 1/n \geq 1 \geq 1/n$, 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 $m^2 \equiv 0, 1, 4, 2, 2, 4, 1 \pmod 7$.
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 $7m^2n^2 - (m^2 + 1)^2 \geq m^2 (m^2 + 3) - (m^2 + 1)^2 = m^2 - 1 > 0$.
This leads to $\sqrt{7}\, mn > m^2 + 1$, so that $\sqrt{7} > m/n + 1/mn$ 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 $2^{x-2} 3^y = k (k+1)$.
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) $k = 2^r$, $k + 1 = 3^y$ $(r \geq 4, y \geq 3)$.
If y = 2t, then $2^r = 3^y - 1 = (3^t - 1)(3^t + 1)$.
The only powers of 2 differing by 2 are $3^t - 1 = 2$ and $3^t + 1 = 4$;
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) $k = 3^y$, $k + 1 = 2^r$ $(r \geq 4, y \geq 2)$.
If r = 2t, then $3^y = 2^r - 1 = (2^t - 1)(2^t + 1)$.
The only powers of 3 differing by 2 are $2^t - 1 = 1$ and $2^t + 1 = 3$;
so t = 1 and r = 2, contradicting $r \geq 4$.
If r = 2t + 1, then $3^y = 2^r - 1 = (3 - 1)^{2t+1} - 1 = 3b - 2$, for some b, by the binomial theorem.
But this is impossible, since $y \geq 2$.

Forthcoming conferences

Compiled by Kathleen Quinn

Please e-mail announcements of European conferences, workshops and mathematical meetings of interest to EMS members, to k.a.s.quinn@open.ac.uk. Announcements should be written in a style similar to those here, and sent as Microsoft Word files or as text files (but not as TeX input files). Space permitting, each announcement will appear in detail in the next issue of the Newsletter to go to press, and thereafter will be briefly noted in each new issue until the meeting takes place, with a reference to the issue in which the detailed announcement appeared.

April 2002

1 April -30 June: Trimester on Algebraic Topology, Barcelona, Spain
[For details, see EMS Newsletter 42]

29 April-12 July: Trimester on Financial Markets: Mathematical, Statistical and Economic Analysis, Pisa, Italy
Scientific committee: W. Brock, D. Duffie, P. Embrechts, D. Farmer, H. Follmer
Main visitors: K. Bach, M.M. Dacorogna, D. Duffie, J. D. Farmer, C. H. Hommes, J. Karatzas, Y. Kabanov, D. Madan, A. McNeil, T. Mikosch, M. Pagano, R.G. Payne, A.M. Rivlin, K. Singleton, N. Touzi
Location: Centro di Ricerca Matematica E. De Giorgi, Scuola Normale Superiore, Pisa
Information:
web site: http://www.crm.sns.it

May 2002

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 41]

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 are researchers 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 L.R. 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 only
Deadline: already passed
Information: e-mail: smr1407@ictp.trieste.it
web site: http://www.ictp.trieste.it/www_users/math/maths2002.html

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

19-26: Symmetry and Perturbation Theory (SPT2002), Cala Gonone, Sardinia, Italy
Information: web site:
http://web.tiscalinet.it/spt_spt/spt2002.html

22-24: Discrete Groups and Geometric Structures, with Applications (Crystallographic Groups and their Generalizations III), Kortrijk, Belgium
Information: web site:
http://www.kulak.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, Alfio Quarteroni, Jurgen Richter-Gebert, Gabriel Taubin
Invited Speakers: Phil Bowers, Mathieu Desbrun, Gerald Farin, Joel Hass, Beau Janzen, Chris Johnson, Ravi Malladi, Tom Wickham-Jones
Conference chairs: Christian Hege and Konrad Polthier
Programme committee: Helmut Alt, James Arvo, Chandrajit Bajaj, Thomas Banchoff, Ken Brakke, Peter Deuflhard, Thomas Ertl, Gerald Farin, George Francis, Hans Hagen, David Hoffman, Chris Johnson, Michael Joswig, Leif Kobbelt, Heinrich Muller, Gregory Nielson, Ulrich Pinkall, Helmut Pottmann, Martin Rumpf, Dietmar Saupe, Hans-Peter Seidel, John Sullivan, Nobuki Takayama, Ross Whitaker, Luiz Velho, Jarke van Wijk, Gunter Ziegler
Organisers: Sonderforschungsbereich *Differential Geometry and Quantum Physics* (Sfb 288) at the Technische Universität in Berlin, Department of Scientific Visualization at the Konrad-Zuse-Zentrum fur Informationstechnik Berlin (ZIB)
Format: keynote lectures, invited talks and contributed presentations. The time for keynote lectures, invited talks and contributed talks will be 50, 40, and 30 minutes (respectively), including discussions. There will be possibilities for software demonstrations
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 by Springer-Verlag 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/b-tex.html. For review papers should be submitted on-line, using the paper submission form at the workshop website. Participants will receive a volume of abstracts
Sponsor: Deutsche Forschungsgemeinschaft (DFG)
Location: Harnack-Haus in Berlin-Dahlem
Deadlines: for submission of papers, 10 March; for final papers, 30 April; for on-line registration, 30 April
Information: e-mail: vismath@math.tu-berlin.de
web site: http://www.math.tu-berlin.de/vismath

25-3 June: XXII International Seminar on Stability Problems for Stochastic Models (SPSM) and Seminar on Statistical Data Analysis (SDA), Varna, Bulgaria
Information: web site: http://stabil.fmi.uni-sofia.bg
[For details, see EMS Newsletter 41]

27-29: Spring School on Frobenius Manifolds in Mathematical Physics, Enschede, The Netherlands
Information: e-mail: nijpjes@sci.kun.nl

27-29: Frobenius Manifolds in Mathematical Physics, The Netherlands
Location: University of Twente, Enschede
Organising committee: G. Heckman, G. Helminck, R. Martini, P. Kersten, J. van de Leur, E. Looijenga, J. Stienstra (all from the Netherlands)
Local organising committee: G. Helminck and P. Kersten
Sponsors: Mathematical Research Institute (MRI), NWO (Netherlands Organization for Scientific Research), University of Twente, Faculty of Mathematical Sciences of the University of Twente (Netherlands), FOM (Foundation for Fundamental Research, the Netherlands)
Speakers: R. Dijkgraaf (Netherlands), B. Dubrovin (Trieste), T. Eguchi (Tokyo), C. Hertling (Bonn), A. Morozov (Moscow), I. Krasil'shchik (Moscow), S.M. Natanzon (Moscow), L. Takhtajan (New York)
Information: e-mail: p.h.m.kersten@math.utwente.nl (programme and registration), d.dalenoord@math.utwente.nl (local managing director)
web site: http://www.math.utwente.nl/fa/springschool/

27-31: 6th Congress of SIMAI (The Italian Society for Applied and Industrial Mathematics), Chia, Sardinia, Italy
Information: web site: http://www.iac.rm.cnr.it/simai (click on 'simai 2002')
[For details, see EMS Newsletter 42]

28-31: 2nd International Conference on Advanced Computational Methods in Engineering (ACOMEN 2002), Liège, Belgium
Information: web site: http://cage.rug.ac.be/~acomen
[For details, see EMS Newsletter 42]

30-2 June: 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 (Utah), Susan Colley (Oberlin), Dan Edidin (Missouri), Eduardo Esteves (IMPA/MIT), Dan Grayson (Illinois), Tony Iarrobino (Northeastern), Bernard Teissier (Paris 7), Israel Vainsencher (UFPE), Ravi Vakil (Stanford), Angelo Vistoli (Bologna)
Organising committee: Susan Colley (Oberlin), Dan Edidin (Missouri), Dan Grayson (Illinois), 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: ragnip@math.uio.no
web site: http://www.math.uiuc.edu/~dan/Kleiman60/

CONFERENCES

June 2002

3-7: Conference dedicated to the 90th anniversary of B. V. Gnedenko, Kyiv, Ukraine
Theme: probability theory and its applications
Aim: the focus will be on topics close to the wide 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; quality control, 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; stochastics and mathematical physics; statistical methods with applications to insurance and finance; probabilistic number theory; discrete probabilistic models; stochastic analysis
Programme committee: A.V. Skorokhod (USA), Yu.V. Kozachenko (Ukraine), A.I. Martikainen (Russia), V.V. Petrov (Russia), Yu.K. Belyaev (Sweden), I.N. Kovalenko (Ukraine), A.V. Ivanov (Ukraine), Yu.N. Lin'kov (Ukraine), J. Steinebach (Germany), N.Kh. Rozov (Russia), D. Vere-Jones (New Zealand), M.I. Yadrenko (Ukraine), A.V. Bulinskii (Russia), N.N. Leonenko (UK), S. Albeverio (Germany), Yu.M. Berezanskii (Ukraine), Yu.G. Kondratiev(Ukraine), Yu.S. Mishura (Ukraine), A.G. Kukush (Ukraine), K.-H. Indlekofer (Germany), I. Katai (Hungary)
Organising committee: V.S. Korolyuk (Ukraine) and Yu.V. Prokhorov (Russia) (co-Chairs), O.D. Borysenko (Ukraine), V.V. Buldygin (Ukraine), S.S. Demidov (Russia), D.B. Gnedenko (Russia), I.A. Ibragimov (Russia), V.I. Khokhlov (Russia), O.I. Klesov (Ukraine), Yu.G. Kondratiev (Ukraine), Yu.V. Kozachenko (Ukraine), Yu.S. Mishura (Ukraine), M.O. Perestyuk (Ukraine), N.I. Portenko (Ukraine), Yu.A. Rozanov (Italy), A.M. Samoilenko (Ukraine), V.V. Sazonov (Russia), B.A. Sevastyanov (Russia), A.N. Shiryaev(Russia), Ya.G. Sinai (Russia), M.I. Skil' (Ukraine), V.V. Skopenko (Ukraine), A.V. Skorokhod (USA), M.I. Yadrenko (Ukraine), O.K. Zakusylo (Ukraine), M.Z Zgurovskii (Ukraine), V.M. Zolotarev (Russia)
Sponsors: Ministry of Education and Science of Ukraine, Center for Science and Methodology of Higher Education, Kyiv National Taras Shevchenko University, National Technical University of Ukraine (KPI), National Pedagogical Dragomanov University, Lviv Franko State University, Institute for Mathematics, National Academy of Science of Ukraine, 'Mathematica' Foundation, Moscow State Mikhail Lomonosov University, Steklov Institute for Mathematics, Russian Academy of Science, Bernoulli Society, INTAS Conference
Abstracts: abstracts should be sent to abstract@tbimc.freenet.kiev, typeset for AMS TeX in amsppt style. If you are not familiar with AMS TeX, please copy the template file at http://ln.com.ua/~tbimc/gnedenko/
Proceedings: papers for the Proceedings should be sent to abstract@tbimc.freenet.kiev.ua or submitted upon arrival, typeset for AMS TeX in amsppt style
Location: Kyiv National Taras Shevchenko University (Volodymyrska, 60), Kyiv, Ukraine
Grants: restricted number of grants for participants from the former Soviet Union and young mathematicians
Deadlines: for requests for a letter of invitation, 31 March; for abstracts, 30 April; for requests for a hotel reservation, 10 May
Information: e-mail: oleg@tbimc.freenet.kiev.ua
fax: +38-044-513-84-07
web site: http://ln.com.ua/~tbimc/gnedenko/

3-8: Abel Bicentennial Conference 2002, Oslo, Norway
Location: University of Oslo
Theme: 2002 marks the bicentennial of the birth of Niels Henrik Abel, 1802-29. The conference will present an overview of the mathematical heritage of Abel and, based upon this heritage, identify new mathematical trends for the 21st century
Topics: there will be sections on the history of mathematics, algebraic geometry, complex analysis, differential equations, non-commutative geometry
Invited speakers: Michel van den Bergh, Fabrizio Catanese, Ciro Ciliberto, Herbert Clemens, Alain Connes, Gerd Faltings, John Erik Fornæss, Günter Frei, William Fulton, Mark Green, Phillip Griffiths, Guenadi Henkin, Christian Houzel, Steven Kleiman, Igor M. Krichever, Hendrik W. Lenstra, Mark Melnikov, Roman Novikov, Norbert Schappacher, Atle Selberg, Yum-Tung Siu, Dennis Sullivan
Support: a few grants are available for young mathematicians, including participants from third world countries. Grants will be approximately 1000 euro each and should cover travel expenses and lodging
Sponsors: International Mathematical Union, The Norwegian Academy of Science and Letters, Ministry of Education, Research and Church Affairs, The Norwegian Agency for Development Cooperation (NORAD)
Scientific committee: Michael Artin, Gerd Faltings, Phillip A. Griffiths, Gennadi Henkin, Christian Houzel, Olav Arnfinn Laudal, Jacob Palis
Information: web site:
http://www.math.uio.no/abel/conference/index.html

3-8: Algebra Conference – Venezia 2002, Venice, Italy
Topics: abelian groups, algebras and their representations, commutative 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. Trlifaj (Czech Republic), C. Vinsonhaler (USA), R. Wiegand (USA)
Plenary speakers: R. Colpi (Italy), D. Herbera (Spain), S. Kasjan (Poland), B. Olberding (USA), D. Shakhmatov (Japan), L. Struengmann (Germany)
Scientific committee: D. Dikranjan (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. Gabelli, E. Gregorio, C. Metelli, L. Salce, F. Stumbo, A. Tonolo, P. Zanardo (Italy)
Site: Venice International University, Island of San Servolo, Venice
Deadlines: registration and abstracts, 31 March
Proceedings: to be published by Marcel Dekker, Inc.
Information: e-mail*:* tonolo@math.unipd.it
web site*:* http://dm.unife.it/~venezia/

3-9: BIOCOMP2002, Vietri sul Mare, Italy
Theme: mathematical biology and biocomputation
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 biocomputation at the beginning of the third millennium
Topics: biomechanics and molecular motors; pattern formation; spatial and non-linear dynamics in population biology and ecology; coding, computations and stochasticity in neurobiology and other excitable media; biocomputing, bioinformatics and gene networks
Programme committee: S. Amari (Japan), J.J. Collins (USA), P. Cull (USA), I. Eshel (Israel), M. Iannelli (Italy), P. Lánský (Czech Republic), S.A. Levin (USA), Z. Ma (China), M. Mimura (Japan), R. Moreno Diaz Sr. (Spain), K. Pakdaman (France), L. Peliti (Italy), F. Pichler (Austria), S. Sato (Japan), J.P. Segundo (USA), C.E. Smith (USA), A. Tesei (Italy), H.C. Tuckwell (Australia), F. Ventriglia (Italy), G. Vidossich (Italy), T. Yanagida (Japan)
Organising committee: Luigi M. Ricciardi, Chair (http://cds.unina.it/~ricciard/), U. Amato, W. Balzano, A. Buonocore, S. Chillemi, A. Dattolo, A. Di Crescenzo, E. Di Nardo, P. Festa, V. Giorno, M. Longobardi, K. Nakagawa, A.G. Nobile, E. Pirozzi, S. Rinaldi, L. Sacerdote
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
Information: web site:
http://www.ijp.si/ftp/pub/STOp/law/
[For details, see EMS Newsletter 41]

5-8: Free Boundary Problems, Trento, Italy
Topics: free boundary problems, phase transitions, fluid filtration, ferromagnetism, mechanics, materials science, biomathematics, image processing, computational methods
Main speakers: L. Ambrosio, G. Bertotti, Z. Chen, P. Degond, E. Di Benedetto, W. Dreyer, C.J. van Duijn, M.E. Glicksman, N. Kenmochi, R. Kohn, S. Mueller, J.-M. Morel, R.H. Nochetto, F. Otto, O. Penrose, E. Presutti, A. Quarteroni, F. Reitich, A. Schmidt, M. Soner, V. Starovoitov, J.J.L. Velazquez
Focus sessions: free boundary problems in polymer science, image processing, grain boundary motion, optimal design for free boundary problems, numerical aspects of free boundary problems, free boundary problems in biomathematics, modelling of crystal growth, transitions with anisotropy
Poster session: open to contributions by all participants
Programme committee: P. Colli , G. Dziuk, A. Fasano, M. Fremond, A. Friedman, S. Luckhaus, K.-H. Hoffmann, M. Niezgodka, J. Ockendon, M. Primicerio, J.-F. Rodrigues, J. Sprekels, C. Verdi, A. Visintin
Organising committee: P. Colli, G. Dziuk, A. Fasano, K.-H. Hoffmann, J. Sprekels, C. Verdi, A. Visintin (local organiser)
Sponsors: University of Firenze, University of Freiburg i. Br., University of Milano, University of Pavia, University of Trento, C.A.E.S.A.R. Institut Bonn, W.I.A.S. Berlin, Deutsche Forschungsgemeinschaft, G.N.A.M.P.A., G.N.C.S., G.N.F.M. of I.N.d.A.M., Project 'Free Boundary Problems' of M.I.U.R., Project 'Scientific Computing: Š' of M.I.U.R., Project 'Symmetries, Geometric Structures, Š' of M.I.U.R.
Venue: Centro S. Chiara, via S. Croce 67, Trento
Grants: for participants from weak currency countries, or born after 1 January 1967
Information: e-mail: P. Colli pier@dimat.unipv.it
web site: http://fbp2002.unitn.it/

5-9: Conference in Honour of Hans Wallin, Umea, Sweden
Information: web site:
http://www.math.umu.se/aktuellt/HWkonferens.htm
[For details, see EMS Newsletter 41]

6-8: Zero Dimensional Schemes and Related Topics, Acireale, Sicily, Italy
[in honour of Tony Geramita on the occasion of his 60th birthday]
Theme: algebraic geometry and commutative algebra
Main speakers: Karen Chandler (Notre Dame), Luca Chiantini (Siena), Aldo Conca (Genova), Alessandro Gimigliano (Bologna), Martin Kreuzer (Regensburg), Tony Iarrabino (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 Harbourne (Nebraska), Juan Migliore (Notre Dame), Ferruccio Orecchia (Napoli), Alfio Ragusa (Catania), Lorenzo Robbiano (Genova)
Grants: limited funding available for young researchers
Related conferences: the AMS-UMI meeting in Pisa, 12-16 June (http://www.dm.unipi.it/~meet2002/) has several special sessions in commutative algebra and algebraic geometry; *Current Trends in Commutative Algebra*, Levico, 17-21 June, (http://www.dima.unige.it/~rossim/Levico.html) is also of interest
Information: web site:
http://cocoa.dima.unige.it/conference/acireale/first.html

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

http://www.bio21.bas.bg/conference/
[For details, see EMS Newsletter 42]

10-14: Homology Theories, Representations and Hopf Algebras, Luminy, France
Theme: homological algebra, representation theory
Topics: Green functors, tilting objects, invariance properties of automorphism groups, Hochschild cohomology, Hopf algebras
Programme: short courses (each of three 45-minute lectures), also conference talks
Course speakers: Serge Bouc Paris 7 (France), Dieter Happel Chemnitz (Germany), Manuel Saorin Murcia (Spain)
Conference speakers: N. Andruskiewitsch (Argentina), A. Bruguieres (France), F. Coelho (Brazil), S. Dourlens (France), F. Dumas (France), M. Farinati (Argentina), D. Guin (France), M. Karoubi (France), C. Kassel (to confirm) (France), T. Lambre (to confirm) (France), P. Malbos (France), E. Marcos (Brazil), S. Natale (Argentina), F. Patras (France), E. Reynaud (France), M. Rosso (France), C. Strametz (France), M. Suarez Alvarez (Argentina), R. Taillefer (France), L. Unger (Germany), M. Vigue-Poirrier (France), A. Zimmermann (France)
Languages: English, French
Organising committee: Claude Cibils (France), Maria Julia Redondo (Argentina), Andrea Solotar (Argentina)
Sponsors: CIRM (France), Université de Montpellier 2, Université de Paris 7, TMR network *K-Theory, Linear Algebraic Groups and Related Subjects*, Ambassade de France in UK
Location: CIRM, Luminy, Marseille (http://cirm.univ-mrs.fr)
Fees: no registration fee; cost of lodging at CIRM is around 45 euros a day, including meals
Deadlines: for registration, 5 May (write to lacan@math.univ-montp2.fr)
Information: e-mail: claude.cibils@math.univ-montp2.fr, solotar@math.univ-montp2.fr, asolotar@dm.uba.ar
web site: gauss.math.univ-montp2.fr/~cibils/CIRM2002

10-16: Aarhus Topology 2002, Aarhus, Denmark
Information: web site: http://www.imf.au.dk/AT2002/
[For details, see EMS Newsletter 41]

11-13: Third International Symposium on Remote Sensing of Urban Areas, Istanbul, Turkey
Information: web site:
http://www.ins.itu.edu.tr/deryamaktav
[For details, see EMS Newsletter 42]

12-16: 2002 WSEAS International Conferences on Signal Processing, Robotics And Automation (ISPRA '02); Microwaves, Antennas & Radar Systems (IMARS '02); Electronics & Hardware Systems (IEHS '02), Cadiz, Spain
Information: web site:
http://www.wseas.org/conferences/2002/spain

16-23: Second Russian-German Geometry Meeting, St Petersburg, Russia
[dedicated to the 90th anniversary of A.D. Alexandrov (1912-99)]
Topics: differential geometry, non-linear differential equations in geometry, geometric analysis, singular spaces, foundations of geometry, applications of geometry to mathematical physics and algebra
Organisers: W. Ballmann (Bonn), Yu. Burago (St Petersburg), Yu.G. Reshetnyak (Novosibirsk)
Co-organisers: S.V. Buyalo (St Petersburg), D. Schueth (Bonn), I.A. Taimanov (Novosibirsk)
Location: Euler International Mathematical Institute, Pesochnaya nab. 10, St Petersburg 197022
Deadline: for registration, 15 April
Information: e-mail: geo2@imi.ras.ru, geometry@math.uni-bonn.de, geometry@math.nsc.ru
web site: http://www.pdmi.ras.ru/EIMI/2002/geo2/

17-19: 24th World Conference on Boundary Element Methods incorporating Meshless Solutions Seminar Sintra, Portugal
Information: web site: http://www
[For details, see EMS Newsletter 42]

17-21: Advanced School and Workshop on Mathematical and Computational Modeling of Biological Systems, Lisboa, Portugal
Theme: mathematical and computational modeling of biological systems
Aim and Format: to provide an updated overview of typical models and tools used in mathematical and computational studies of biological tissues, organs and systems. The event has two components: Advanced Course and Research Workshop
Theme: mathematics and biology, with special emphasis on modelling tissues, organs and systems of the human body
Topics: mechanics of soft tissues, mechano-electrical function of the heart, thermo-chemo electro-mechanics of porous media, skeletal muscles and neuromuscular control, control and mechanics of human movement systems, physiological fluid mechanics
Main speakers: Gerhard Holzapfel (Austria), Peter Hunter (New Zealand), J. Huyghe (Netherlands), J. van Leewen, (Netherlands), Clyde Martin (USA), Prof. Oliver Jensen (UK)
Programme: 18 hours of Course lectures; 9 hours of Workshop paper presentations and discussions
Call for papers: two-page abstracts containing the author's name, affiliation, address, and e-mail can be sent by e-mail (text, word, pdf, or ps format) or by fax
Organising committee: J.A.C. Martins, IST, Portugal, E.B. Pires, IST, Portugal
Main sponsor: this event is part of the Thematic Term on *Mathematics and Biology*, sponsored by CIM (Centro Internacional de Matemática), a member of ERCOM - European Research Centres on Mathematics
Other sponsors: Instituto de Engenharia de Estruturas, Territorio e Construção (ICIST), Fundação Calouste Gulbenkian Fundação para a Ciência e a Tecnologia (FCT)
Proceedings: to be published
Location: Congress Centre of Instituto Superior Técnico Building of the Departamento de Engenharia Civil e Arquitectura Instituto Superior Técnico, Lisboa, Portugal
Grants: 30 euro discount for students
Notes: class notes will be provided to participants
Deadlines: for receipt of abstracts, 15 March
Secretariat and Address: 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
web site: http://www.civil.ist.utl.pt/bio.systems

17-21: Seventh international conference on *p*-adic functional analysis, Nijmegen, The Netherlands
[analysis in and over valued fields other than **R** or **C**]
Scientific committee: W. Schikhof (Netherlands), A. Escassut (France), C. Perez-Garcia (Spain)
Programme: each participant is asked to contribute a half-hour lecture on recent research, in English
Abstracts: to Ms. W. van de Sluis (local manager), e-mail: willy@sci.kun.nl
Proceedings: we intend that these will be published. Participants are asked to deliver a manuscript at the start of the conference: more details will be available later
Sponsors: Mathematical Research Institute (MRI) (Netherlands), NWO (Netherlands Organization for Scientific Research) (Netherlands), Subfaculty of Mathematics, University of Nijmegen (Netherlands)
Deadlines: for abstracts, 1 May
Information: e-mail: schikhof@sci.kun.nl
web site: http://www.sci.kun.nl/math/p-adic2002

17-21: Stochastic Inequalities and their Applications, Barcelona, Catalonia
Aim: the topics to be covered belong to different areas of probability, statistics and analysis, and therefore the conference will provide a unique opportunity for exchange of ideas occurring in different fields and for interdisciplinary contact and collaboration
Topics: to include concentration and deviation inequalities for various types of processes using isoperimetry, differential inequalities and information inequalities, other exponential and moment inequalities for sums of independent or weakly dependent random vectors and related variables, inequalities in Malliavin Calculus, geometric inequalities for log-concave probability measures, particularly the Gaussian correlation inequality, martingale and decoupling inequalities.
Programme: plenary lectures, invited and contributed half-hour lectures, and problem and discussion sessions
Main speakers: Luis Caffarelli (Austin, USA), Nicolai Krylov (St Paul/Minneapolis, USA), Rafal Latalà (Warsaw, Poland), Michel Ledoux (Toulouse, France), Gàbor Lugosi, Barcelona, Catalonia), Pascal Massart (Orsay, France), Colin McDiarmid (Oxford, UK), Philip Protter (Ithaca, USA), Emmanuel Rio (Versailles, France), Ofer Zeitouni (Haifa, Israel)
Scientific programme committee: Evarist Giné (Storrs, USA), David Nualart (Barcelona, Catalonia), Christian Houdré (Atlanta, USA)
Local organising committee: David Nualart, Frederic Utzet, Arturo Kohatsu, Maria Jolis
Sponsors: Centre de Recerca Matemàtica, European Commission, Ministerio de Ciencia y Teconología (Spanish Government) and Bernoulli Society
Location: Centre de Recerca Matemàtica, Universitat Autònoma de Barcelona, Science Building 08193, Bellaterra, Spain
Deadlines: application for financial support, 5 April; registration and payment, 30 April
Information: Secretary of the conference, Consol Roca, Centre de Recerca Matemàtica, Apartat 50, 08193 Bellaterra, Catalonia, Spain; phone: 34-93-5811081. e-mail: crm@crm.es, web site: http://www.crm.es(activities)

17-21: XVth Householder Symposium on Numerical Linear Algebra, Peebles, Scotland
Information: web site:
http://www.maths.strath.ac.uk/~matrix/
[For details, see EMS Newsletter 42]

17-22: School on Population Dynamics, Bêdlewo, Poland
Information: web site:
http://www.math.us.edu.pl/cmmpd/
[For details, see EMS Newsletter 42]

18-22: The Barcelona Conference on Stochastic Inequalities and their Applications (EuroConference), Bellaterra, Barcelona, Spain
Information: web site*:* http://www.crm.es/stochineq

18-23: 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), Stephen C. Cowin (USA), Manuel Doblaré (Spain), Rik Huiskes (Netherlands), Harrie Weinans (Netherlands), José M. Guedes (Portugal), Helder Rodrigues (Portugal)
Organising committee: H. Rodrigues (Portugal), J. Guedes (Portugal)
Proceedings: to be published
Location: Instituto Superior Tecnico, Av. Rovisco Pais, Lisboa, Portugal
Information: e-mail: Bone.Mechanics@dem.ist.utl.pt
web site: http://www.dem.ist.utl.pt/~bonemec

19-21: 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
Main speakers: G. Lallement (France), J. Piranda (France), M. Balda (Czech Republic), E. Hahn (Australia)
Call for papers: participants are invited to contribute papers on the above topics. Oral presentation should be in English (25 minutes including discussion). Contributors should submit, as an attached file via e-mail to the e-mail conference address: ec437@it.cas.cz or euromech.437@it.cas.cz, a one-page extended

abstract of their proposed paper including its title, author's name, affiliation, full mail address and e-mail address. The extended abstracts 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 EUROMECH Colloquium 437. The proceedings will be available for delegates attending the Colloquium. Selected papers from the Colloquium will be recommended for the publication in international journals for theoretical and applied mechanics
Preliminary scientific committee: Miroslav Balda (Czech Academy of Sciences), Vasyl Chekurin Pidstryhach (National Academy of Sciences, Ukraine), Ivan Dobias (Czech Academy of Sciences), Jaromir Horacek (Czech Academy of Sciences), Jean Piranda (University Franche Comte), Ladislav Pust (Czech Academy of Sciences), Alexandru Valentin Radulescu (University Politehnica, Bucharest), Gu Zhengqi (Hunan University, P.R. China)
Chairs: Gerard Lallement AML RC, University Franche Comte, Besancon, France, Jan Kozanek, Institute of Thermomechanics, Czech Academy of Sciences
Location: Institute of Thermomechanics, Czech Academy of Sciences, Dolejskova 5, 182 00 Prague 8, Czech Republic
Grants: some reduction of fees for young participants
Deadlines: for submission of extended abstracts, 29 March (acceptance by 30 April); for payment, 10 May
Information: e-mail: ec437@it.cas.cz
euromech.437@it.cas.cz
fax: +420-2-86584695,
web: http://www.it.cas.cz/ec-437/

21-26: Symmetries and Integrability of Difference Equations: EuroConference on 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 the Painlevé equations, isomonodromic deformation theory, asymptotics of orthogonal polynomials, symmetries of difference equations, applications to numerical analysis
Main speakers: Mark J. Ablowitz (Boulder, USA); Alexander Its (Indianapolis, USA); Reinout Quispel (Bundoora, Australia); Claude Brezinski (Lille, France); Nalini Joshi (Adelaide, Australia); Alfred Ramani (Paris, France); Peter Clarkson (Canterbury, UK); Martin Kruskal (Rutgers, USA); Konstantin Rerikh (Dubna, Rumania); Robert Conte (Saclay, France); Ilpo Laine (Joensuu, Finland); Jacques Sauloy (Toulouse, France); Rod Halburd (Loughborough, UK); Decio Levi (Rome, Italy); Junkichi Satsuma (Tokyo, Japan); Peter E. Hydon (Surrey, UK); Jean-Marie Maillard (Paris, France); Walter van Assche (Louvain, Belgium); Gertruida Immink (Groningen, Netherlands); Frank Nijhoff (Leeds, UK); Alexander Veselov (Loughborough, UK); Arieh Iserles (Cambridge, UK); Vassilis Papageorgiou (Patras, Greece); Pawel Winternitz (Montreal, Canada)
Programme: available on-line
Chairs: Claude Viallet (CNRS Paris, France), Jarmo Hietarinta (University of Turku, Finland)
Sponsors: European Commission, Research DG, Human Potential Programme, High-Level Scientific Conferences (Contract No: HPCF-CT-2001-00013), INTAS
Location: VVF Presqu'île de Giens La Badine
Grants: available in particular for nationals under 35 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 scientists of 35 years old or under from the New Independent States of the former Soviet Union (NIS)
Deadline: for grants, 28 March
Information: contact Rachid Adghoughi (radghoughi@esf.org), Conference Organiser, European Science Foundation, Euresco Office, 1 quai Lezay-Marnésia, 67080 Strasbourg
web site: http://www.esf.org/euresco/02/pc02185

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. Gonzalez Vera (La Laguna, Spain), L. Jodar (Valencia, Spain), A.B.J. Kuijlaars (Leuven, Belgium), A. Martinez-Filkenshtein (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 committee: Jesus Dehesa (Granada), Antonio Duran (Sevilla), Guillermo Lopez Lagomasino (Madrid), Paco Marcellan (Madrid), Walter Van Assche (Leuven)
Organising committee: Renato Alvarez-Nodarse (Sevilla: ran@us.es), Jorge Arvesu (Madrid: jarvesu@math.uc3m.es) and Paco Marcellan (Madrid: pacomarc@ing.uc3m.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://merlin.us.es/~renato/iwop02/

24-28: Conference on Mathematical Modelling of Population Dynamics, Bêdlewo, 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.N. Pshenichnyi (1937-2000), Kyiv, Ukraine
Scope: optimisation, mathematical theory of control, dynamic games
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. Kurzhanski (Russia), Y.S. Ledyaev (Russia), A.G. Chentsov (Russia), A.A. Chikrii (Ukraine), V.S. Melnik (Ukraine), V.F. Demyanov (Russia), B. Mordukhovich (USA), 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 extended abstract (one full single-spaced A4 page in English, LaTeX format): the name, affiliation and e-mail of the author are to be shown under the title of the paper. Address for submission of abstracts: shiran@mmsa.ntu-kpi.kiev.ua. The files should also be sent to the conference chair: chik@d165.icyb.kiev.ua
Programme: lectures and contributed papers
Programme committee: Chair: I.V. Serhienko (Ukraine); Co-Chairs: M.Z. Zhurovskii and V.M. Kuntsevich (Ukraine); Members: A. Azimov (Turkey), V.D. Batukhtin (Russia), L. Berkovitz (USA), A.G. Chentsov (Russia), F.L. Chernousko (Russia), A.A. Chikrii (Ukraine), F. Clarke (Canada), J.-P. Dedieu (France), V.F. Demyanov (Russia), G. Feichtinger (Austria), R.F. Gabasov (Belarus), E. Galperin (Canada), F. Giannessi (Italy), O. Hajek (USA), J.-B. Hiriart-Urruty (France), Y.C. Ho (USA), F. Imado (Japan), A. Ioffe (Israel), J. Kaluski (Poland), F.M. Kirilova (Belarus), I.N. Kovalenko (Ukraine), N.N. Krasovskii (Russia), J. Krawczyk (New Zealand), A.V. Kryazhymskii (Russia), A.B. Kurzhanski (Russia), Y.S. Ledyaev (Russia), V.N. Malozyomov (Russia), V. Marchenko (Belarus), A.A. Melikyan (Russia), V.S. Melnik (Ukraine), A. Meystel (USA), Ye.F. Mishchenko (Russia), B. Mordukhovich (USA), M.S. Nikolskii (Russia), Yu.S. Osipov (Russia), M. Papageorgiou (Greece), P. Pardalos (USA), Z. Parsa (USA), J.-P. Penot (France), V.N. Redko (Ukraine), A. Rubinov (Australia), N.Z. Shor (Ukraine), I.V. Skrypnyk (Ukraine), M. Thera (France), V.M. Tikhomirov (Russia), V.Ye. Tretyakov (Russia), V.O. Zhukovskii (Russia)
Organising committee: A.A. Chikrii (Chair, Ukraine)
Organisers: Glushkov Institute of Cybernetics of the National Academy of Sciences, Institute for Applied System Analysis of the National Academy of Sciences and the Ministry of Education and Science of Ukraine, National Technical University 'Kyiv Polytechnical Institute'
Book of abstracts: to be published
Location: in Kyiv, on the campus of the National Technical University 'KPI'
Deadline: for submission of abstracts, 15 April
Information: web site:
www.icyb.kiev.ua/conferences/conferences.html

25-28: 8th International Conference on Applications of Computer Algebra, Volos, Greece
Themes: computer algebra, symbolic computation
Topics: computational quantifier elimination, computer algebra and cagd, numerical-symbolic methods in physical modelling, Gröbner bases and applications, robotics, mathematical physics and control theory, non-standard applications, industrial and engineering applications of computer algebra, symbolic and exact linear algebra, automatic theorem proving, celestial mechanics, combinatorial and computational methods in algebraic geometry and singularities, mathematical implementations, algebraic tools for differential equations, computer algebra in education, dynamical systems and mechanics, new developments in mathematica, approximate algebraic computation and stabilisation, symbolic-numerical methods in computational science, computational commutative and differential algebra
General chairs: Alkiviadis G. Akritas, Ilias S. Kotsireas
Administrative assistance: Theodora Terlexi
Programme chairs: Victor Edneral, Eugenio Roanes-Lozano
Organising committee: Stanley Steinberg, Michael Wester
Local arrangements committee: Thomas Kylindris, Yiannis Parassidis, Korina 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. Kaltofen (USA), I.S. Kotsireas (Canada), B. Kutzler (Austria), R. Liska (Czech Republic), B. Pletsch (USA), E. Roanes-Lozano (Spain), S. Steinberg (USA), Q. Tran (USA), N. Vassiliev (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, Cotopaxi, 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'
Deadlines: for submissions of abstracts, 20 April; for submissions of full papers, 30 December
Location: University of Thessaly, Department of Computer Engineering, Telecommunications and Networks
Information: phone: + 30-421-074886, e-mail: aca2002@uth.gr
web site: 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 details, see EMS Newsletter 42]

27-2 July: 19th International Conference on Operator Theory, Timisoara, Romania
Topics: operator theory, operator algebras and their applications: differential operators, complex functions,

mathematical physics, matrix analysis, systems theory, etc.
Main speakers (tentative): A. Atzmon (Israel), J. Bellissard (France), L.G. Brown (USA), I. Gohberg (Israel), Ch.R. Johnson (USA), L. Kerchy (Hungary), R. Nest (Denmark), J.R. Partington (England), R. Rochberg (USA), M. Rordam (Denmark), Z.J. Ruan (USA), G. Weiss (USA)
Programme committee: W.B. Arveson (USA), N.K. Nikolskii (France), N. Salinas (USA), S. Stratila (Romania), F.H. Vasilescu (France)
Proceedings: expected to be published
Location: West University of Timisoara
Sponsors: Institute of Mathematics of the Romanian Academy and West University of Timisoara
Grants: some financial support for PhD students and young researchers will be available: contact also the EURROMMAT programme (http://pompeiu.imar.ro/~eurrommat/positions.html)
Deadlines: for registration, 30 March
Information: e-mail: ot@imar.ro
web site: http://www.imar.ro/~ot

30-14 July: 'Let's Face Chaos through Nonlinear Dynamics', 5th International Summer School and Conference, Maribor, Slovenia
[dedicated to the 75th birthday of Prof. Hermann Haken]
Themes: non-linear dynamics, chaos theory, synergetics, complex systems
Scope: lecture courses (delivered by invited speakers) starting at introductory level adapted to senior undergraduate and graduate students, and concluding with the most recent research results comprehensible for most of the audience and subject to discussion among the attending invited speakers, experts and specialists
Aim: scientific exchange among seemingly distant disciplines, allowing students and junior scientists to understand better the role of interdisciplinary research, to bring them in touch with science in making, and to offer the opportunity to present their own research work (in short reports and posters)
Topics: atomic physics, biophysics, chaos, classical mechanics, computational physics, condensed matter, electromagnetism, fluid dynamics, general physics, mathematical physics, mathematics, medical physics, mesoscopic physics, molecular physics, non-linear dynamics, plasma physics, quantum chaos, quantum mechanics, solid state physics, statistical physics, theoretical physics
Invited lecturers: Y. Aizawa (Japan), V. Anishchenko (Russia), O. Bohigas (France), T. Bountis (Greece), G. Casati (Italy), P. Cvitanovic (USA), T. Frank (Netherlands), H. Fujisaka (Japan), G. Gallavotti (Italy), P. Gaspard (Belgium), I. Grabec (Slovenia), S. Grossmann (Germany), I. Guarneri (Italy), F. Haake (Germany), H. Haken (Germany), H. Hasegawa (Japan), Y. Kuramoto (Japan), J. Laskar (France), M. Matsushita (Japan), P. McClintock (UK), E. Mosekilde (Denmark), K. Nakamura (Japan), D. Pagon (Slovenia), J. Pichard (France), P. Prelovsek (Slovenia), T. Prosen (Slovenia), M. Robnik (Slovenia), V. Romanovski (Slovenia), M. Rosenblum (Germany), A. Ruffing (Germany), J. Schumacher (Germany), T. Seligman (Mexico), A. Shudo (Japan), M. Sonis (Israel), A. Stefanovska (Slovenia), H. Stoeckmann (Germany), G. Tanner (UK), P. Tass (Germany), J. Weele (Netherlands), M. Wilkinson (UK)
Programme: 77 invited 60-minute lectures, at school and conference level; opportunities to present research work as a short report (20 minutes) or poster; a rich cultural and social programme
Call for papers: apply with abstract (posters or short report); see http://www.camtp.uni-mb.si/chaos/2002/apply.html
Organising committee: director: M. Robnik (CAMTP, Slovenia); honorary directors: G. Casati (Italy), P. Cvitanovic (USA), S. Grossmann (Germany), H. Haken (Germany); members: Y. Aizawa (Japan), T. Bountis (Greece), H. Hasegawa (Japan), I. Mozetic (Slovenia), J. Pichard (France), T. Prosen (Slovenia), A. Ruffing (Germany), A. Stefanovska (Slovenia)
Sponsors: Ministry of Education, Science and Sport, Nova Kreditna Banka Maribor, Telekom Slovenia
Proceedings: accepted papers will be published, together with the lectures of invited speakers, as a special volume of the *Supplement of Progress in Theoretical Physics* (Kyoto, Japan)
Location: CAMTP: 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 chaos-support@uni-mb.si
Deadlines: for application with abstract (poster or report) or without presentation, 15 May; for late application, 27 June; for application for financial support, 18 April; for hotel reservation , 27 June
Information: e-mail: chaos@uni-mb.si
http://www.camtp.uni-mb.si/chaos/2002/

July 2002

1-5: Congrès de mathématiques appliquées à la mémoire de Jacques-Louis Lions, Paris, France
Speakers: L. Ambrosio, F. Baccelli, J. Ball, F. Brezzi, L. Caffarelli, M.-P. Cani, A. Chorin, J.-M. Coron, L. Evans, O. Faugeras, M. Fink, M. Ghil, T. Hou, A. Majda, L. Nirenberg, G. Papanicolaou, A. Patera, B. Perthame, R. Rannacher, P. Souganidis, E. Tadmor, S. Varadhan, C. Villani, M. Vishik, J.-C. Yoccoz, E. Zuazua
Honour committee: H. Curien, H. Fujita, P. Lax, E. Magenes (Chair), G. Marchuk
Patronages: International Mathematical Union and Académie des Sciences de Paris Supported and sponsored by: Ministère de la Recherche, CNRS, CNES, INRIA, Collège de France, Ecole Polytechnique, Université Pierre et Marie Curie (Paris VI), SMAI and SMF
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 Boî te courrier 187 75252 Paris cedex 05 France,
fax : + 33 1 44 27 72 00,
e-mail: congres.jllions@ann.jussieu.fr
web-site: http://acm.emath.fr/congres-jllions/

1-6: Advanced Course on Mathematical Finance: Models, Bellaterra, Barcelona, Spain
Coordinator: Joan del Castillo
Information: web site: http://www.crm.es/matfin

1-6: 2nd International Conference on the Teaching of Mathematics at Undergraduate Level, Chersonissos, Crete, Greece
Information: web site: http://www.math.uoc.gr/~ictm2
[For details, see EMS Newsletter 42]

1-6, 2002 Workshop on Wavelets and Applications, Barcelona, Spain
Topics: EDPs, numerical analysis, probability theory, signal processing
Main speakers: C. Canuto (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. Carro, 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.ub.es/wavelets

2-6: 2002 Barcelona Conference on Algebraic Topology (a EuroConference), Barcelona, Spain
Information: web site: http://www.crm.es/2002bcat

2-6: 5th Conference of the European Society of Mathematics and Theoretical Biology on Mathematical Modelling and Computing in Biology and Medicine, Milano, Italy
Aim: to foster interdisciplinary collaboration between mathematicians and bioscientists and to act as the main forum for the exchange of recent research results and new research directions 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, infectious diseases, individual based models, computational neuroscience, visualisation, regulatory gene networks
Main speakers: Marina Alexandersson (Sweden), Giuseppe Baselli (Italy), Tom Britton (Sweden), Klaus Dietz (Germany), Wulfram Gerstner (Switzerland), Hans-Christian Hege (Germany), Claudia Neuhauser (USA), A. Neumann (Israel), Alfio Quarteroni (Italy), Jonathan Sherratt (UK), Karl Sigmund (Austria), Denis Thieffry (France), Daniel Tranchina (USA), Tamiki 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. Agur, O. Arino, M. Chaplain, M. Gyllenberg, J.A.P. Heesterbeek, M. Kaufman, V. Krivan, A. Stevens, P. Tracqui
Programme committee: P. Cinquin, A. De Roos, P. Deuflhard, A. Goldbeter, P. Jaegers, W. Jager, P. Lansky, P. Maini, H. Metz, R. Nisbet, C. Peskin, S. Rinaldi, L. Segel. Liaisons: A. Hastings (SMB), M. Mimura (JSMB)
Organising committee: V. Capasso, E. Beretta, P. Cerrai, P. Colli-Franzone, S. Cerutti, A. De Gaetano, A. Fasano, P. Fergola, A. Gandolfi, E. Galli, M. Gatto, F. Grandoni, A. Mari, C. Matessi, A. Morabito, D. Morale, G. Naldi, S. Paveri-Fontana, L. Preziosi, A. Pugliese, L. Sacerdote
Sponsors: European Union, Centro Nazionale delle Ricerche Universita' degli Studi di Milano, Politecnico di Milano, Milan Research Centre for Industrial and Applied Mathematics (MIRIAM), Universita' degli Studi di Pavia, MURST-COFIN Processi Stocastici a Struttura Spaziale, Domus Galilaeiana, STMicroelectronics
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: ecmtb@mat.unimi.it
web site: http://ecmtb.mat.unimi.it

7-14: 6th WSEAS CSCC Multiconference on Circuits; Systems; Communications; Computers; Applied Informatics; Signal Processing and Computational Geometry and Vision; Scientific Computations and Soft Computing, Rethymna Beach, Crete
Information: e-mail: manolis7@wseas.org
web site: 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 re-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 arithmetics; 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 (France), M. Karoubi (France), M. Kolster (Canada), A.O. Kuku (Italy), M. Levine (USA), S. Lichtenbaum (USA), J.-L. Loday (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), C. Soulé (France), V. Voevodsky (USA), C. Weibel (USA)
Programme: the first two weeks (8-19 July) will

comprise invited expository lectures on several aspects of the field; the last week (22-26 July) will be a Conference featuring mainly research lectures by invited specialists, with possible contributions by some selected participants
Organising committee: M. Karoubi (France), A.O. Kuku (Italy), C. Pedrini (Italy)
Sponsor: Abdus Salam International Centre for Theoretical Physics
Proceedings: will be published
Location: Abdus Salam International Centre for Theoretical Physics (Strada Costiera 11, Trieste)
Grants: some financial grants are available for applicants from, and working in, developing countries only, to be selected by the organisers; there may also be other support for participants from European countries
Deadline: already passed
Information: e-mail: smr1418@ictp.trieste.it
web site: http://www.ictp.trieste.it/www_users/math/maths2002.html

10-13 VISIT-ME-2002 (Vienna International Symposium on Integrating Technology into Mathematics Education), Vienna, Austria
Aim: to bring together experts and non-experts with an interest in this topic
Topics: include CAS-based curricula and teaching methods, dynamic geometry systems as teaching tools, assessing with technology, internet as a teaching aid, dispensable and indispensable mathematical skills and abilities, CAS as pedagogical tools for visualisation, experimentation, concentration, new classroom examples using CAS, the next generation: PeCAS = Pedagogical CAS, applications in mathematics, the natural sciences, research and development, economy, social sciences, industry, interfaces to other programs/tools, producing and using utility files, programming in Derive, TI-89/92, and other CAS, problems and limitations, web resources going on-line, teaching and learning with Derive and other CAS, connecting computer algebra and computational logic
Main speakers: Bruno Buchberger (Austria), Miguel de Guzman (Spain), Albert Rich (USA), Hans-Georg Weigand (Germany)
Languages: English and German
Programme committee: Josef Boehm (Austria), Vlasta Kokol-Voljc (Slovenia), Bernhard Kutzler (Austria), Carl Leinbach (USA), Brian Denton (UK), Wilfried Herget (Germany), Jean-Baptiste Lagrange (France), Edith Schneider (Austria), James Schultz (USA), Marlene Torres-Skoumal (Austria), Bernard Winkelmann (Germany), Michel Beaudin (Canada), Josef Lechner (Austria), Francisco Puerta (Spain), Eugenio Roanes (Spain), Theresa Shelby (USA), David Sjoestrand (Sweden), Hubert Weller (Germany), Johann Wiesenbauer (Austria)
Organising committee: Josef Boehm (Austria), Helmut Heugl (Austria), Bernhard Kutzler (Austria)
Sponsors: Austrian Ministry of Education, Soft Warehouse Europe, Texas Instruments
Proceedings: to be published with an ISBN on CD-ROM
Location: University of Vienna, Strudlhofgasse, Vienna, Austria
e-mail: b.kutzler@eunet.at
web site: http://www.acdca.ac.at/visit-me-2002

15-18: Modular Curves and Abelian Varieties (EuroConference), Bellaterra, Barcelona, Spain
Coordinator: J. Quer
Information: web site: http://www.crm.es/mcav02

16-22: 7th International Spring School: Nonlinear Analysis, Function Spaces and Applications (NAFSA 7), Prague, Czech Republic
Information: web site: http://www.math.cas.cz/~nafsa7
[For details, see EMS Newsletter 40]

22-25: IEEE Symposium on Logic in Computer Science (LICS'02), Copenhagen, Denmark
[part of the 2002 Federated Logic Conferences – FloC'02]
Topics: automata theory, automated deduction, categorical models and logics, concurrency and distributed computation, constraint programming, constructive mathematics, database theory, domain theory, finite model theory, formal aspects of program analysis, formal methods, hybrid systems, lambda and combinatory calculi, linear logic, logical aspects of computational complexity, logics in artificial intelligence, logics of programs, logic programming, modal and temporal logics, model checking, programming language semantics, reasoning about security, rewriting, specifications, type systems and type theory, and verification
Main speakers: Stephen Cook (University of Toronto), Georg Gottlob (TU Wien), John Reynolds (Carnegie Mellon), Natarajan Shankar (SRI), Maurizio Lenzerini (Universita di Roma 'La Sapienza')
Programme committee: Franz Baader (Aachen), Marco Cadoli (Rome), Vincent Danos (Paris), Anuj Dawar (Cambridge), Rocco De Nicola (Firenze), Harald Ganzinger (Saarbrücken), Orna Grumberg (Haifa), Robert Harper (Carnegie Mellon), Furio Honsell (Udine), Phokion Kolaitis (Santa Cruz), Johann Makowsky (Haifa), Oded Maler (Grenoble), Yoram Moses (Haifa), Robert Nieuwenhuis (Barcelona), Peter O'Hearn (London), Doron Peled (Austin), Benjamin Pierce (Philadelphia), Andrew Pitts (Cambridge), Gordon Plotkin (Chair, Edinburgh), Andreas Podelski (Saarbrücken), Andre Scedrov (Philadelphia), Peter Thiemann (Freiburg), Andrei Voronkov (Manchester)
Information: e-mail: lics-request@dcs.ed.ac.uk
web site:
http://www.dcs.ed.ac.uk/home/grohe/lics/lics02/

22-26: Universal Algebra and Lattice Theory, Szeged, Hungary
[dedicated to the 70th birthday of B. Csakany]
Main speakers: J. Berman (Chicago), P. Dehornoy (Caen), M. Goldstern (Vienna), E.W. Kiss (Budapest), M. Maroti (Nashville), P.P. Palfy (Budapest), I.G. Rosenberg (Montreal)
Call for papers: we are using the facilities of Atlas Mathematical Conference; if you wish to present a talk, please submit your abstract at http://at.yorku.ca/cgi-bin/amca/submit/caiv-01
Programme committee: J. Jezek (Prague), K. Kearnes (Boulder), R. Poeschel (Dresden), A. Romanowska (Warsaw), A. Szendrei (Szeged), R. Willard (Waterloo)
Organising committee: A. Szendrei (Szeged), L. Szabo (Szeged), M. Dorman (Szeged)
Grants: reduction of the registration fee or contribution to accommodation costs may be provided upon request for some participants, especially for students and young people who are not supported by their universities
Deadlines: for registration, 15 April; for abstracts: 1 July
Information: e-mail: algebra@server.math.u-szeged.hu
web site:
http://www.math.u-szeged.hu/confer/algebra/2002/

August 2002

3-9: Logic Colloquium 2002 (ASL European Summer Meeting), Muenster, Germany
[change of date]
Sponsors: Association of Symbolic Logic, Westfälische Wilhelms-Universität Münster Rheinische Friedrich-Wilhelms-Universität Bonn Deutsche Forschungsgemeinschaft
Deadlines: for travel grants, 1 April; for submission of abstracts, 1 May
Note: satellite meeting: Colloquium Logicum 2002
Information: web site: http://www.math.uni-muenster.de/LC2002/
[For details, see EMS Newsletter 41]

5-9: International Conference on Ill-Posed and Inverse Problems, Novosibirsk, Russia
Information: web site:
www.math.nsc.ru/conference/mml
[For details, see EMS Newsletter 42]

9-11: Colloquium Logicum 2002, 2nd Biannual Meeting of the DVMLG, Münster, Germany
[satellite meeting of Logic Colloquium 2002]
Organising and scientific committee: Justus Diller (Münster), Peter Koepke (Bonn), Benedikt Löwe (Bonn), Wolfram Pohlers (Münster, Chair), Christian Thiel (Erlangen), Wolfgang Thomas (Aachen), Andreas Weiermann (Münster)
Invited speakers: Toshiyasu Arai (Hiroshima), Joan Bagaria (Barcelona), André Nies (Chicago), Martin Otto (Swansea), Charles Parsons (Cambridge, USA), Anand Pillay (Urbana-Champaign), Michael Rathjen (Leeds), Johan van Benthem (Amsterdam- Stanford)
Sponsors: Deutsche Vereinigung für Mathematische Logik und für Grundlagen der Exakten Wissenschaften (DVMLG) Deutsche Forschungsgemeinschaft
Information: web site:
http://wwwmath.uni-muenster.de/LC2002/CL2002.html

10-11: Colloquium Logicum 2002, Münster, Germany
[satellite conference of Logic Colloquium 2002]
Information:
web site: http://wwwmath.uni-muenster.de/LC2002/
[For details, see EMS Newsletter 41]

25-30: Wireless and Optical Communications (WOC'02), Miedzyzdroje, Poland
Information: web site:
http://www.worldses.org/wses/calendar.htm

25-30: Nanoelectronics, Nanotechnologies (NN'02), Miedzyzdroje, Poland
Information: web site:
http://www.worldses.org/wses/calendar.htm

27-2 September: Third International School-symposium: Symmetry and Cosymmetry Applications in the Theory of Bifurcations and Phase Transitions, Big Sochi, Russia
Theme: mathematical physics
Topics: symmetry and cosymmetry, theory of bifurcations, phase transitions
Programme: symmetry in classical mechanics, integrability of conservative systems, connection with symmetry and cosymmetry, conservative chaos, convection of homogeneous and multicomponent fluids – phase transitions, bifurcation, asymptotic models, influence of electromagnetic field, convection of fluid in a porous medium, chaotic motions, phase transitions in ferro- and antiferro-magnets and in liquid crystals, symmetry and cosymmetry influence, symmetry and cosymmetry in classical hydrodynamics, theory of stationary motions and their stability, applications to hydrodynamics and others fields of mathematical physics, magnetodynamics problems
Sessions: Section 1: Phase transitions in continuous media and scenarios of chaos origin; Chairs Victor Yudovich (Russia), George Zaslavsky (USA). Section 2: Phase transitions in solid states and fluids; Chairs Jakow Granovskii (Poland), Yurii Gufan (Russia)
Programme committee and main speakers: V. Yudovich (Russia), V. Pukhnachev (Russia), Yu. Gufan (Russia), E. Vinberg (Russia), G. Zaslavsky (USA), G. Iooss (France), G-F. Sartory (Italy), J. Granovskii (Poland), B. Karasözen (Turkey), Jai Sam Kim (South Korea), A. Sadkov (Russia)
Organising committee: V. Yudovich (Russia), Yu. Gufan (Russia), J. Erusalimsky (Russia), A. Sadkov (Russia)
Languages: English and Russian
Call for papers: 2-page extended abstracts must be submitted by e-mail to sadkov@ip.rsu.ru or yudovich@math.rsu.ru
Sponsors (provisional): RFBR and INTAS
Proceedings: to be published
Location: camping 'Slava' on the Big Sochi coast of the Black Sea
Grants: we may be able partially to reimburse subsistence expenses for young scientists, students and lecturers
Deadlines: for registration, 1 June; for abstracts, 1 July
Information: e-mail: sadkov@ip.rsu.ru or yudovich@math.rsu.ru
web site:
http://www.math.rsu.ru/mexmat/kvm/school2002

September 2002

1-9: 8th AHA 2002, International Congress on Algebraic Hyperstructures and Applications, Samothraki Island, Greece

Topics: hypergroups, semi-hypergroups, hypergroupoids, hyperrings, hyperfields, hypervectorial spaces, Hv-structures (Hv-groups, semigroups, rings), non-associative and feebly associative hypergroupoids, join spaces, hyperstructures associated with geometric spaces, ordered hyperstructures, fuzzy hyperstructures, hypergraphs, generalisations and applications
Main speakers: P. Corsini (Italy), Y. Sureau (France), I. Rosenberg (Canada), S. Comer (USA), J. Jantosciak (USA), J. Mittas (Greece), R. Migliorato (Italy), V. Loereanu (Romania), M.M. Zahedi (Iran), M. Konstantinidou-Serafimidou (Greece)
Call for papers: to present an oral communication, submit an abstract (type and centre the title, in capitals, 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. Konstantinidou-Serafimidou (Greece), R. Migliorato (Italy), I. Rosenberg (Canada), S. Spartalis (Greece), Y. Sureau (France), T. Vougiouklis (Greece)
Organising committee: T. Vougiouklis (Greece), S. Spartalis (Greece), H. Sakonidis (Greece)
Sponsors: Democritus University of Thrace, Hellenic Ministry of Education
Proceedings: to be published
Location: Hotel Aeolos, Samothraki Island, Greece
Deadlines: for registration, 31 March; for abstracts, 30 April; for hotel deposit 30 June
Information: e-mail: aha2002@agro.duth.gr, tvougiou@edu.duth.gr, sspart@utopia.duth.gr

3-7: 8th International Conference on Stability, Control and Rigid Bodies Dynamics, Donetsk, Ukraine
Information: web site:
http://www.iamm.ac.donetsk.ua/conf2002.html
[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: polynomial 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 geometry software, special-purpose tools, automated theorem provers, experimental studies, applications of ADG to mechanics, geometric modelling, CAGD/CAD, computer vision, robotics and education
Main speakers: two invited talks: names of speakers to be announced shortly
Call for papers: see the web site
Programme committee: Shang-Ching Chou (Wichita, USA), Andreas Dress (Bielefeld, Germany), Desmond Fearnley-Sander (Hobart, Australia), Xiao-Shan Gao (Beijing, China), Hoon Hong (Raleigh, USA), Deepak Kapur (Albuquerque, USA), Josef Schicho (Linz, Austria), Bernd Sturmfels (Berkeley, USA), Gert Vegter (Groningen, Netherlands), Dongming Wang (Paris, France), Volker Weispfenning (Passau, Germany), Neil White (Gainesville, USA), Franz Winkler (Linz, Austria), Chair Lu Yang (Chengdu, China)
Organising committee: F. Winkler (Chair, Austria), M. Athale (Austria)
Proceedings: authors of extended abstracts and full papers accepted for presentation will be invited to submit full and/or revised papers for publication in the proceedings of ADG 2002 after the workshop; the submitted papers will be formally reviewed by PC members and external referees. It is expected that the accepted papers will be published as a volume in the LNAI series by Springer-Verlag. (The proceedings of ADG '96, ADG '98 and ADG '00 appeared as LNAI 1360, LNAI 1669 and LNAI 2061)
Location: Schloss Hagenberg (15km north of Linz), the home of Johannes Kepler University's Research Institute for Symbolic Computation (RISC-Linz): see the RISC homepage (http://www.risc.uni-linz.ac.at) for more information
Deadlines: extended abstract submission by 3 June, notification of acceptance or rejection by 3 July, full paper submission by 4 November
Information: e-mail: {Franz.Winkler, Manasi.Athale}@risc.uni-linz.ac.at
web site:
http://www.risc.uni-linz.ac.at/conferences/adg2002

4-6: 3rd International Conference on Mathematical and Computational Applications, Konya, Turkey
Theme: engineering, natural sciences or social sciences where mathematical and/or computational techniques are necessary for solving specific problems
Aim: to provide a medium by which a wide range of experiences can be exchanged among researchers from diverse fields such as engineering (electrical, mechanical, civil, industrial, aeronautical, nuclear etc.), natural sciences (physics, mathematics, chemistry, biology etc.) or social sciences (administrative sciences, economics, political sciences etc.)
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
Call for papers: we are using the facilities of Internet *and International Journal of Applied Mechanics and Engineering* (V. 6, No. 4, 2001)
Programme committee: H. Adeli (USA), M. Akbaba (Bahrain), R. Aliev (Azerbaijan), N. Allahverdi (Turkey), S. Ay (Turkey), O. Balci (USA), A. Baykasoglu (Turkey), M. Bikdash (USA), N. Bildik (Turkey), F. Botsali (Turkey), D. Bozkurt (Turkey), B. Can (Turkey), M. Can (Turkey), Z. Celep (Turkey), A. Caliskan (Turkey), K. Carman (Turkey), T. Dereli (Turkey), A.H. Elkholy (Kuwait), K. Erciyes (USA), A. Erisen (Turkey), E. Murat Esin (Turkey), Z. Fazekas (UK), I. Guler (Turkey), K. Gulez (Japan), F. Gurgen (Turkey), E. Hasanov (Turkey), H. Huseynov (Turkey), C. Isci (Turkey), S. Kahramanli (Turkey), H. Kaplan (Turkey), H. Karagulle (Turkey), R. Karakuzu (Turkey), B. Karlik (Bahrain), M. Keskin (Turkey), S. Kocak (Turkey), A. Kuliev (Turkey), A. Kucukbursa (Turkey), A.C.J. Luo (USA), F.M. Mahomed (South Africa), D.L. Mitov (Bulgaria), P.M. Oliveira (Portugal), M. Pakdemirli (Turkey), J. Saleh (Jordan), E. Savas (Turkey), O. Sayman (Turkey), S. Selvi (Turkey), Z. Sen (Turkey), A. Sinan (Turkey), K. Soltanov (Azerbaijan), M. Tekelioglu (Turkey), O. Tokhi (UK), M. Turhan (Turkey), I. Uluer (Turkey), U. Uzman (Turkey), F. Unsacar (Turkey), G. Unal (Turkey), V. Vagin (Russia), A. Vidybida (Ukraine), E. Walicki (Poland), A. Yavas (USA), A.S. Yigit (Kuwait),
Organising committee: N. Allahverdi (Turkey), K. Carman (Turkey), T. Sisman (Turkey), A. Gunes (Turkey), M.N. Ornek (Turkey), I. Saritas (Turkey), L. Civcik (Turkey)
Location: Suleyman Demirel Culturel Centre, Campus, Konya
Grants: probably support for participants from countries in a difficult economic situation and young mathematicians
Organisers: Technical Education Faculty of Selcuk University, Association for Scientific Research
Deadlines: for full papers, passed; for registration, 30 June
Information: e-mail: icmca2002@selcuk.edu.tr
web site: http://www.selcuk.edu.tr/icmca2002

4-7: International Conference on Dynamical Methods for Differential Equations, Valladolid, Spain
Information: web site:
http://wmatem.eis.uva.es/~dmde02/
[For details, see EMS Newsletter 41]

4-7: Perspectives in Mathematical Physics, Rome, Italy
[in honour of the 60th birthday of Prof. Giovanni Gallavotti]
Topics: mathematical physics, such as classical and quantum statistical mechanics, dynamical systems, hamiltonian perturbation theory, macroscopic limits, fluid dynamics
Speakers: include D. Brydges (Canada), L. Chierchia (Italy), E.G.D. Cohen (USA), G. Dell'Antonio (Italy), S. Doplicher (Italy), H. Epstein (France), J. Froelich (Swiss), L. Galgani (Italy), G. Gentile (Italy), S. Graffi (Italy), F. Guerra (Italy), G. Jona Lasinio (Italy), J. Lebowitz (USA), E. Lieb (USA), C. Liverani (Italy), R. Livi (Italy), C. Marchioro (Italy), S. Miracle-Sole (France), E. Olivieri (Italy), V. Rivasseau (France), D. Ruelle (France), Ya. Sinai (USA)
Organising committee: G. Benettin (Italy), G. Benfatto (Italy), F. Bonetto (USA), M. Cassandro (Italy), A. Celletti (Italy), R. Esposito (Italy), C. Falcolini (Italy), A. Giorgilli (Italy), V. Mastropietro (Italy)
Location: Department of Physics, University of Roma 'La Sapienza'
Notes: there is no registration fee: only invited communications will be presented
Deadline: for registration, 15 May
Information:
web site: http://www.mat.uniroma2.it/pmp2002

8-13: ALGORITMY 2002, Conference on Scientific Computing, High Tatra Mountains, Podbanske, Slovakia
Information: web site: http://www.math.sk/alg2002
[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 Poncin; organised jointly by the Centre Universitaire of Luxembourg and the University of Metz
Location: Centre Universitaire of Luxembourg (9-10 September) and University of Metz (11-12 September)
Main speakers (preliminary list): C. Anantharaman-Delaroche, J.P. Anker, Y. Benoist, E. Damek, H. Fujiwara, H. Oh, E. Kaniuth, A. Lubotzky, D. Müller, K.H. Neeb, D. Poguntke, G. Robertson, W. Schmid, T. Steger, A. Valette, A.M. Vershik
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@cu.lu
web site: http://www.cu.lu/harmonic_analysis

10-20: Advanced Course on Geometric 3-Manifolds, Bellaterra, Barcelona, Spain
Coordinator: Joan Porti
Information: web site: http://www.crm.es/geom-mani

20-25: International Conference on Computational Methods in Science and Eng. (CMMSE-2002), Alicante, Spain
Information: web site: www.ua.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 Galilee, Universite Paris 13
Information:
http://www-math.math.univ-paris13.fr/~ramifica/

25-28: 2nd WSEAS International Conferences on: Simulation, Modelling and Optimization; Signal, Speech and Image Processing; Multimedia, Internet and Video; Robotics, Distance Learning and Intelligent Communication Systems, Skiathos, Greece
Information: e-mail: skiathos2002@wseas.org
web site:
http://www.wseas.org/conferences/2002/skiathos/

Recent books

edited by Ivan Netuka and Vladimír Souček

Books submitted for review should be sent to the following address:
Ivan Netuka, MÚUK, Sokolovská 83, 186 75 Praha 8, Czech Republic.

J. Adams and D. Vogan (eds.), ***Representation Theory of Lie Groups,*** *IAS/Park City Mathematical Series* ***8****, American Mathematical Society, Providence, 2000, 340 pp., US$49, ISBN 0-8218-1941-0*
Each summer, there are 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 P. Trapa) describes the Langlands parametrisation of irreducible (admissible) representations of such groups. The lectures by R. Zireau and L. Barchini describe cohomologically induced families of unitary representations, which appear in harmonic analysis and the theory of authomorphic 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.Vilonen use geometrical tools (constructible sheaves, semialgebraic sets and derived categories) to recover 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)

H. Amann and J. Escher, ***Analysis III,*** *Grundstudium Mathematik, Birkhäuser, Basel, 2001, 480 pp., ISBN 3-7643-6613-3 and 3-7643-6614-1*
This volume is devoted to integration and to global analysis. Integration theory is developed along standard lines (measure spaces, measures, outer measure, 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 Heisenberg 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, vector fields, the Riemann metric and vector analysis. The last part of the book deals with integration on manifolds: integration of differential forms and Stokes' theorem, including such special cases as the Gauss-Green theorem, Green's formulae and the classical Stokes' theorem. In view of their applications, manifolds with a small singular part are allowed. The second part contains 100 problems for solution.

The material included in this book exceeds the volume usually covered in analysis courses, and may be used for seminars or for supplementary reading. The book is recommended to students and to teachers of mathematical analysis. (in)

Yu. Aminov, ***The Geometry of Vector Fields,*** *Gordon and Breach Publishers, Amsterdam, 2000, 172 pp., £45, ISBN 90-5699-201-5*
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 geometry of a regular family of surfaces can be described in terms of this normal field. Quite naturally, by the end of the nineteenth 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. (jiva)

V. I. Arnold, M. F. Atiyah, P. Lax and B. Mazur (eds.), ***Mathematics: Frontiers and Perspectives,*** *International Mathematical Union, American Mathematical Union, Providence, 2000, 459 pp., US$49, ISBN 0-8218-2070-2*
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 interaction between mathematics and theoretical physics for future development in mathematics. There are also articles on the connections between pure mathematics and certain areas of applied mathematics. The authors are M.F. Atiyah (preface), A. Baker, G. Wustholz, J. Bourgain, S.-S. Chern, A. Connes, S.K. Donaldson, W.T. Gowers, V.F.R. Jones, D. Kazhdan, F. Kirwain, 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.I. Arnold, P.D. Lax and B. Mazur.

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

A. V. Balakrishnan (ed.), ***Semigroups of Operators: Theory and Applications,*** *Progress in Nonlinear Differential Equations and Their Applications* ***142****, Birkhäuser, Basel, 2000, 367 pp., DM 178, ISBN 3-7643-6310-X*
This volume is the proceedings of the conference on C_0-semigroups and their applications, held at Newport Beach in December 1998. These proceedings consist of 35 contributions. Most of them are short (less than 10 pages), but a reader can 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 are given to problems in physics (fluid dynamics, aero-elasticity, Dirac equation and flutter of wings) and control theory (thermo-elastic plates). (jmil)

S. Batterson, ***Stephen Smale: The Mathematician Who Broke the Dimension Barrier,*** *American Mathematical Society, Providence, 2000, 306 pp., US$35, ISBN 0-8218-2045-1*
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 non-mathematicians.

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 masterpiece. (jiva)

M. B. Bekka and M. Mayer, Ergodic Theory and Topological Dynamics of Group Actions on Homogeneous Spaces, *London Mathematical Society Lecture Note Series* ***269****, Cambridge University Press, Cambridge, 2000, 200 pp., £24.95, ISBN 0-521-66030-0*
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, we find an introduction and some classical examples and results from ergodic theory, including von 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 geodesic flows on Riemannian structures are then studied. The vanishing theorem of Howe and Moore is presented in Chapter III, together with Moore's ergodicity theorem and mixing of all orders arising as a strengthening of strong mixing. 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 Siegel sets and their applications to lattices in n-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. (dh)

R. A. Bertlmann, *Anomalies in Quantum Field Theory,* *International Series of Monographs on Physics* ***91****, Oxford University Press, Oxford, 2000, 566 pp., £29.95, ISBN 0-19-850762-3*
An 'anomaly' in field theory means a violation of classical symmetry at the quantum level. Anomalies play a key role in modern quantum field theory and they have been studied intensively since the late-1960s. Although the literature on this subject is enormous, a comprehensive monograph on anomalies has long been missing – Bertlmann's book thus represents a highly desirable filling of the gap.

The core of the monograph is a discussion of the deeper mathematical aspects of chiral and gravitational anomalies that will appeal mostly to the mathematically oriented theoretical physicists specialising in quantum field theory and elementary particle physics. It is shown, in particular, that the techniques of modern differential geometry (which are necessary in this context) are useful, not only as an elegant language for the formulation of the theory but also as a practical computational tool. In studying these advanced parts, the reader is greatly helped by the introductory chapters that include some basic material on differential geometry and topology and make the book fairly self-contained. The detailed discussion of the mathematical aspects tends to restrict the exposition of the physical applications of anomalies; on the other hand, the whole subject is so vast that a one-volume monograph can hardly be fully exhaustive.

Bertlmann's book can be warmly recommended to Ph.D. students, lecturers and researchers working in the quantum field theory and mathematical physics, since its contents are unique within the existing literature and cover, in an essential way, the development of modern methods in this area. (jho)

M. Bonk, J. Heinonen and P. Koskela, *Uniformizing Gromov Hyperbolic Spaces,* *Astérisque* ***270****, Société Mathématique de France, Paris, 2001, 99 pp., FRF 150, ISBN 2-85629-098-1*
The unit disc U in the complex plane can be equipped with two natural geometries: the Euclidean one, and hyperbolic geometry, which forms on U the structure of a complete Riemannian manifold of constant negative curvature. This is a model case of a much more general situation that is studied here.

Given a locally compact, rectifiably connected non-complete metric space, it is possible to introduce on it a suitable quasi-hyperbolic distance. Roughly speaking, if we pass from the initial metric to the quasi-hyperbolic distance, uniform spaces become Gromov hyperbolic; conversely, special conformal deformations of the metric of a Gromov hyperbolic space leads to a uniform metric. If we compose these two modifications, the initial and final spaces belong to the same quasi-similarity class. Numerous further results on Gromov hyperbolic spaces are established in the book. The Gehring-Hayman theorem is generalised to this framework. Loewner spaces are investigated, their definition being based on the concept of the modulus of a family of curves. Planar Gromov hyperbolic spaces are characterised, and a partial characterisation is also given in higher dimensions. Quasi-conformal homeomorphisms of Gromov hyperbolic spaces of bounded geometry are studied. A description of the Martin boundary of a Gromov hyperbolic domain establishes a link with potential theory.

This book is an original research work with many deep and interesting results. It provides a well-written contribution to the geometric theory of metric spaces. It is a favourite and topical theme to recognise which results can be generalised from Euclidean spaces to spaces with a more complicated geometry, and to find methods that could be fruitful in this framework. This research has many applications to concrete problems on manifolds and more general spaces. (jama)

J. A. Buchmann, *Introduction to Cryptography,* *Undergraduate Texts in Mathematics, Springer, New York, 2001, 281 pp., DM 69, ISBN 0-387-95034-6*
This book describes many of the well-known symmetric and public-key cryptosystems, together with the necessary mathematics, in a way that is accessible to students with a limited mathematical background.

The first quarter of the book is devoted to definitions of basic mathematical structures that are needed in modular arithmetics, the associated basic algorithms (extended Euclidean algorithm, fast exponentiation), and the analysis of these algorithms and of basic modular operations with respect to their computational cost. Other mathematical concepts appear in the book later, always in connection with a cryptosystem. Block ciphers are associated with permutations, affine ciphers with matrices and linear maps, and the Vernam one-time pad with a discussion of probability notions, including Shannon's theorem on perfect secrecy. The part about symmetric cryptosystems concludes with a thorough exposition of the DES algorithm.

The second half of the book is concerned with public key encryption, including the concepts of digital signature, cryptographic hash-functions, identification, and certification authorities. RSA cryptosystems, Rabin encryption, Diffie-Hellman key exchange and ElGamal encryption are all described in detail, including some discussion of the prime number generation (Carmichael numbers, Miller-Rabin test), factoring (p–1 method, quadratic sieves) and the discrete logarithm problem (the Shanks, Pollard and Pohlig-Hellman algorithm).

This book retains the form of a mathematical text, with statements of theorems and proofs, but its main purpose seems to be to give a general and reasonably elaborated understanding of basic cryptographic notions. From this point, it makes sense that a several concepts are mentioned without being really explained (such as pseudo-random numbers, class groups and number field sieves). There is also no attempt to formalise the concepts of algorithm complexity. However, in this and other cases, the reader is referred to appropriate sources. The book serves well as a first encounter with cryptography. (ad)

E. Cohen, R. F. Riesenfeld and G. Elber, *Geometric Modeling with Splines. An Introduction,* *A. K. Peters, Natick, 2001, 616 pp., US$59, ISBN 1-56881-137-3*
The authors present a broad base of fundamentally important techniques for curve and surface representations in computer-aided modelling, with a focus on their applications in design. Balancing mathematical rigour and broad applicability, the authors show how theoretical properties can be used to derive practical algorithms. The book offers a thorough study of applications of splines in general, and B-splines in particular, to the domain of geometric modelling.

The first two chapters contain background material. The next eleven chapters (conic sections, differential geometry for space curves, Bézier curves and Bernstein approximation, B-splines curves, spline spaces, differential geometry for surfaces and surface representations) could form the basis for a one-semester introductory class. A two-semester class would include most of the remaining chapters of the book (data fitting with B-splines, fitting surfaces, modelling with B-spline surfaces, subdivision and refinements for splines, modelling of other polynomial bases for interpolation, other derivations of B-splines, set operations to effect modelling, model data structures, subdivision surfaces and higher-dimension tensor products of B-splines). The chapters conclude with exercises to be solved.

This is a nicely written book of great value for stimulating active work by students. In particular, it can be strongly recommended as an undergraduate or graduate text, and as a comprehensive source for a self-study. (knaj)

B. Conrad and K. Rubin (eds.), *Arithmetic Algebraic Geometry,* *IAS/Park City Mathematics Series* ***9****, American Mathematical Society, Providence, 2001, 569 pp., US$75, ISBN 0-8218-2173-3*
This book consists of lecture notes from the 1999 Graduate Summer School (and from the corresponding Mentoring Program for Women in Mathematics, MPWM) of the IAS/Park City Mathematics Institute. The lecture courses were centred around topics related to A. Wiles's work on modular elliptic curves – the arithmetic of elliptic curves, modular forms and Galois representations.

The lectures by J.P. Buhler provide 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 $(\mathrm{cl}(\mathbf{Q})/\mathbf{Q}) \to \mathrm{GL}_2(\mathrm{cl}(\mathbf{F}_k))$. The 'weak' Serre conjecture states that ρ comes from a modular form f; while 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 weight 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 F.Q. Gouvêa concentrate on deformation of Galois representations. The first six lectures – inspired by B. Mazur's earlier accounts – develop the general theory, while the remaining two lectures sketched the (still mainly conjectural) links to p-adic families of modular forms. The lectures of R. Greenberg treat Iwasawa theory of elliptic surves, with emphasis on its algebraic aspects:

variations of Mordell-Weil groups and of analytic ranks in towers of number fields; Selmer groups, Λ-modules and Mazur's Control Theorem. Two lectures by J. Tate summarise basic properties of Galois cohomology groups. Appendices by B. Conrad and K. Buzzard, and by M. Dickinson, T. Weston and M. Emerton, to the articles by Ribet and Stein, and Gouvêa, 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 MPWM. 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 Ph.D. 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. (jnek)

J. F. Davis and P. Kirk, *Lecture Notes in Algebraic Topology,* *Graduate Studies in Mathematics* ***35****, American Mathematical Society, Providence, 2001, 367 pp., US$55, ISBN 0-8218-2160-1*

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 Poincaré duality theorem.

The theory of fibre bundles is explained in the fourth chapter, which is also the starting point of an advanced course. Both principal and associated bundles are introduced here, and the Èech cohomology is mentioned as well. The homology and cohomology of spaces with local coefficients are presented in Chapter 5. Fibrations, cofibrations and homotopy groups are studied in the sixth chapter: this chapter also presents a brief introduction into homotopy theory, ending with the Hurewicz and Whitehead theorems.

In the next part of the book, obstruction theory and Eilenberg-MacLane spaces, bordism, spectra and generalised homology are discussed. At the end of the book, spectral sequences are defined and explained, and their applications to several problems in algebra and algebraic topology are presented; for example, there are applications to computations of homotopy groups of spheres, cohomology operations and construction of bordism invariants. The final chapter is devoted to a study of simple-homotopy theory and torsions, such as the Whitehead and the Reidemeister torsion and their applications. There are many exercises and comments in the book, which complement the material, as well as suggestions for further study, presented in the form of projects.

The book is a nice advanced textbook on algebraic topology and can be recommended to anybody interested in modern and advanced algebraic topology. (jbu)

A. Dijksma, M. A. Kaashoek and A. C. M. Ran (eds.), *Recent Advances in Operator Theory,* *Operator Theory Advance and Applications* ***124****, Birkhäuser, Basel, 2001, 558 pp., DM 260, ISBN 3-7643-6573-0*

A conference held at Groningen (Netherlands) in December 1998 was organised on the occasion of the 70th birthday of Israel Gochberg, who is one of the initiators of the series of International Workshops on Operator Theory and its Applications (IWOTA), to which the conference belonged. This volume is a selection of 35 papers in operator theory, related to lectures presented at the meeting.

Most of the papers contain rather long introductions that can be used by non-experts as a guide to a current state of research in the theory of linear operators in Hilbert spaces. The articles deal with analytic operator functions, interpolation and extension problems, dilation and commutant lifting theorems, several problems connected with control theory, Hilbert function spaces and spaces with indefinite metrics. There are also applications to partial differential equations (spectra of elliptic operators, scattering theory, multiplier theorems and R-boundedness).

A short description of I. Gochberg's mathematical work (by M.A. Kaashoek) and a complete list of his publications are added. (jmil)

H. M. Enzensberger, *Drawbridge Up: Mathematics - A Cultural Anathema,* *A. K. Peters, Natick, 1999, 47 pp., US$9.95, ISBN 1-56881-156-X*

This book contains the bilingual version (German and English) of an address given by the author at the 1998 International Congress of Mathematicians in Berlin. The first edition was in paperback form in 1999: a review of it can be found in this *Newsletter*, No. **34**, Dec 1999, p.37. (vs)

T. Friedrich, *Dirac Operators in Riemannian Geometry,* *Graduate Studies in Mathematics* ***25****, American Mathematical Society, Providence, 2000, 195 pp., US$34, ISBN 0-8218-2055-9*

This book is a nice introduction 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 Dirac and the twistor operators and their properties are studied in detail. Special attention is paid to eigenvalue estimates and to solution spaces of special spinorial field equations, such as Killing spinors and twistor spinors. 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)

P. G. Goerss and J. F. Jardine, *Simplicial Homotopy Theory,* *Progress in Mathematics* ***174****, Birkhäuser, Basel, 1999, 510 pp., DM 118, ISBN 3-7643-6064-X*

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 for 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 applications, such as homological algebra, algebraic geometry, number theory and algebraic K-theory are not included. Nonetheless, another aim of the monograph is to provide specialists 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 in such a way that it gives a basic orientation in the above-mentioned fields of application.

But the main aim is to gather together old and new results and serve 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 nicely written, and for experts it is quite indispensable. For its quality and importance it should be included in every mathematical library. (jiva)

H. Grassmann, *Extension Theory,* *History of Mathematics* ***19****, American Mathematical Society, London Mathematical Society, Providence, 2000, 411 pp., US$75, ISBN 0-8218-2031-1*

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 secondo l'Ausdehnungslehre di H. Grassmann, preceduto delle operazioni della logica deduttiva*, Birkhäuser, Boston, 2000) is based on Hermann Grassmann's *Gesammelte mathematische und physikalische Werke* (Teubner, Stuttgart, Leipzig, 1896).

The German mathematician Hermann Günter Grassmann (1809-77) developed a circle of ideas relating multi-dimensional geometry, linear algebra and vector analysis. The first edition of his *Extension Theory* appeared in Leipzig in 1844 under the name *Die lineale Ausdehnungslehre, ein neuer Zweig der Mathematik*. In 1861, the book was essentially rewritten and extended, and the author skipped unnecessary philosophical parts. The second edition was printed under the name *Die Ausdehnungslehre*. New material not included in the first edition covers, for example, a development of the inner product, the concept of angle, Grassmann's theory of functions and Grassmann's contributions to the Pfaff problem.

This book contains Grassmann's *Extension theory* (325 pp.), the Editorial Notes (59 pp. from Grassmann's *Gesammelte Werke*, 1896), Supplementary Notes (8 pp.) and Subject Index (13 pp.). Grassmann's classical work can be warmly recommended to mathematicians and to historians of mathematics as a source of Grassmann's mathematical ideas. (jbe)

J. E. Graver, *Counting on Frameworks. Mathematics to Aid the Design of Rigid Structures,* *Dolciani Mathematical Expositions* ***25****, Mathematical Association of America, Washington, 2001, 180 pp., £23.95, ISBN 0-88385-331-0*

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 tensegrity frameworks (made of rods and cables).

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

H. Hauser, J. Lipman, F. Oort and A. Quirós (eds.), ***Resolution of Singularities****, A Research Textbook in Tribute to Oskar Zariski, Progress in Mathematics* ***181****, Birkhäuser, Basel, 2000, 598 pp., DM 168, ISBN 3-7643-6178-6*

The basic question treated in the book is: given a variety X, determine a subvariety Z of X such that blowing up X in Z resolves the singularity of X. The book is a report on recent results and problems concerning this problem. It is dedicated to the memory of the well-known algebraic geometer Oskar Zariski, who created fundamental parts of the theory.

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

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)

D. J. Hurley, and M. A. Vandyck, ***Geometry, Spinors and Applications****, Springer and Praxis Publishing, London, 2000, 369 pp., DM 179, ISBN 1-85233-223-9*

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 explained, 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 derivatives 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, but uses a lot of standard coordinate-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)

G. W. Johnson and M. L. Lapidus, ***The Feynman Integral and Feynman's Operational Calculus****, Oxford Mathematical Monographs, Clarendon Press, Oxford, 2000, 771 pp., £90, ISBN 0-19-853574-0*

This is a representative monograph (770 pages) on all aspects of the mathematical theory of the Feynman integral. This 'elusive and formidable' 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 half-century, after 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 personalities (related to the subjects treated in the book) provide amusement for the reader. (However, some readers could find it unusual that the same script is used in the book for both the theorems and the remarks.)

The first part of the book (Chapters 1-13) contains, among other things, a complete treatment of existing approaches to the concept of the Feynman path integral – namely, the method of analytical continuation (in time or mass) converting the problem of Feynman integral to the well-established theories of Wiener integrals and Brownian motion, the method of Trotter formulas employing many deep results from the theory of operator semigroups, and the modified method, due to the authors of the book, that replaces the exponentials in the Trotter formulas by suitable resolvent operators. (The concept of a 'Fresnel integral' is also discussed, but is postponed to the last chapter of the book.) It is shown that all these approaches (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 anybody interested in the mathematical theory of Feynman path integrals and the related operational calculus. (mzahr)

M. Jutila and T. Metsänkylä (eds.), ***Number Theory****, Proceedings of the Turku Symposium on Number Theory in Memory of Kustaa Inkeri, 1999, Walter de Gruyter, Berlin, 2001, 328 pp., DM 268, ISBN 3-11-016481-7*

This volume contains selected contributions by 71 participants at a conference organised by the Rolf Nevalinna 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 (Greaves and Huxley), arithmetic functions (Haukkanen), Lucas and Pell numbers (Ribenboim and McDaniel, Strazdins), Riemann, Dirichlet, Hecke and L-series (Iviæ, Jutila, Matsumoto, Laurin, Sands), exponential sums (Huxley and Kolesnik), summation of multiple series (Dilcher, Haller), arithmetic aspects of functional equations (Bundschuh), hypergeometric and binomial series (Amou, Katsurada and Väänänen, Matala), higher power residue symbols (Helou), representation of primes by special quadratic forms (Jackson), binary additive divisor problem (Meurman). The volume is carefully prepared. (šp)

W. J. Kaczor and M. T. Nowak, ***Problems in Mathematical Analysis, II. Continuity and Differentiation****, Student Mathematical Library* ***12****, American Mathematical Society, Providence, 2001, 398 pp., USD$49, ISBN 0-8218-2050-8*

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. It contains three chapters and covers subjects like limits, continuity, differentiation, and limits and series of functions. Numerous problems are well chosen and solutions of 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 238 and 130 problems, respectively.

As with the first volume, the book is of great help for problem seminars and also for self-study. Some problems are not new and the authors mention some sources in the preface. Almost two-thirds of the volume are devoted to the presentation of solutions, usually in a relatively detailed manner; those who know the first volume will probably appreciate this continuation.

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

W. M. Kantor and A. Seress (eds.), ***Groups and Computation III****, Ohio State Univ. Mathematical Research Institute Publications* ***8****, Walter de Gruyter, Berlin, 2001, 368 pp., DM 248, ISBN 3-11-016721-2*

This collection of 23 papers presents a fairly accurate 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) that consequently appear throughout the volume.

The papers can be somewhat artificially divided into five categories (in order of frequency): group recognition, computational solutions 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 unisingular 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 is eloquently documented 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 authors with the editors, 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)

J. Kigami, *Analysis on Fractals*, *Cambridge Tracts in Mathematics* ***143****, Cambridge University Press, Cambridge, 2001, 226 pp., £35, ISBN 0-521-79321-1*

This book contains some very important tools for studying the dynamical aspects of objects modelled by 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 introduction to the subject, starting from the basic geometry of 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 measure theory, this book will be of value to graduate students and researchers in analysis and probability theory. It will also be useful as a supplementary text for graduate courses covering fractals. Individual chapters contain such topics as the geometry of self-similar sets, analysis on limits of networks, the construction of Laplacians on P.C.F. self-similar structures, eigenvalues and eigenfunctions of Laplacians and heat kernels. Some mathematical background (self-adjoint operators, quadratic forms, semigroups, Dirichlet forms, Nash inequality and the renewal theorem) is described in the Appendix. (pp)

S. Levy (ed.), *The Eightfold Way. The Beauty of Klein's Quartic Curve*, *Cambridge University Press, Cambridge, 2001, 331 pp., £19.95, ISBN 0-521-00419-5*

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)

J. H. van Lint and R. M. Wilson, *A Course in Combinatorics*, *second edition, Cambridge University Press, Cambridge, 2001, 602 pp., £24.95, ISBN 0-521-00601-5*

In this second edition, some material has been added (list-colorings of graphs, the Lovász sieve, associative block designs) and there are many new exercises. The book is unique in the variety of topics treated, in 38 chapters on more than 550 pages and in the large space devoted to non-graph-theory combinatorics.

The following list provides a brief overview, by no means exhaustive, of the areas covered: graph theory (Eulerian and Hamiltonian circuits, spanning trees, Turán's theorem, Hall's theorem, Ramsey's theorem, connectivity, planarity, squared squares, graphs on surfaces), posets (Dilworth's theorem, Sperner's theorem), permanents (the Minc and van der Waerden conjectures), Latin squares (counting, the Evans conjecture, the Dinitz conjecture, orthogonal Latin squares), enumeration (de Bruijn sequences, the Möbius function, generating functions, Bell and Stirling numbers, Lagrange inversion, partitions, the Jacobi triple product identity, Young tableaux, 0-1 matrices, Pólya theory), algebraic combinatorics (projective and combinatorial geometries, Gaussian numbers, q-analogues, strongly regular graphs, difference sets, Singer's theorem, Shannon capacity, association schemes), and designs and codes (Hadamard matrices, Paley matrices, Steiner systems, Golay codes, Reed-Muller codes, the Bruck-Ryser-Chowla theorem, Baranyai's theorem).

This well written textbook can be highly recommended to any student of combinatorics and, because of its breadth, has many new things to tell researchers in the field also. (mk)

A. Mehlmann, *The Game's Afoot! Game Theory in Myth and Paradox*, *Student Mathematical Library* ***5****, American Mathematical Society, Providence, 2000, 159 pp., US$26, ISBN 0-8218-2121-0*

Looking at the title and the format of this book, one is inevitably reminded of the well-known *The Compleat Strategyst* by J. Williams (Dover Publications, N.Y., 1986). However, this first impression quickly disappears after the reading of the first few pages. Mehlmann's book is no 'primer in the theory of games', but a rather advanced treatment of different aspects of the theory of games and its applications. Various concepts and problems are discussed from different points of view and illustrated by means of parables from history, mythology and literature of fiction. These features make the book a fascinating, entertaining and enlightening reading.

In the author's words, the book is intended as 'a light-hearted excursion into the world of strategic calculation'. However, to enjoy this excursion fully, the reader should depart on it equipped with some basic knowledge of the fundamentals of game theory and a fairly broad general cultural background. (jmach)

R. A. Minlos, *Introduction to Mathematical Statistical Physics*, *University Lecture Series* ***19****, American Mathematical Society, Providence, 2000, 103 pp., US$24, ISBN 0-8218-1337-4*

This is a book on rigorous statistical physics. The author is one of the co-founders and leading 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 sciences. The greatest impact came from physics, not only through phenomena like phase transitions but also some important methods developed originally by theoretical physicists. These methods, like the method of expansions, were later converted (notably also by the author of this book) into important technical tools of pure mathematics. On the other hand, another important and traditional tool of mathematical statistical mechanics is probability theory.

In the 103 pages of this book, 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 theory. He then gives a concise explanation of important statistical ensembles (micro-canonical, canonical, grand-canonical) and of their mutual relations. He then explains, in Part II, the method of correlation functions (expansions) based on the use of Kirkwood-Salsburg equations. Finally, he discusses various thermodynamical potentials – entropy, pressure, free energy, etc. Part III deals with phase transitions. 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 theory. Finally, in an epilogue, he adds a short discussion of Wulff droplets and the roughening transition.

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

C. J. Mozzochi, *The Fermat Diary*, *American Mathematical Society, Providence, 2000, 196 pp., US$29, ISBN 0-8218-2670-0*

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 are now labelled 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 summarised the reports in the newspapers and journal, and took more than thousand photographs during and after the lectures and the connected social events.

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 those of us 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 quotations, 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. (šp)

H. Niederreiter and C. Xing, *Rational Points on Curves over Finite Fields. Theory and Applications*, *London Mathematical Society Lecture Note Series* ***285****, Cambridge University Press, Cambridge, 2001, 245 pp., £27.95, ISBN 0-521-66543-4*

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, NXl and XNL codes), applications to cryptography (almost perfect sequences, perfect hash functions and low-discrepancy sequences). Because of the carefully selected contents and lucid style, the book can be warmly recommended to mathematicians interested in the abovementioned topics or in algebraic curves over finite fields with many rational points. (šp)

W. F. Pfeffer, *Derivation and Integration*, *Cambridge Tracts in Mathematics* ***140****, Cambridge University Press, Cambridge, 2001, 266 pp., £45, ISBN 0-521-79268-1*

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 is natural to ask whether there exists a generalisation of the Lebesgue integral such that the Gauss-Green theorem in $\mathbf{R}^n$ holds for each differentiable vector field v and suitable sets A, if the integral over A of div v is taken in the sense of this generalised integral. If we also need 'good properties' of the generalised integral (in particular, its rotation invariance), the problem cannot be solved by a direct generalisation of the Denjoy-Perron integral. However, in the last twenty years, several solutions have been found; they use the idea of the Kurzweil-Henstock ('Riemann type') definition of the Denjoy-Perron integral.

The solution presented in this book is based on the theory of (finitely) additive set functions,

defined on the family of all bounded BV sets in $\mathbf{R}^n$; such set functions, which are continuous with respect to a suitable topology, are called charges. In the book, a deep theory of derivatives and variations of charges is presented. Using a type of variation, the important class of AC^* charges is defined. The basic definition of the R-integral is a descriptive one, and is based on the notion of the indefinite R-integral. Roughly speaking, the indefinite R-integral of f is an AC^* charge for which $DF(x) = f(x)$ for almost all x, where $DF(x)$ 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 Gauss-Green theorem can be proved, and the author explains how it can be extended to the Stokes theorem on Lipschitz manifolds. In the final chapter, the R-integral is extended to the GR-integral, which has even better properties than the R-integral.

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 non-absolutely convergent integrals, and has a solid background in graduate level analysis. (lz)

J.-P. Pier, *Mathematical Analysis During the 20th Century,* *Oxford Univesity Press, Oxford, 2001, 428 pp., £59.50, ISBN 0-19-850394-6*

This book is devoted to the history of some parts of mathematical analysis, including probability and algebraic geometry in the 20th century. While the period 1900-50 is treated in certain depth, the evolution from 1950 to 2000 is characterised by representative achievements. The book contains many original quotations (with English translations) and brief expositions of results chosen to illustrate the main ideas and trends.

The chapters contain texts on general, algebraic and differential topology, integration and measure, functional and harmonic analysis, Lie groups, the theory of functions and ODEs and PDEs. The text occupies approximately 350 pages, numerous references take another 60 pages, and two Indexes and a List of Symbols take about 20 pages. It will be a valuable source book for analysts interested in the history of the main ideas of analysis, as well as for others wanting to know about developments in other fields. A certain familiarity with the material included will be of great help. The book can be recommended to mathematical libraries, researchers and students. (jive)

V. P. Pikulin and S. I. Pohozaev, *Equations in Mathematical Physics. A Practical Course,* *Birkhäuser, Basel, 2001, 206 pp., DM 196, ISBN 3-7643-6501-3*

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. Each chapter 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)

Yu. V. Prokhorov and V. Statulevièius (eds.), *Limit Theorems of Probability Theory,* *Springer, Berlin, 2000, 273 pp., DM 169, ISBN 3-540-57045-4*

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 five 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 Berry-Esséen inequality, and the law of the iterated logarithm are covered in this chapter. V. Bentkus *et al.* wrote Chapter II, containing the problem of accuracy of Gaussian approximation for distribution on infinite-dimensional Banach spaces. Chapter III, written by J. Sundoklas, 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; this chapter is written by P. Gudynas. The final chapter, by L. Saulis and V. Statulevièius, is devoted to limit theorems on large deviation.

This book should be at hand for any specialist on asymptotic methods in probability and statistics, and can also serve as a basic reference for graduate and Ph.D. students of stochastics. (dh)

L. Schwartz, *A Mathematician Grappling with His Century, Birkhäuser, Basel, 2001, 490 pp., DM 68, ISBN 3-7643-6052-6*

Laurent Schwartz is one of the most distinguished mathematicians of the 20th century. His autobiography can be considered, apart from other things, as a history of mathematics from the 20th century, and partly also of the centuries before. He describes the development of mathematical thinking towards its current level of exactness. He was for a certain time a member of the Bourbaki group, which contributed substantially to this development. Thanks to his cooperation with many mathematicians all over the world, he has been able to give interesting comments on circumstances connected with substantial mathematical discoveries. In particular, 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 comments on significant events of 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 direct evidence from 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 only in his advanced age. The book is attractive and can be highly recommended to any reader intersted in the subject. (jjel)

R. Y. Sharp, *Steps in Commutative Algebra,* *second edition, London Mathematical Society Student Texts* ***51****, Cambridge University Press, Cambridge, 2000, 355 pp., £17.95, ISBN 0-521-64623-5*

This book is meant as a tool for an undergraduate student with some knowledge of polynomials and linear algebra to grasp the basic notions of structural commutative algebra. The self-professed goal of the book (see the preface to the first edition) is to close the gap between books on basic algebra (which include topics like unique factorisation in Euclidean domains) and existing books on commutative algebra that require much deeper experience and sophistication. This book seems to assume that the reader has no problems in doing even quite complex calculations with polynomials, but may have nearly no experience with abstract structural mathematics. This can be observed in the care with which the author explains notions related to factorisation, both in the context of ring ideals and submodules.

In addition to the basic material, the first half of the book is concentrated around the primary decomposition of ideals, the structure of commutative Noetherian rings and the structure of modules over principal ideal domains. As an application, the author derives the canonical forms of square matrices, and presents some applications to field theory, up to transcendental extensions. The closing chapters (about 100 pages) deal with integral dependence, affine algebras over fields, dimension theory, regular sequences (and grade) and Cohen-Macaulay rings. The latter two chapters did not appear in the first edition, and constitute the main difference between the two editions (beyond the corrections of misprints, which are now very few). The author has succeeded in keeping the context within the self-imposed limits – there is no reference to the tensor product, categories are touched on only marginally, and the exposition is careful and clear. 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)

P. N. de Souza and J.-N. Silva, *Berkeley Problems in Mathematics,* *second edition, Problem Books in Mathematics, Springer, New York, 2001, 535 pp., DM 73,83, ISBN 0-387-95207-1*

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)

G. Tenenbaum and M. M. France, *The Prime Numbers and their Distribution,* *Student Mathematical Library* ***6****, American Mathematical Society, Providence, 2000, 115 pp., US$17, ISBN 0-8218-1647-0*

This is an English translation of the French edition, first published in 1997 as a volume in a paperback encyclopaedia containing about 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 authors have succeeded 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 arithmetical 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 logarithmic function. Finally the reader 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. (šp)

G. Tian, *Canonical Metrics in Kähler Geometry,* *Lectures in Mathematics ETH Zürich, Birkhäuser,*

Basel, 2000, 1000 pp., DM 38, ISBN 3-7643-6194-8
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 given, and there is an example of a manifold without Kähler-Einstein metric. The monograph is well written and can be recommended to anybody interested in the topic. (jbu)

V. A. Vassiliev, *Introduction to Topology*, *Student Mathematical Library* ***14****, American Mathematical Society, Providence, 2001, 149 pp., US$25, ISBN 0-8218-2162-8*
The word 'Topology' in the title of this book means, roughly speaking, 'Algebraic Topology': homotopy, homology, cohomology, Morse theory, Poincaré duality, degree of maps, and manifolds. The book explains what algebraic topology is, without assuming a deep knowledge of general topology. Because of this, many proofs 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. (mih)

D. Williams, *Weighing the Odds. A Course in Probability and Statistics*, *Cambridge University Press, Cambridge, 2001, 547 pp., £24.95, ISBN 0-521-00618-X, ISBN 0-521-80356-X*
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. 223 '*A celebrated result, the Neyman-Pearson lemma (not discussed in this book), does prove that the LR Test is unquestionally 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. (ja)

R. J. Wilson, *Stamping Through Mathematics*, *Springer, 2001, 126 pp., £17.00,11, ISBN 0-387-98949-8*
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, Nicolaus Copernicus (stamps of Poland, GDR and Venezuela), Isaac Newton (stamps of GB, North Korea, Monaco and Nicaragua), France and the Enlightment (d'Alembert, Condorcet, Lagrange and Laplace), Russia (Kovalevskaya, Lyapunov, Ostrogradsky and Tchebychev), and much else besides. The book would be a nice present for anybody with interests in mathematics and stamp collecting as well. (jive)