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NOTICE FOR MATHEMATICAL SOCIETIES

Labels for the next issue will be prepared during the second half of May. 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

A message from the new Editor-in-Chief

As the new Editor-in-Chief of the *EMS Newsletter*, it is my first pleasant duty to express my thanks to my predecessors at Glasgow Caledonian University—Roy Bradley, Iain Clark, Jagan Gomatam, Vikram Jha, Gerry Kennedy, Martin Speller and Julie Wilson. During their two-and-a-half years at the helm, the format and contents of the *Newsletter* has developed considerably, with a new attractive style of cover and many interesting articles. I am very grateful to them for the help that they have given me during the recent handover period.

At the end of December 1998 several members of the Executive Committee reached the end of their terms of office, and their contributions to the Society will be sorely missed—in particular, Jean-Pierre Bourguignon (President), David Wallace (Vice-President), Peter Michor (Secretary), Aatos Lahtinen (Treasurer), and ordinary member Alberto Conte; we also lose our publicity officer, Mireille Chaleyat-Maurel. The recent committee meeting in Denmark included members of both the old and new committees, and I should like to thank them all for their encouragement and help as we discussed ways of making the *Newsletter* even more attractive and interesting in the future. You will meet several members of the new committee on page 5.

The basic structure of the *Newsletter* will remain much as before, with many features unchanged—in particular, you will continue to see regular updates of EMS news, interviews, information about conferences, the problems corner and book reviews. However, there are a number of changes on which I would welcome your views:

- I have tried to make the layout more attractive—in this context I should like to thank Armstrong Press of Southampton for their help with the design
- I hope to make the tone of the *Newsletter* a little more informal with the introduction, from the next issue onwards, of a 'Letters page'; I am keen that you as readers will come to regard the *Newsletter* as 'yours', that you will contribute short articles or other items for inclusion, and that you will send me your suggestions as to what you would like to see in future issues
- I also hope to make the *Newsletter* a little less 'cosy' by including some items of a controversial nature, such as the articles on the sale of the Turner collection and the impact on mathematics of political changes in Eastern Europe; please send in your views on such articles, and make suggestions for other ones
- EMS news has been collected together into a special section near the beginning of each issue
- I have introduced a new 'Anniversaries' section, compiled by June Barrow-Green and Jeremy Gray; this issue contains anniversaries related to Agnesi and Hilbert, and the June issue will commemorate Klein, Lie and Krull; please contact June or Jeremy if you would like to contribute to this section
- in the past the 'Euronews' section has consisted mainly of announcements of future conferences; these have now been collected into an expanded 'Forthcoming conferences' section in which some attempt has been made to standardize the style of the contributions. I hope to reintroduce the Euronews section and include more items of a personal nature (prizes, promotions, brief obituaries, etc.); for this purpose it would be most helpful to have a representative in each country who would send me news on a regular basis—if you would like to play this role, please contact your national mathematical society and let me know

In this issue, in order to get the show on the road, I have commissioned several articles from British colleagues and friends. I hope that the content of future issues will be more international, and I rely on you to send me appropriate material for inclusion.

Robin J Wilson *[e-mail: r.j.wilson@open.ac.uk]*

Editorial by the new EMS President Rolf Jeltsch

When you pick up this issue, two things will immediately catch your eye: the EMS has a new president for the next four years, and this issue is the first one produced by our new Editor-in-chief, Robin Wilson. I am sure that you will not only notice but appreciate his style.

Let me briefly share my thoughts with you on the European Mathematical Society. First of all—and most importantly—the main objectives of the EMS remain unchanged:

- strengthening the feeling of a European identity among mathematicians
- functioning as *the* European partner in mathematics for the European Union and for outside Europe
- nurturing relations between the mathematical community and society as a whole.

Clearly, we don't want to reproduce on a European level what our corporate member societies already do excellently. However, certain tasks lie ahead which can only be dealt with on a European level. Let me give you some examples of on-going projects:

MPRESS preprints index This project was launched to create a harvesting system to collect comprehensive information on preprints and to provide easy facilities to search preprints on the Web. It will give access to publications in their earliest available form. If you want to participate in the system, visit MPRESS on our website.

EULER This project was started last year with the goal of producing strictly user-oriented, integrated network-based access to mathematical publications. The EULER service intends to offer a 'one-stop shopping site' for users interested in mathematics. It is a truly European venture, since universities, libraries and documentation institutions from five European countries are involved in its development.

***Zentralblatt* MATH** The EMS wants to get this major bibliographical database recognised as a 'large infrastructure' within the 5th framework program of the EU, which started this year. If current plans are realised, institutions in at least four European countries will work together to make *Zentralblatt* MATH even more attractive.

Reference levels in mathematical education This project has been set up at the request of the European Commissioner for Science and aims at establishing 'Reference levels for the teaching of mathematics' for 16-year-old students. In later phases, similar studies will be carried out for 18-year-old students and for students after two years of university education.

World Mathematical Year 2000 In 1992 the International Mathematical Union declared the year 2000 as World Mathematical Year. The EMS will naturally play an active part in the planning of this event. One project is to create a series of posters about mathematics that will be displayed in public transport systems in major cities to increase the public's awareness of mathematics. The EMS is running a competition for the creation of these posters (details below).

No fewer than three of the above projects are concerned with making mathematical data electronically available to researchers; indeed, the EMS recognised the necessity for this a long time ago and has duly created the European Mathematical Information System, *EMIS*, at http://www.emis.de/, which is freely available. It already contains an extensive electronic library and we are working hard to include even more publications. You can also find more information on the above projects at this website, as well as our Conference Calendar. Since events can be ordered according to subject, you will not be overwhelmed by an avalanche of information that you don't need. It is easy to submit your own conference information directly on to the Web, too. The more organisers enter their events, the more powerful this tool will be. The same applies to the Euro-Math-Job link on *EMIS* which leads to open positions for mathematicians.

With 52 member societies, the EMS represents practically the entire European mathematical community. However, as an applied mathematician, I hope to increase the representation of societies where applied mathematics plays an important role. I would also like to see an increase in the number of individual members and I urge you, if you have not already done so, to join EMS and to encourage your colleagues to do the same. The joining-up procedure is described on *EMIS*, and for some reviewers of *Zentralblatt*, especially those from eastern Europe, membership fees can be paid from their reviewers' accounts at *Zentralblatt*.

Obviously, the EMS also organises scientific activities of its own: the Diderot Mathematical Forums, the EMS summer schools, the EMS lectures and the European Mathematical Congress. They are all set up to promote the European dimension of our society. You will find all the dates of future events in the Agenda on page 4. The first issue of our newly-founded *Journal of the European Mathematical Society*, JEMS, appeared a few weeks ago and aims to become a leading journal covering all of mathematics. As a member of the EMS, you are entitled to a reduced subscription price. To help the mathematical community in central and Eastern Europe, special reduced rates are available for these regions. For more information, see the advertisement at the beginning of this issue.

At the turn of the year, several members of our various committees finished their terms in office. I would like to thank them for all they have done for the EMS and the mathematical community. Without their willingness to put in extra hours after their regular work, the EMS could not function. It goes without saying that we are in need of more colleagues who are prepared to devote some of their time to our common cause.

Let me end on a somewhat philosophical note: I think the multicultural society we have in Europe provides a great opportunity to create new ideas through interaction. Despite this, we are sometimes forced to acknowledge that communication is not always easy. As mathematicians we all have the same objective, which surely makes it easier for us to overcome cultural, lingual, financial and political barriers. I am convinced that we can set a fine example of prejudice-free co-operation. And now—enjoy this issue of the *Newsletter*!

EMS News: Committee and Agenda

EMS COMMITTEE

EMS Agenda

1999

17 – 18 April
Executive Committee Meeting, hosted by the Institut d'Estudis Catalans, Barcelona

1 May
Deadline for submission of proposals for the WMY 2000 Mathematical posters competition (see page 5)
contact: Vagn Lundsgaard Hansen, *e-mail: V.L.Hansen@mat.dtu.dk*

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*

31 May
Deadline for submission of proposals for the 2000 EMS Summer schools
contact: Rolf Jeltsch, *e-mail: jeltsch@math.ethz.ch*

May - June
Third EMS lectures: *Real and complex dynamics* by Prof. M. Lyubich (SUNY Stony Brook, USA)
contact: *e-mail: EMS Secretariat, tuulikki.makelainen@helsinki.fi*

17 - 22 May: Russian Academy of Sciences, St Petersburg (Russia)
contact: Anatoly Vershik, *e-mail: Vershik@pdmi.ras.ru*

31 May - 4 June: Universitat de Barcelona, Barcelona (Spain)
contact: Nuria Fagella, *e-mail: fagella@maia.ub.es*

14 - 18 June: Technical University of Denmark, Lyngby (Denmark)
contact: Bodil Branner, *e-mail: branner@mat.dtu.dk*

28 June – 6 July
CIME-EMS Summer School at Martina Franca (Italy) in Pure Mathematics: *Iwahori-Hecke algebras and representation theory*
contact: V. Baldoni (Rome), *e-mail: baldoni@axp.mat.uniroma2.it*

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*

6 – 21 September
EMS Summer School at Heidelberg, Freiburg, Karlsruhe, Stuttgart, Tübingen (Germany) and Zürich (Switzerland) in Applied Mathematics: *Numerical simulation of flows*
organizer: University of Heidelberg
contact: Gabriel Wittum, *e-mail: wittum@iwr.uni-heidelberg.de*

9 – 10 October
Executive Committee Meeting hosted by the ETH, Zürich

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

3 – 4 December
Diderot Mathematical Forum *Mathematics and music*, in Lisbon (Portugal), Paris (France) and Vienna (Austria)
contact: Mireille Chaleyat-Maurel, *e-mail: mcm@ccr.jussieu.fr*

2000

3 – 7 July
ALHAMBRA 2000: a joint mathematical European-Arabic conference in Granada (Spain), promoted by the European Mathematical Society and the Spanish Royal Mathematical Society
contact: Ceferino Ruiz, *e-mail: ruiz@ugr.es*
website: www.ugr.es/~ruiz/

10 – 14 July
Third European Congress of Mathematics (3ECM)} in Barcelona (Spain)
contact: S. Xambo-Descamps, *e-mail: sxd@grec.upc.es*
website: www.iec.es/3ecm/

Introducing the Committee : part 1

Rolf Jeltsch (*President*) is Professor at the Eidgenössische Technische Hochschule (ETH) in Zürich.
He received his doctorate there in 1972 and subsequently held visiting appointments in Halifax (Nova Scotia), Los Angeles, Stanford, Kentucky, Bochum and Helsinki.
In 1979 he became Professor in Mathematics and Director of the Institute for Geometry and Practical Mathematics of the University of Technology RWTH Aachen, before returning to ETH as Professor in 1989. His research interests include numerical analysis (from theoretical investigations to engineering applications), parallel computing and computational sciences. At ETH he has introduced a new curriculum on Computational Sciences and Engineering.
He was elected an EMS Council Member in 1994 and has been a member of the electronic publishing committee. He became a member of the Executive Committee in 1997, and President in January 1999.

Luc Lemaire (*Vice-President*) received a Doctorat from the Université Libre de Bruxelles in 1975 and a Ph.D. from the University of Warwick in 1977. From 1971 to 1982 he held a research position at the Belgian F.N.R.S., and has been a professor at the Université Libre de Bruxelles since then. His research interests lie in differential geometry and the calculus of variations, with a particular interest in the theory of harmonic maps.
A former chairman of the Belgian Mathematical Society, he has been associated with the European Mathematical Society since its creation in 1990, being a member of the Council from 1990 to 1997, a member of the group on relations with European Institutions since 1990, and Liaison Officer with the European Union since 1993.

David Brannan (*Secretary*) has been a professor of mathematics at the Open University, UK, since 1979, and is currently Dean and Director of Studies in the Mathematics and Computing Faculty. He has worked for many years in aspects of geometric function theory, and has an abiding interest in functions of bounded boundary rotation. He has also worked in potential theory in the plane, looking at asymptotic paths and growth problems. For three years he was joint organiser of major complex analysis research meetings in Durham.
From 1971 to 1981 he was Council and General Secretary of the London Mathematical Society, and has held other LMS posts, including Publications Secretary from 1986 to 1996. He helped to found the journal *Nonlinearity*, and to develop the overall publishing programme of the LMS. He has also served on the council of the Association of Learned and Professional Society Publishers and on the management committee of the Isaac Newton Research Institute in Cambridge.

Bodil Branner is an associate professor at the Technical University of Denmark, Lyngby (Copenhagen). She graduated from the University of Aarhus in 1967 in algebraic topology, but for the last 20 years has concentrated on problems within dynamical systems, in particular in holomorphic dynamics. She has been a visiting professor at Cornell University and the Université de Paris-Sud, and a visitor at the Max-Planck-Institut für Mathematik in Bonn and the Mathematical Sciences Research Institute (MSRI) in Berkeley.
She has also been involved in establishing the network of European Women in Mathematics from its beginning in 1986. Since 1992 she has been a delegate of the Council of EMS, representing individual members, and has been a member of the Executive Committee since 1997. She is currently the President of the Danish Mathematical Society and a member of the Danish Natural Science Research Council.

Marta Sanz-Solé studied at the University of Barcelona, receiving her Ph.D. in 1978. After working at the Universitat Politècnica de Catalunya, she became associate professor at the Universitat Autònoma de Barcelona, later becoming professor at the Universitat de Barcelona in 1986 and Dean of the Faculty of Mathematics from 1993 to 1996. Her research interests include stochastic differential equations, stochastic partial differential equations, analysis on the Wiener space and Malliavin calculus. She has been active in the creation of a research group in stochastic analysis in Barcelona.
She was elected to the EMS Executive Committee in 1996.

EMS Executive Committee Meeting

in Lyngby, Copenhagen, 28 – 29 November 1998

A weekend meeting was held at the Technical University of Denmark, Lyngby, on 28-29 November 1998, attended by members of the 'old committee' [Jean-Pierre Bourgignon (President), David Wallace (Vice-President), Peter Michor (Secretary), Aatos Lahtinen (Treasurer), and Ordinary members Bodil Branner, Alberto Conte, Rolf Jeltsch, Andrzej Pelczar, Marta Sanz-Solé and Anatoly Vershik], members of the 'new committee' [Luc Lemaire, David Brannan, Olli Martio, Doina Cioranescu and Renzo Piccinini] and invited guests [Mireille Chaleyat-Maurel, Tuulikki Mäkeläinen, Carles Casacuberta, Vagn Lundsgaard Hansen and Robin Wilson].

Among the items discussed were the following:

• **New Individual Members**: 289 new members have joined since the October 1997 meeting; the total of individual members was 1782 on 1 November 1998.

• **EMS Summer Schools**:

— The organiser for the 1997 Portuguese Summer School is currently completing the *Proceedings*.

— The 1998 EMS Summer Schools were successful. The report on the Orsay summer school was accepted by EU/EC. The financing for the Cluj school was possible without an EMS grant, thanks to the support given by the UNESCO Venice office and the money given by the French speakers on the stipends they got from the French Embassy. However, in spite of great efforts, gathering money for cheaper meetings in Eastern Europe is difficult.

— The call for applications for the 1999 summer schools was not very successful: there is one application for a school in an applied field but none in pure mathematics.

• **EMS Newsletter**: There was a discussion on the editorial policy and contents of the *Newsletter*. A division of responsibilities was planned so that Steen Markvorsen would take care of interviews and education, Krzysztof Ciesielski of member societies, and Anatoly Vershik and Peter Michor of the column on Eastern Europe. A page of 'Letters to the editor' should be introduced. As Editor-in-Chief, Robin Wilson would like to establish a net of representatives of member societies. There was a discussion on the cover, the design of which was decided to be kept for the time being. The possibility of selling the *Newsletter* to mathematics departments and libraries was considered.

• **EMS Publicity Officer**: M. Chaleyat-Maurel was due to end her term as EMS Publicity Officer on 1 January 1999. The EC expressed its deep gratitude for the time and energy she devoted to the Society, which resulted in numerous successful new projects and products.

• **The History of the EMS**: David Wallace (Vice-President) has offered to write the history of the Society from its inception in Madralin; the format of the publication will be decided later.

• ***EMIS***: EMIS now has 32 mirrors and includes over 30 journals; the material pertaining to EMS is to be managed by EMS.

• **European Congress of Mathematics, ECM 2000**: There was extensive discussion of ECM 2000; full details can be found in the First Announcement on page 7.

• **The Zentralblatt-MATH database**:

— In November the President (Jean-Pierre Bourguignon) and Secretary (Peter Michor) attended the Coordination Committee meeting for the Zentralblatt-MATH database held in Berlin, and the President attended the meeting of the Innovations Committee for Zentralblatt-MATH.

— The extension of the database to Eastern European countries is proceeding well: centres in Eastern European countries are working for Zentralblatt-MATH producing notices. For the first time in 15 years, Zentralblatt-MATH is close to financial viability; 60-70 new subscriptions are needed to break even.

— Discussions on the application to be made to the European Union in the Large Infrastructure component of the 5th Framework Programme have been initiated. The aim is to ask for support for actions that would improve the Zentralblatt-MATH database once and for all, such as the keyboarding of back issues, and the setting up of an author database and a journal database. The cooperation of several countries would enhance the chances for success for this application. Germany and France are already cooperating, but two more countries would be needed.

— The President and Vice-President-elect (Luc Lemaire) met several persons on the staff of Edith Cresson, Commissioner in charge of Science, following up a direct meeting of the President with her in Paris in September; the main points under discussion were the Fifth Framework Programme and the possibility of having Zentralblatt-MATH recognised as a large infrastructure. The President also remarked that it would be important to have good representation of mathematics in the Commission's INTAS programme.

— The President met the new Secretary General of the ESF. Under discussion had been the possible support of the ESF to the Zentralblatt-MATH database and the Diderot Mathematical Forums, with special attention paid to the planned DMF on telecommunications.

• **UNESCO**: The President submitted a plan for support of EMS actions to the UNESCO-ROSTE (Venice) office which supports scientific activities in Eastern and Central European countries and in countries around the Mediterranean Sea; Professor Dalafi, director of the office, hopes that a grant of about US $50,000 will be assigned to the EMS for various projects, including the Alhambra conference in 2000.

• **The 100th Anniversary of the Union of Bulgarian Mathematicians**: The President and the President-elect (Rolf Jeltsch) participated in this celebration in Sofia, which offered an excellent opportunity to meet mathematicians from Balkan countries (Serbia, Macedonia, Greece, Turkey) representing their national societies.

• **Authorisation for the Financing of Special Projects**: The value of the contract between the EMS and the OECD was FRF 75 000 (= 11 305,20 ecu); the EC earlier authorised the expenses (about 3000 ecu) connected with the opening of the Strasburg mirror to be taken out of this income. In addition, it was decided at the Helsinki meeting to use part of this contract income for publicity at the Berlin ICM98; the costs for the booth and reception in Berlin were about 1200 ecu.

• **The Offer of International Press**: International Press has offered to give a discount of its publications to EMS individual members.

• **World Mathematical Year 2000**: V. L. Hansen, Chairman of WMY2000, reviewed the activities of the WMY 2000 committee. One project discussed was the *subway project*: the plan to have posters in subways has won wide support and concerted action is called for, as a definite scheme of action with cost estimates has to be prepared for the European Commission. A competition for designs for the subway posters has been proposed (see page 15). Other ideas have included mathematical themes in shopping bags with leaflets in libraries explaining the content, posters in petrol stations, etc. In several countries mathematical stamps will be issued in 2000.

• ***MPRESS*** **(European Mathematical PREprint Server System)**: There is an ongoing project to develop a European component for a system to facilitate the search for and the world-wide access to electronic preprints in mathematics. Germany, France, Austria, and the Topology Atlas are already involved in it.

• **Next meetings**: Marta Sanz-Solé and Rolf Jeltsch invited the Executive Committee to meetings in Barcelona on 17-18 April and Zurich on 9-10 October 1999.

3rd European Congress of Mathematics

Shaping the 21st Century

Barcelona, 10–14 July 2000

First Announcement

The Organizing Committee is pleased to announce that the Third European Congress of Mathematics will take place in Barcelona from Monday 10 July to Friday 14 July, 2000. It is organised by the Societat Catalana de Matemàtiques, under the auspices of the European Mathematical Society.

Plenary speakers

- **Robbert Dijkgraaf**, Universiteit van Amsterdam, NL
- **Hans Föllmer**, Humboldt-Universität zu Berlin, DE
- **Hendrik W. Lenstra, Jr.**, Univ. of California at Berkeley, USA/ Universiteit Leiden, NL
- **Yuri I. Manin**, Max-Planck-Institut für Mathematik, Bonn, DE
- **Yves Meyer**, Ecole Normale Supérieure de Cachan, FR
- **Carles Simó**, Universitat de Barcelona, ES
- **Marie-France Vignéras**, Université de Paris 7, FR
- **Oleg Viro**, Uppsala Universitet, SE/POMI St Petersburg, RU
- **Andrew J. Wiles**, Princeton University, USA

Scientific programme

The programme of the Congress includes nine plenary lectures, thirty invited lectures in parallel sessions, lectures given by the EMS prizewinners, mini-symposia, round-table discussions, and poster sessions. As in previous European Congresses, a number of prizes will be awarded to mathematicians under the age of 32. Mini-symposia are a new feature of the **3ecm**; several current interdisciplinary topics will be selected by the Scientific Committee. The full programme of lectures, mini-symposia and round-table sessions will appear in the Second Announcement. Short communications by participants will be possible in the form of posters; instructions for submission of poster abstracts are given below. Demonstrations of mathematical software, video and multimedia are also planned.

For organizational purposes, the following list of scientific fields has been established:

1. Logic and Foundations
2. Algebra and Number Theory
3. Algebraic and Analytic Geometry
4. Differential Geometry
5. Topology
6. Discrete Mathematics and Computer Science
7. Modelization and Simulation
8. Ordinary Differential Equations and Dynamical Systems
9. Partial Differential Equations
10. Functional Analysis
11. Complex Analysis
12. Probability and Statistics
13. Real Analysis
14. Mathematical Physics

Committees

- The **Scientific Committee** is chaired by Sir **Michael Atiyah** (University of Edinburgh, UK)
- The **Prize Committee** is chaired by **Jacques-Louis Lions** (Collège de France, FR)
- The **Round Table Committee** is chaired by **Miguel de Guzmán** (Universidad Complutense de Madrid, ES)
- The **Organizing Committee** is chaired by **Sebastià Xambó Descamps** (Universitat Politècnica de Catalunya, ES)

The Scientific Committee, Prize Committee and Round Table Committee were appointed by the European Mathematical Society. The Scientific Committee held its first meeting in October 1997 in Barcelona and will meet again in April 1999. The Organizing Committee was appointed by the Societat Catalana de Matemàtiques.

Pre-registration

If you wish to receive the Second Announcement and e-mail information about the **3ecm**, please pre-register via the web site **http://www.iec.es/3ecm** (if you have not done so already). Pre-registration is free and implies no obligation whatsoever. In order to become a participant in the **3ecm**, subsequent full registration and payment of the registration fee are necessary. Pre-registration is also possible by e-mail to **3ecm@iec.es**, or by ordinary mail to the Societat Catalana de Matemàtiques (see address below). Please indicate your name, institution, full mailing address, e-mail address, and scientific fields of interest (one or several fields may be chosen from the above list).

Registration

The period for registration for the **3ecm** will begin in the Autumn of 1999. Detailed information about the registration process will be given in the Second Announcement and posted on the web site. The registration fee is 29,000 pta (174 euros) before 1 April 2000, or 41,000 pta (246 euros) after this date. There is a reduced registration fee for individual members of the European Mathematical Society and the Societat Catalana de Matemàtiques: 23,000 pta (138 euros) before 1 April 2000, or 33,000 pta (198 euros) afterwards. The registration fee for those accompanying fully registered participants is 12,000 pta (72 euros) before 1 April 2000, or 18,000 pta (108 euros) after this date. This fee will entitle participants to attend social events organized during the **3ecm**, and will entail other benefits.

Continuing the tradition set by the previous European Congresses, the Organizing Committee will secure funds for conference grants covering registration and/or accommodation expenses. Deadlines for applications will be specified in the Second Announcement.

Call for posters

All registered participants will have the opportunity to present their mathematical work in the form of a poster. Decisions on acceptance will be made by the Organizing Committee on the basis of an abstract which should reach the organizers before **1 April 2000**. Abstracts submitted after this date will not be considered. Acceptance will be confirmed before 20 April 2000.

A poster is a display in a vertical space of approximately 100 cm by 80 cm, where the main points of a mathematical work are presented in a synthetic form that can be grasped quickly by other mathematicians. Accepted posters will be grouped according to subject, and will be displayed for a limited time between 11–13 July 2000.

Authors will be required to be present and available for questions and discussions during a specified period (yet to be determined). Abstracts of

accepted posters will be available through the web site of the Congress.

Abstracts should conform with the following instructions. It is strongly recommended that abstracts be submitted electronically by using the form provided in the web site **http://www.iec.es/3ecm/posters.htm**. Abstracts may also be sent by e-mail to **posters.3ecm@upc.es**, with the Subject field containing exclusively the relevant section number (see the list of sections above). If electronic submission is not possible, the following mail address should be used: *Posters 3ecm (Prof. Josep M. Font), Facultat de Matemàtiques, Universitat de Barcelona, Gran Via 585, E-08007 Barcelona, Spain.*

Abstracts should preferably be written in English, and prepared in LaTeX using only standard commands and AMS macros, symbols and fonts. They should have the following structure:

- section number
- name and affiliation of author(s), indicating a return address (e-mail if possible)
- title of the poster
- text of the abstract, not exceeding 300 words, including references
- 1991 mathematics subject classification
- key words

Call for presentations of mathematical software

A session on mathematical software will take place during the Congress. In this session, mathematical software systems relating to all fields of mathematics, and applicable to a variety of purposes, will be presented.

The scheduled length of a presentation including discussion will be 30 minutes. The systems presented should meet the highest standards with respect to mathematical content and technical quality in design and implementation. Public domain software will be given preference over commercial software. The Organizing Committee will evaluate and select a number of contributions according to criteria of mathematical originality, novelty and range of applications, bearing in mind the thematic balance of the session.

Submissions must be received by the organizers before **1 February 2000**. They may be made electronically by using the form provided in the web page **http://www.iec.es/3ecm/mathsoft.htm**, or by e-mail to **mathsoft.3ecm@upc.es** with a Subject field containing exclusively the word *mathsoft*. The following mail address can also be used for submission or to send complementary material: *Mathsoft 3ecm (Prof. Santiago Zarzuela), Facultat de Matemàtiques, Universitat de Barcelona, Gran Via 585, E-08007 Barcelona, Spain.*

Submissions should be written in English, indicating the name and affiliation of the contributors. They should include clearly explained information about the foundations with regards to the systems, the fields of application, the targeted user community, the software design and techniques, and the availability of the software. A URL will also be very useful.

Contributors will be notified of the acceptance or rejection of their submission by the Organizing Committee by 1 April 2000. A timetable will subsequently be organized depending on the selected presentations. Contributors will be asked to send an abstract which will be available through the web pages of the Congress. At this stage, demands for special equipment needed for presentations can be discussed.

It is the contributor's responsibility to secure any necessary permission and licences for any material contained in the presentation or handouts.

Additional information will be available and further indications will be given on the Congress web site. The address **mathsoft.3ecm@upc.es** may be used in order to contact the organizers of this session or to ask any related questions.

Call for video and multimedia

Several complementary activities and cultural events are planned during the **3ecm**. One of these is the preparation and production of a DVD containing both short videos and multimedia with mathematical content. This DVD will be exhibited in several general public sessions. It will also be available to individuals at various places throughout the **3ecm** site. Submission of contributions for this DVD may be made from all areas of mathematics.

The size of each contribution must be of the equivalent of approximately 5 minutes of video at most. Larger special contributions may also be considered. Contributions should be of interest to a broad audience, and meet the highest standards with respect to mathematical content, visualization techniques, artistic design and availability. The Organizing Committee will evaluate and select a number of contributions according to criteria of quality, interest, originality and thematic balance. Non-commercial contributions will be given preference.

Submissions must be received by the organizers before **1 February 2000**. They should be sent by ordinary mail to: *Video 3ecm (Prof. Santiago Zarzuela), Facultat de Matemàtiques, Universitat de Barcelona, Gran Via 585, E-08007 Barcelona, Spain.* Each entry should include a complete signed submission form written in English. Submission forms are available at **http://www.iec.es/3ecm/video.htm**, where additional detailed information about how to submit may be found.

Contributors will be notified of the acceptance or rejection of their submission by the Organizing Committee by 1 April 2000. Those selected will be asked to send a final version of their work if necessary and any other useful information to prepare the final DVD.

It is the contributor's responsibility to secure any necessary permission and licences for visual and audio material contained in their work.

The address **video.3ecm@upc.es** may be used to contact the organizers of this complementary activity or to ask any related questions.

Satellite activities

The following is a list of satellite activities which have been acknowledged by the **3ecm** Executive Committee by January 1999. Proposals for further satellite congresses or other mathematical events will be welcome. They should be communicated to the President of the Organizing Committee before **1 February 2000**, either by e-mail to **3ecm@iec.es** or by mail to the Societat Catalana de Matemàtiques (see address below).

The Executive Committee of the **3ecm** offers the following advantages to organizers of satellite activities. A summary of information about each satellite activity will be freely distributed through the printed and electronic systems of the **3ecm**. The reduced registration fee offered to participants of the **3ecm** registered before April 2000 will be extended

until the beginning of the **3ecm** for participants of satellite activities. Addresses of satellite activity participants may be included in the mailing list of the **3ecm** for distribution of information.

- **Summer School on Interactions between Algebraic Topology and Invariant Theory: Ioannina, Greece, 26 June - 1 July 2000**. *Speakers:* F. Cohen, L. Smith, N. Marmaridis, N. Kechagias. *Contact:* Nondas Kechagias (University of Ioannina), *e-mail: nkechag@cc.uoi.gr*
- **Functional Analysis Valencia 2000, an International Functional Analysis Meeting on the Occasion of the 70th Birthday of Professor Manuel Valdivia: Valencia, 3–7 July 2000**. *Invited Speakers:* G. Dales, T. W. Gamelin, G. Godefroy, J. Lindenstrauss, N. Kalton, R. Meise, A. Pelczynski, G. Pisier, D. Vogt, P. Wojtaszczyk. *Scientific Organizing and Programme Committee:* R. M. Aron, K. D. Bierstedt, J. Bonet, J. Cerdà, H. Jarchow, M. Maestre, J. Schmets. *Contact:* José Bonet (Universidad de Valencia), *e-mail: vlc2000@mat.upv.es*, or Klaus D. Bierstedt (Universität Paderborn), *e-mail: vlc2000@uni paderborn.de*, website: http://www.upv.es/VLC2000/
- **6th International Conference on Harmonic Analysis: El Escorial, Madrid, 3–7 July 2000**. *Invited Speakers:* A. Carbery, M. Christ, C. Kenig, P. Mattila, F. Ricci, P. Sjögren, E. Stein, S. Wainger, G. Weiss. *Organizing Committee:* P. Cifuentes, J. García-Cuerva, E. Hernández, F. Soria, J. L. Torrea, A. Vargas. *Contact:* Eugenio Hernández (Universidad Autónoma de Madrid), *e-mail: eugenio.hernandez@uam.es*
- **Alhambra 2000, a joint Mathematical European-Arabic Conference. Granada, 3–7 July 2000**. Promoted by the European Mathematical Society within the activities of the WMY2000. *Contact:* Ceferino Ruiz (Universidad de Granada), *e-mail: alhambra2000 @ugr.es*
- **First Euro-Mediterranean Topology Meeting. Bellaterra, 4–7 July 2000.** *Organizing Committee:* C. Broto, R. Piccinini, L. Schwartz. *Contact:* Carlos Broto (Universitat Autònoma de Barcelona), *e-mail: broto@mat.uab.es*
- **cem 2000, Congrés d'Educació Matemàtica, I Jornades d'Educació Matemàtica a Catalunya. Mataró, 3–5 or 5–7 July 2000**. *Advisory Committee:* K. Clements, A. J. Bishop, P. Boero, P. Abrantes, G. de Abreu, T. Nunes, C. Alsina, J. M. Fortuny, M. A. Canals, L. Rico, L. Balbuena, V. Rivière, N. Gorgorió. *Programme Committee:* X. Vilella, Ll. Girondo, C. Aguadé, A. Violant, M. Berini, R. Codina, C. Lladó, I. del Blanco, N. Gorgorió. *Contact:* Xavier Vilella (FEEMCAT), *e-mail: xvilella@pie.xtec.es*
- **Distributions with given Marginals and Statistical Modelling. Barcelona, 17–19 July 2000**. *Organizing Committee:* C. M. Cuadras, J. Fortiana, F. Oliva, J. A. Rodríguez-Lallena. *Scientific Committee:* C. Alsina, J. A. Cuesta, C. Genest, R. Nelsen, I. Olkin, J. Quesada-Molina, C. Sempi, B. Schweizer. *Contact:* Carles M. Cuadras (Universitat de Barcelona), *e-mail: carlesm@bio.ub.es*

Barcelona, Catalonia

The country of Catalonia, with six million people, lies in the north-east of Spain. Catalan and Spanish are its official languages. Catalonia offers a great variety of landscapes, ranging from sunny beaches to the high peaks of the Pyrenees. Visitors can find a wide choice of sights and events, such as Romanesque churches and paintings, Gothic cathedrals, many museums, classical or modern music performances, and exhibitions of all kinds.

Barcelona, the second largest city of Spain and the capital of Catalonia, is located on the shores of the Mediterranean Sea and enjoys a mild climate throughout the year. Founded by the Romans more than 2000 years ago, it maintains a rich historical heritage and deeply rooted cultural traditions. With the Olympic Games in 1992, Barcelona underwent a renovation of its public and private infrastructure, reinforcing its role as one of the most modern cities in Europe, and an attractive destination for business, tourism, and culture. Barcelona has acquired a solid reputation as a site for successful conferences and sport events of the highest level.

Travel Barcelona is within three hours flight of all the main cities in Europe, Northern Africa, and the Middle East. The modern, recently renovated airport has flights to many other destinations throughout the world. An air shuttle with Madrid facilitates connections with intercontinental flights.

Leisure and Culture Everyone identifies Barcelona as the city of Gaudí; his best-known works are the Pedrera, the Sagrada Família, and the Park Güell. Many other architectural treasures can be admired in Barcelona, from Gothic to splendid modernism, to rationalism, and striking contemporary achievements. In the sphere of art, Barcelona offers also a wide range of possibilities: classical music, opera, and ballet; one of the best collections of Romanesque painting in the world; the Picasso museum, the foundations of Joan Miró, Antoni Tàpies, and Thyssen-Bornemisza, or the new museum of contemporary art by Richard Meier. Night life goes on until the small hours with an excellent choice of restaurants, shows, and ultramodern bars.

Tours Catalonia offers excellent possibilities for excursions: the Costa Brava with the Dalí Museum, the cava wineries, the monasteries of Montserrat, Poblet, Santes Creus, and Vallbona, the picturesque village of Sitges, or the historical cities of Girona and Tarragona.

Accommodation A list of hotels of various categories will be offered in the Second Announcement, together with instructions for reservation. A large number of rooms at low prices will be available in student residences.

Sponsors

The following list of sponsors has been updated as of February 1999:

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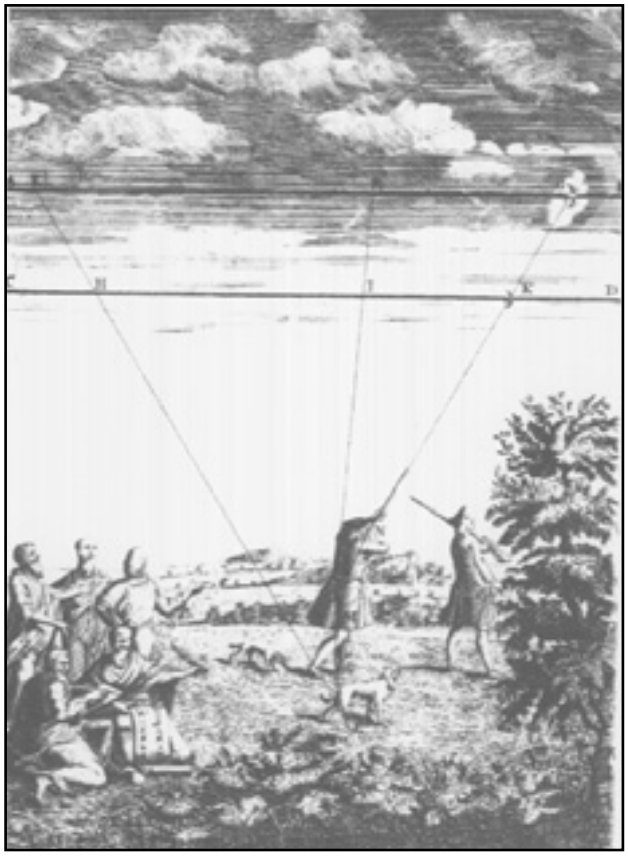
Caring for the mathematical past: a recent British experience

John Fauvel

The most prominent mathematics story to make the front page of the national Press in the UK in recent months, if not years, hit the news stands just before Christmas, until it was squeezed off the front page by the misdemeanours of yet another Cabinet Minister. Alas, the story the newspaper had to tell was not of a new mathematical result, nor of further recognition and success for British mathematicians in international meetings, nor indeed of debates about the quality of our mathematics teaching. It was a much sadder story, of the secret destruction of a public asset by those supposed to guard it and care for it, which raises melancholy reflections about the governance of our universities today. It points to a lack of respect for mathematics and for scholarship which raises questions about the increasing divergence between age-old academic values and the brave new world of those who manage universities with the values of accountants.



Newton's 'Method of Fluxions', one of the books sold by Keele University to a book dealer.

'Fury at £1m sale of Keele mathematics collection' ran the headline on 22nd December 1998 all across the front page of *The Daily Telegraph*, a newspaper which sells a million or more copies each day to readers representing the traditional values of the English middle and upper classes. The story was almost unbelievable: that the managers of an English university had secretly sold to a book-dealer a collection of mathematical texts, including some of the great mathematical books of four centuries, which had been given to the University only thirty years before for the benefit of students and scholars. The secret conversion of a public good into a private possession by the secret decision of a University Council deeply offends everyone's sense of what a university is for. As the story unravelled, the University managers' defensiveness led them into claims which seemed less and less defensible, and showed a remarkable lack of awareness of the repercussions of their selfish actions for researchers, teachers and curators throughout the mathematical and scholarly communities.

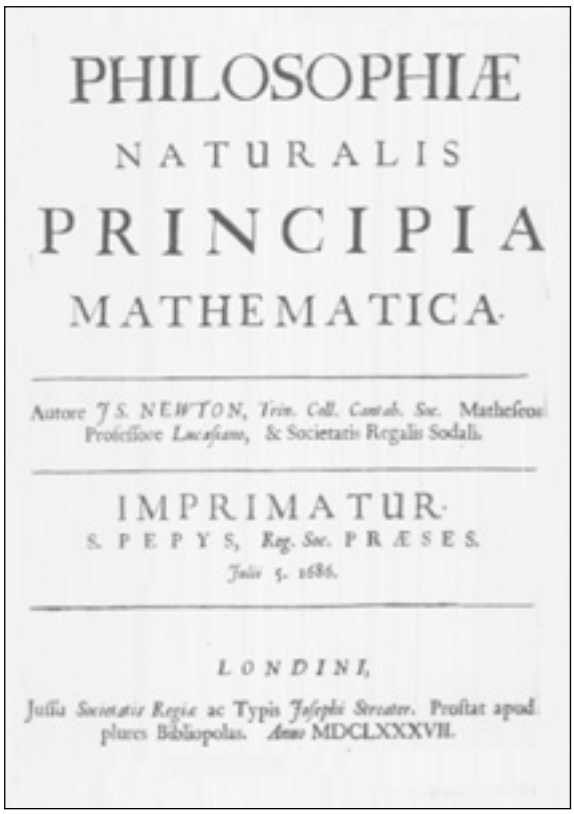
Keele is a small university, just off the motorway between Manchester and Birmingham, founded after the war with high ideals: the closest of English universities to the concept of a liberal arts college. At first and for many years it provided, unusually for England, a four-year degree course, the first year of which engaged students in a cross-disciplinary curriculum involving both arts and sciences. When the elderly civil servant Charles Turner (1886–1973) looked around for a permanent home for the collection of mathematics books he had built up over a lifetime, his eye fell upon Keele through his friendship with a member of the academic staff there, the physicist David Ingram. It was Turner's wish that the collection should go to a university which had not had the opportunity or good fortune to acquire such a special collection, and the young University of Keele fitted this criterion exactly.

The books which Charles Turner gave to Keele were indeed a choice collection of the masterworks of four centuries. There were sixteen items published before 1500, including Ratdolt's 1485 edition of Sacrobosco's *Sphaera mundi*, the first printed book to utilize more than two colours, and his magnificent 1482 edition of Euclid's *Elements*. Besides this, the first printed edition of Euclid, Turner collected a further twenty-four Euclids printed before 1600, and thirty-five more from 1600 onwards. The collection of British mathematical works was very good, with authors ranging from the great mediaeval mathematician Thomas Bradwardine (who died in 1349) up to leading nineteenth-century mathematicians such as Cayley and Clerk Maxwell, and a particularly fine sub-collection of eighteenth century fluxional works (the calculus used in England, under Newton's influence, while the rest of Europe was using Leibnizian calculus). As well as a large number of books by Isaac Newton, including all three editions of *Principia*, at least eight of Turner's books were from Newton's library, some with annotations in his own hand. Works by Viète, Kepler, Galileo and Descartes were all there too. . . some 1400 books in all. Of course any one of them, bar those significant through their ownership or annotations, is likely to be found in some other library too — that's why books were invented — but the Collection as a collection was unique, and its being located in a friendly study room in a small university far from the great metropolitan centres also made it unique.

Charles Turner gave his life's collection to Keele. It would never have crossed his mind, nor that of the Librarian and Vice-Chancellor who accepted the gift, that their successors would prove such unworthy custodians of their heritage. Had he known what kind of people would be leading Keele in the 1990s, he would doubtless have built into his gift a clause that the Collection should not be sold secretly into private ownership in order to finance the Department of Management's MBA programme. But

as he didn't, he didn't.

What was the Turner Collection used for, and who used it? Many generations of Keele students had come to see the Collection, to handle and read the original works of the great mathematicians of the past. They sometimes did projects, sometimes just absorbed inspiration from the very existence and appearance of the books. Members of staff used the Collection in connection with teaching programmes at both undergraduate and graduate level, in mathematics and in educational studies in particular, though by no means confined to that. Outside bodies also valued and used the Collection. The Open University, founded shortly after Keele had accepted Turner's gift, has made a great deal of use of the Collection over the years, including filming several television programmes for its innovative history of mathematics course. The British Society for the History of Mathematics, founded in 1971, held a meeting at the Collection in 1992 with several talks about different aspects of the Collection. Two articles were written about the Collection, the Leverhulme Foundation gave money for it to be catalogued, the British Library gave money for rebinding some of the books . . . In short, everything was proceeding well and the Turner Collection was playing a key and valued role in the reinvigoration of interest in the history of mathematics which has taken place in the UK, and indeed in Europe as a whole, over the past thirty years, among mathematicians, teachers and others.



PHILOSOPHIÆ
NATURALIS
PRINCIPIA
MATHEMATICA

Autore J.S. NEWTON, Trin. Coll. Cantab. Soc. Matheseos Professore Lucasiano, & Societatis Regalis Sodali.

IMPRIMATUR.
S. PEPYS, Reg. Soc. PRÆSES.
Julii 5. 1686.

LONDINI,
Juſſu Societatis Regiæ ac Typis Joſephi Streater. Proſtat apud plures Bibliopolas. Anno MDCLXXXVII.

Newton's 'Principia Mathematica'

Until, that is, the managers of the University of Keele discovered that old mathematics books are valuable and can be sold for cash to support such causes as the MBA programme of the Department of Management. None of those who used and valued the Collection, inside or outside the University, was consulted by the University managers before they promoted a vote in Council to effect its secret disposal. This was a mistake, because now that the outside world has belatedly learned of its loss, the dismay and anger of those deprived of any influence over the decision has grown in volume until it is audible even behind the walls of Keele. It is sadly ironic that the Keele management should apply cynical accountancy values—knowing, in Whistler's words, the price of everything and the value of nothing—to their custodianship of a great mathematics collection at precisely the moment when the rest of the world was beginning to recognise the interest and importance of its history for both teaching and research in mathematics.

Everyone will sympathize with hard-pressed university administrators trying hard to square circular budgets and lacking the resources to achieve their ambitions for students and faculty. But the decision to sell the collection in the secretive way chosen was entirely self-defeating and has done immeasurable harm to the reputation of the University, as well as to the development of history of mathematics in Britain. For the forces currently arrayed against Keele would have been lined up with it in sympathy and support to raise the money, save the Collection and help the Keele students, if only the Vice-Chancellor and her colleagues had chosen, instead of hatching secretive deals, to talk about the problem with the wider world. There is no shame in needing to raise money, and these days a million pounds is not a large sum to raise. Many wealthy organisations and many individuals have funds to contribute towards such a cause. A publicly accessible home could have been found, such as the London Mathematical Society are now offering to help find. Many people would have been only too glad to help raise the money, in the process raising the profile of the Collection and of the history of mathematics. All of this was pre-empted by the foolish, short-sighted, hasty, shameful, duplicitous decision of the senior management which has brought Keele University into disrepute.

What lessons for the mathematics community can be learned from this sad episode? One very obvious one is the value of community. Even while one laments that this is an occasion of bringing the community together, it is heartening to discover that those who are concerned and offended at the loss of the Turner Collection include most members of the mathematical community as well as historians, teachers and scholars of all kinds. In a striking testimony to the renewed appreciation of the importance of history of mathematics for the culture and practice of mathematics, the London Mathematical Society has played a leading role in its strong encouragement of moves to trace the Collection and restore it to a public institution.

But another sobering reflection is surely that university administrators — in Britain, at least, battered by twenty years of government funding attrition — are no longer our natural allies, sharing the core values of pursuing and supporting teaching and scholarship in a way which looks to the wider good of society. This was foreshadowed, perhaps, in a phrase made popular in the 1920s, the 'treason of the clerks'. There can come times when those with a moral imperative to the world of the mind fail in their duty to the past, and indeed the future. For it is the future undergraduates of Keele, deprived for ever of the riches and benefits of a great collection of their mathematical heritage, who are the losers through their managers' selfish and short-sighted secret deals.

John Fauvel [e-mail: j.g.fauvel@open.ac.uk] is a senior lecturer in mathematics at the Open University, UK, and is a former president of the British Society for the History of Mathematics.

REPLY TO JOHN FAUVEL'S ARTICLE

The above article was sent to Keele University for comment; here is the reply sent by Allan Foster (*e-mail: a.j.foster@keele.ac.uk*), Director of Information Services & University Librarian, University of Keele

John Fauvel's account of the sale of the Turner Collection is flawed in several respects. That he has repeated a number of the misleading tabloid-style newspaper by-lines does him no credit. Despite the campaign of vilification waged by him and others, the University has acted legally and with integrity in this matter. I will deal with some of the main points he raises.

The Collection was sold in order to generate an urgent need for substantial investment in library materials to support current and future teaching and research programmes. For many years the University has been unable to allocate sufficient funds for library resources. With the national unit of resource diminishing year by year, there was no prospect of significant additional funds to provide this essential support. The difficulties of libraries maintaining and developing adequate holdings of printed materials, together with the new generation of electronic resources, are well known. We are determined to provide this essential infrastructure at Keele. A strategic review of our special collections, together with the development of a collections development policy, emphasised the need to concentrate our limited resources on those collections and materials which are relevant to teaching and research programmes, now and in the future. This was not an opportunistic, spur of the moment decision but one over which the University agonised, weighing up the options very carefully.

The decision to sell the Collection was not taken in secret, far from it. The proposal to sell was debated extensively by the VC's Committee (the University's management team), the Finance Committee, the Senate and the University Council during the May to June period last year. So open was the debate that, given that it was seen as a matter of conscience for senior colleagues, the process was handled as a series of set piece debates with two members of the VC's Committee leading the 'pro' and 'anti' sale cases. There was a close vote in a straw poll of members of the Senate (22 against the sale; 19 in favour). The Council took this into account when it agreed to the sale in principle on 26th June 1998 by a vote of 14 for, 8 against, plus 1 abstention. There were passionate speeches both for and against the sale. Academic colleagues said that the Senate debate had been the best one in living memory. The University's students were unanimously behind the sale and said so in a letter to the Times Higher Educational Supplement which, interestingly, the Editor did not choose to print. Full minutes of the Senate and the Council debates were available on the University's internal web site early in the 1998/9 academic year. The Council gave delegated power to the two most senior lay members and the Vice-Chancellor to determine the means of the sale. Following further investigation and consultation, the decision to sell to the private buyer was later confirmed. Whether commentators approved of the final decision or not, there is no doubt that the process was conducted with probity throughout and following a very careful consideration of the issues involved.

Whilst there is no doubt that the Collection is a very interesting one, with some unusual and rare items, virtually all the books are also held in major centres — Trinity College Cambridge, University College London (the Graves Collection), Edinburgh University, and Manchester. These collections are much bigger than Turner and much more accessible for scholars. This explains why the use of the Turner material was so poor—for instance, two external visitors in the last two years, nine postal enquiries in a decade. The British mathematical community, apparently now so opposed to the sale, showed relatively little interest in it during the 30 years it was at Keele. The eight items from Newton's library are of great interest but they are dwarfed by the 800 items from his library held at Trinity College Cambridge. The Graves Collection on the history of mathematics at University College London has ten times the number of Turner volumes and replicates many of these items. The professional advice we received was that no other public institution was likely to buy the Collection in its entirety at the valuation that had been made. Our earnest objective of doing nothing that would lead to the break up of the Collection guided us throughout. Before we sold the Collection, the University decided to retain all Newton annotations and dog-ears, and other books from the Collection, in facsimile, photographic and copied form for the use of scholars within and outside Keele. Some of these will be distributed to these larger collections mentioned above. We also plan to digitise these selectively and to make them available internationally over the World Wide Web. Thus scholars will continue to have access to the material in a variety of forms.

John Fauvel's dismissive reference to the proceeds of the sale being used to finance the University's MBA programme is quite wrong. In fact, a significant proportion is being invested back into the Library's many unique special collections including the listing, conservation and digitisation of papers from Arnold Bennett, Wedgwood, Sneyd, Karl Mannheim and others. Many academics at the University and outside are delighted that we will be at long last able to provide the care and improved access to these collections which will benefit scholarship so tangibly. Other funds will be directed to increase the range of printed and electronic scholarly resources across all disciplines to support present and future teaching and research programmes. Given the open nature of our access policies, these resources will not only benefit staff and students at the University but also members of the public in the locality and scholars everywhere.

Finally, Fauvel's remarks about the philistinism of university administrators can not be allowed to pass without comment. The history of Keele, like most universities, is based on a careful and creative partnership between senior administrators (usually notable academic themselves, of course), the body of the academic community in its entirety, support staff and, last but not least, students. Additional to these groups, of course, are the local and national communities represented by lay members of university councils, courts and boards. In as much as the formal process of governance reflects this richness, the decision to sell the Turner Collection was the collective wisdom of the University community. Crude analysis of differences between academics and administrators, 'them' and 'us', really won't do. As the problems of developing universities in a climate of ever tighter finances become more complex, then we need every member of the institution, not just academics, to pull together and make their unique contribution.

Editor's note:

Since the above articles were written, individual books from the Turner Collection have been advertised within the book trade, indicating that the Collection is indeed being broken up. Also, Keele University has agreed to set up a review of the sale of the Turner Collection, to be carried out by the Audit Committee of Council.

Please let me have your views on John Fauvel's article and Allan Foster's reply for the 'Letters page' in the June issue.

Interview with Robert M. Mattheij (Eindhoven)

[President, European Consortium for Mathematics in Industry (ECMI)]

interviewer: Vincenzo Capasso (Milan)

Q. I think it would be of interest to go back to the roots of ECMI, Bob.

A. In 1985 a meeting in Amsterdam organised by Hazewinkel, van Groesen, and myself was named ESMI, European Symposium on Mathematics in Industry. Besides being successful scientifically, the groundwork was laid to establish a European organisation devoted to mathematics in industry. Later, in 1986, under the steering leadership of Helmut Neunzert, ECMI was founded in Mussbach.

Q. What are the aims of ECMI?

A. It has a three-fold philosophy: to promote the use of mathematics in industry, to educate young 'industrial mathematicians', and to operate on a European scale.

Q. Has ECMI matched these aims?

A. The first objective is quite vivid and has only gained momentum—even worldwide—as many initiatives for bringing mathematics to industry have become fruitful undertakings, through meetings, mathematics-in-industry study groups, special programmes and even special institutes, where funding from industry is essential.

The second objective has probably had the most success, as far as ECMI's joint postgraduate educational system is concerned. At the moment fifteen institutions, spread out over ten European countries, are working together on a programme that takes away a bit of their local freedom in order to allow for a really transnational common curriculum. This is quite impressive compared to what many other European cooperative programmes have realised thus far.

From the onset those who shaped ECMI's ideals had in mind a clear relationship between education and research.

Q. The ECMI educational programme is clearly a success; ECMI has substantial recognition in various articles that appeared in the press. But was there the same success for cooperative research in the ECMI network?

A. The latter is visible through a variety of meetings, from the biannual large ECMI meeting to so-called 'industrial days'. Moreover, ECMI has special interest groups which are application-oriented. What would not be possible for mathematicians in a single country can be attractive on a European scale: cooperation on research into polymers, glass, textiles, etc. by mathematicians. Thus the third objective has induced many cooperative efforts, quite often not even within ECMI's framework directly, but undoubtedly inspired or fostered by it.

Q. Which roles have been played by the stimulation programmes launched by the European Union for the existence of ECMI?

A. The very existence of ECMI as a foundation and consortium was intended to open up new financial possibilities through Brussels, encouraging educational and research programmes alike. It should be noted, however, that the European formula of ECMI is much less unique than in the early days, as there are a few other consortia who also work on some sort of cooperation between industry and mathematically oriented institutes (albeit in narrower areas).

Q. What do you consider the major achievements of ECMI with respect to its original aims?

A. In summary, ECMI's basic ideas have been implemented in the following activities:

• *Conferences*:

— a research conference is held every two years on 'Mathematics for industry', attended by academic applied mathematicians and industrial scientists, the latter comprising about 25% of the total attendance; the most recent one, ECMI98, was held in Gotheborg from June 22–27, 1998

— industry days are held at various ECMI centres each year to strengthen links between ECMI and local industries

— meetings on mathematics for special areas of industrial activity are held several times a year at various ECMI centres

• *ECMI Educational Programme*

— ECMI offers a European Postgraduate Programme 'Mathematics in industry', where some seventy students participate at fourteen centres yearly

— training sessions and annual modelling weeks are held for graduates

• *Special Interest Groups*

ECMI's Special Interest Groups (SIGs) stimulate long-term collaboration in specific areas. These SIGs are application oriented, like glass, multibody dynamics, etc. The first SIG, on glass, has met annually since 1995 and the most recent meeting, 'Glass days in Kaiserslautern', attracted fifty participants (twenty from industry) from six different countries.

• *European Study Groups with Industry*

European study groups have been held for many years: in 1998 alone they were held in Southampton, Lyngby and Leiden. These are genuine brain-storming sessions on real problems, the only formal sessions being at the beginning and the end of the week. The spin-off is substantial in terms of contacts with industry and genuine mathematical problems.

Q. How do you encourage young mathematicians to do applied research for industry?

A. ECMI offers opportunities for young researchers to work on mathematical problems in industry at doctoral and postdoctoral level. EU grants have supported a network of postdoctoral researchers at key institutions who work on specific industrial problems and take part in a joint training programme.

ECMI postdoctoral fellowships are important for maintaining and strengthening its research base and collaborative links between centres. They provide a unique possibility for young researchers to learn from the (to some extent) complementary expertise at the various centres. Up to now, most have been funded under the HCM and TMR schemes of the EU. Appointments are currently being made for the TMR network 'Differential equations in industry and commerce' which will run till 2001.

Q. What is the scope of these postdoctoral fellowships?

A. To train industrial mathematicians for a career in industry; to better exploit the benefits of complementary expertise at the various centres through frequent visits by ECMI fellows to other centres; and to increase the links with European industries through research on relevant problems

Q. How do you envisage the role played by these postdocs in the future development of industrial mathematics in Europe?

A. Although the ECMI network provides many other ways of exchange and communication, it has been clear, almost from the beginning, that one of

the best ways to strengthen this network to the benefit of both industry and the participating centres alike, should be the employment of young researchers who can transfer expertise. Naturally, these young researchers themselves are the first to benefit from this exchange programme.

Q. Do you plan to maintain, and possibly extend, this programme?

A. We hope to obtain both EU and industrial money to support further students and postdoctoral researchers within the ECMI network

— extension to more ECMI insitutions should be made possible

— in addition, we are planning an extension of the programme to include doctoral fellows

Q. How does ECMI disseminate its results and achievements?

A. ECMI has various publication links, such as a biannual *ECMI Newsletter* and an ECMI book series (Teubner-Wiley). Moreover, publications of academic papers is encouraged and facilitated via journals on industrial and applied mathematics which are based at ECMI centres: *European Journal for Applied Mathematics* (Oxford), *Journal of Engineering Mathematics* (Eindhoven), *Surveys on Mathematics in Industry* (Linz), and *IMA Journal on Industrial Mathematics and Finance* (Strathclyde).

Q. Have you considered the spread of ECMI ideas beyond the EU?

A. ECMI is often asked to help set up mathematics in industry activities elsewhere. Thus it has collaborated worldwide on setting up educational programmes and study groups. As an example, teams from ECMI have led industrial workshops in countries like Latvia (1996), Mexico (1995, 1997), and Brazil (1997).

Q. Which kinds of membership are there for ECMI?

A. ECMI has three levels of membership: academic members, industrial members and individual members. In the past the main emphasis was on having industrial and academic members; they are still the most important categories. However, the very nature of (e.g.) SIG makes individual membership quite meaningful. It is hoped that this category will further increase by the activities of these SIGs.

Q. Can you say more about the research activity in collaboration with industry?

A. Special interest groups play a key role in the research branch of ECMI. They are typically application-oriented, and provide a forum across boundaries, where a single European country may be too small. They have turned out to be a successful means for letting industrialists discuss relevant actual problems with mathematicians, thus increasing knowledge for the first and expertise for the second.

Q. How can one start a SIG?

A. The first SIGs arose from the experience at meetings and other ECMI activities that, despite the generality of mathematics, both researchers and industry would be better served if research were grouped around themes. ECMI is quite unique as this is done in terms of application-oriented, not mathematics-oriented, areas.

Q. What are the existing SIGs?

A. At the moment there exist five SIGs. Since the concept is working well, the number is rapidly growing. We list them here, with the addresses of the coordinating institution.

SIG on Glass

Coordinator: Prof. Dr R. M. M. Mattheij, Department of Mathematics, Technische Universiteit Eindhoven, P.O. Box 513, Eindhoven, The Netherlands

SIG on Polymers

Coordinator: Prof. V. Capasso, Universitaà di Milano, Dipartimento di Matematica, Via C. Saldini 50, 20133 Milano, Italy

SIG on Composite materials

Coordinator: Prof. S. McKee, University of Strathclyde, Department of Mathematics, 26 Richmond Street, Glasgow G1 1XH, Scotland

SIG on Multibody dynamics

Coordinator: Prof. Dr. P. Rentrop, Technische Universitaet Darmstadt, Fachbereich Mathematik, Schlossgartenstr. 7, 64289 Darmstadt, Germany

SIG on Scientific computing in the electronic industry

Coordinator: Prof Dr M. Gunther, Fachbereich 17, Universität Gesamthochschule Kassel, Postfach 10 13 80, 34109 Kassel, Germany

SIGs on acoustics and paper are presently being formed.

Q. As an example, could you say something more about the SIG that you coordinate?

A. Despite the fact that glass is an old material there are still many interesting and important problems which need to be solved. Glass is produced in an oven from raw material through heating. The products are obtained from pressing and blowing. This way (e.g.) bottles and jars, but also TV screens, are formed. Another way is the production of pane (float glass). Sometimes quite refined chemical processes are needed to purify the material (such as the sol-gel technique for producing optical fibres).

We mention a few questions showing the extreme importance of mathematical modelling:

— *residual stresses*: the cooling must be done so that the stresses in the material do not cause breakage, etc.

— *morphology* due to the ever-growing demands of customers' optimal shape design for pressing and blowing requires a lot of modelling

— *designing production tools*; production of (e.g.) float glass requires appropriate modelling of the flow/heat problems and thus (e. g.) the placement of rollers.

— *heat exchange*: since the viscosity is highly dependent on the temperature, it is extremely important to model this correctly. Moreover, today there hardly exist measurement tools for this; in particular, radiation is very important, but extremely difficult. One should realise that the energy consumption is the most important production cost.

Q. How does ECMI attract attention towards a SIG ?

A. ECMI has organised a number of special meetings on glass: 1994, 1996, 1997, 1998. This frequency is increasing. The meetings are 'Glass days', minisymposia at conferences (ECMI conferences, ICIAM conferences, SIAM conferences) and 'Modelling of Glass Forming Processes', Euromech 388 (Valenciennes).

Q. Would you say more about the ECMI conferences?

A. Conferences are an important and integrating part of ECMI's activities. They ensure timely distribution of ideas and thoughts and provide a forum where 'supply and demand' can meet. In view of its special role ECMI focusses on applications rather than on mathematical subjects. At the same time special meetings are organised where the problem themes are central, not the solution methodology as such.

Q. What do you expect as the 'revenue' from an ECMI Conference?

A. The goals of an ECMI Conference are in synthesis:

— to provide a forum for those who are actively involved and those more generally interested in mathematics in industry

— to serve as a venue for ECMI members at large

— to explore new and relevant industrial areas where mathematics plays a role

Q. What about the present structure?

A. Originally there was an annual

conference. Since 1994, ECMI has organised only one bigger meeting every two years; attendance is about 400 persons, with 25% from industry.

Q. How do you stimulate interaction with industry for individual members of ECMI?

A. In addition to the biannual general conferences, ECMI organizes more frequent meetings and workshops specifically designed for interaction with industry. Let me mention the most regular activities:

— *industrial days*: since 1991 many of these industrial days have been organised: typically, ECMI members address the industries of the country where the meeting is organised. Typical attendance is about 50 people, with 50% from industry

— *special topic symposia*: typically, application areas like multi-body dynamics or glass are surveyed. On the one hand industry can display timely problems, and on the other experts can talk about their results. Attendance is about 50-80, with a large number from industry

— *study groups with industry*: week-long meetings where a limited number of problems from industrial companies of current interest are modelled and analysed.

Q. Do you train young graduates in interaction with industry?

A. As part of the ECMI educational programme 'Mathematics in Industry', ECMI organizes 'modelling weeks': week-long meetings for training postgraduates in modelling problems arising in industry. This has largely a didactical purpose; attendance is about 70 students and 10 university teachers.

Q. Before ECMI, what experience existed on systematic interaction between academia and industry in Europe?

A. One of the first successful examples in this respect are the so-called 'Study Groups with Industry'. This is a tried-and-tested method for initiating collaboration between industry and academic mathematicians. Industrial participants bring a specific problem of current interest to a week-long meeting hosted by a group of applied mathematicians. Intensive discussions are held on each problem over several days, followed by a verbal report at the end of the week. A more detailed written report is completed within a few weeks.

Q. What are the aims of such an initiative?

A. They are:

— to create a mutually beneficial link between researchers in industry and academic applied mathematicians

— to provide a large number of experts with varied expertise to concentrate on industries' problems

— to act as an 'introduction meeting', so that industrialists are able to identify the most useful group for further collaboration

— to stimulate academics by working on problems that are both new and relevant and often present exciting mathematical challenges

— to introduce students to industrial research in action

— to provide recruitment possibilities for students.

Q. How and where did they start?

A. The Study Groups were pioneered in Oxford and have since been copied all over the world. In quite a few cases ECMI experts have helped to set up such initiatives elsewhere. An annual meeting has been held in the UK since 1968, and since 1991 the meetings have been designated *European Study Groups with Industry*. These meetings are now held under the ECMI umbrella and in 1998 besides the UK meeting there was one in Denmark and one in Holland.

Q. How do you evaluate the outcome of this experience?

A. The results of a Study Group meeting are very varied, but in every case some benefit was gained by both the industrial sponsor and the academic participants. The involvement of students in these meetings is also very valuable in giving them some insight into industrial research, as well as providing a recruitment opportunity for industrialists.

Q. Do you intend to disseminate this idea further in the future?

A. At least three study groups will be held in Europe each year, in different universities in order to attract a wide range of industrial participants. Also, ECMI hopes to start a journal for the publication of case studies of general interest, and reports from the Study Groups will provide some suitable problems for such a journal.

Q. What future do you envisage for ECMI?

A. At the moment ECMI is experiencing a new challenge. Although the success rate in obtaining funding from Brussels has been quite high, given the amount and character of the request for support, the actual impact has been much less than originally anticipated.

Thus, concerted action, mainly steered by the newly appointed director Dr Henk Kuiken, has been undertaken. As a result, ECMI is now in the process of submitting a joint proposal with ECCOMAS for a 'Network of excellence' on mathematical modelling and simulation.

Also, membership of the EMS (European Mathematical Society) has been acquired in order to help combining the forces in Europe to achieve more visibility for mathematics. Quite recently, a request has come from yet another European institution, ERCOFTAC, to set up some joint activity; this illustrates how ECMI has grown up and will continue to do its share in the coming years for mathematics in industry.

World Mathematical Year 2000 : Poster competition

Vagn Lundsgaard Hansen

Posters in subways,
math displays,
Says,
the EMS committee of WMY:
let a competition fly,
don't be shy,
have a try,
why?
For the future of Mathematics!

As one of the events during the World Mathematical Year 2000, the European Mathematical Society, together with local committees in several countries, wishes to encourage the idea of posters with a mathematical theme to be displayed in subways and other public places. These posters should catch the eye, and be representative of mathematics and its uses. The EMS is convinced that suitable posters will contribute to raising the public awareness of mathematics.

The EMS committee of WMY 2000 invites mathematicians to submit proposals for posters, in the form of a sketch of the graphics and a suggestion for a short text. There will be prizes of 200, 150 and 100 ECU for the three best proposals, and the name of the proposer will appear on all those posters which are eventually used.

Proposals should be sent before 1 May 1999 to the Chairman of the EMS committee for WMY 2000: Prof. Vagn Lundsgaard Hansen, Department of Mathematics, Technical University of Denmark, Building 303, DK-2800 Lyngby, Denmark; *e-mail: hansen@ mat.dtu.dk*

The impact on mathematics of political changes in Eastern Europe

moderated by Peter Michor

This is the beginning of a discussion forum on the changes in Mathematics caused by the political landslide in Eastern Europe in the last ten years. To start this column a questionnaire was sent out which is reproduced below. The answers are the opinions of the authors alone; only moderate corrections of English have been done. Further contributions to this column may be sent to Peter.Michor@esi.ac.at, who is willing to collect them for the Newsletter.

Call for articles on the impact of the political changes in Eastern Europe on mathematics

This is an invitation to write an article about your personal experiences during and after the political changes in Europe since 1989 and about their impact on your life as a mathematician. The *Newsletter* plans to give room for articles of this kind and to initiate a discussion on the impact of the political changes on mathematics.

Here are some questions that you may answer in this article:

1. How did you feel the influence of the changes of the political background in your country during the last ten years on science and mathematics?

2. How do you judge the role of the 'brain drain' for mathematics: as natural, as regrettable, or as positive for individuals?

3. What are the most important problems in any attempt to keep the Mathematical traditions of your country alive?

4. What could be the role of EMS or other transnational mathematical organizations in the process?

Answer by Dmitri V. Anosov

[e-mail: anosov@mi.ras.ru]

1. Unfortunately in Russia, as well as in all New Independent States (NIS), political changes were accompanied by economical changes and in changes of attitude towards science and education which are far from being favourable for them. For me and my group the negative consequences of one factor are more or less in balance with the positive consequences of another—more freedom, less administrative control (although increases in bureaucracy), better exchange with the West. But take into account that in 1991 I achieved the highest possible position in our scientific community (full member of the Russian Academy of Sciences) which makes the situation better for me than it would be otherwise.

2. I don't think it is the brain drain itself that causes a problem. If a student goes to work in a bank where his salary (for his knowledge in computer software) cannot be even compared with what he gets as a student or what he can hope to get in the nearby future as a teacher or researcher, he is usually more lost for science in Russia than if he gets a position in the university at the opposite point of the globe. (In the latter case he at least sometimes visits us and tells us the latest news.)

3/4. The main thing seems to be financial support. There are some grants like INTAS grants which are given to relatively small groups and provide some support for members of such groups. (ISF grants were the most well organized and generous in this respect, but they do not exist any more.) They provide some help to individuals, but not so much help and not for so many individuals. And I doubt whether EMS can do the same. But possibly you can help us, say, to get journals for our libraries. I don't know if you can support scientific conferences in Russia (which can include covering travel expenses inside NIS, if you have enough money, or only covering the organizer's expenses otherwise).

Answer by Anatoly Vershik

[e-mail: vershik@pdmi.ras.ru]

1. Besides the evident consequences of political changes in Russia and Eastern Europe (openness of contacts between Russian and foreign scientists, end of the power of the KGB and communist bureaucracy, etc.) which were very important and positive changes for most active mathematicians, I feel a very serious danger for the future of Russian mathematics. This is because many of its leaders moved to the West, perhaps because they see no perspective for further development of our science in Russia; consequently, young mathematicians took up this doubt in the future as a sign for moving from Russia. The same process in other Eastern countries seems not so dramatic.

2. In a sense it is a natural process: a brain drain in the whole world has existed for many years, and as usual Russia with a very big delay joins this process. But the case of Russia is very special: even clear-sighted observers in the West emphasize how undesirable for World mathematics it is if that process exhausts all mathematical schools in this country and if we lose our strongest traditions. Those schools and traditions were created a long time ago, in spite of the Soviet regime which prevented the natural development of science and thanks to many talented scientists who were oppressed by the bureaucracy.

3. The main problem of course is youth. For a long time many young talented persons were not accepted for the universities, could not obtain positions or degrees, could not go abroad, etc., because of the Soviet disgraces. Today we have other problems which also seem serious but which are of a completely different kind. But again we have the problem of how to keep young persons in mathematics, who cannot survive on the almost zero stipendia, salary, etc.

4. My impression is that these organisations must become much more involved in the organization of contacts between Russian and foreign mathematicians, especially young ones: up to now, we have had extraordinary possibilities for contacts, which was difficult to imagine up to the 90s, but we use them worse than during the stagnation. It is important to organize international seminars, miniconferences (not only in Moscow and St Petersburg), and workshops. Also, we have no special programmes for short exchanges between young mathematicians from the West and Russia—such programs are very important and useful for both sides.

Answer by Vladimir Arnold

[e-mail: arnold@pi.ceremade.dauphine.fr]

1. The situation of scientists and of mathematicians in Russia and in other former Soviet Union countries has changed drastically. The salary of a mathematician used to be sufficient, even attractive. Now the price of food at Moscow being close to that in Paris, the salaries of mathematicians in Russia are about a hundred times smaller than those of their American colleagues. (This was written in June 1998; in September the ratio reached three hundred).

The fact that we still have active mathematicians is partially due to the traditional idealism of the Russian intelligencia (which most Westerners consider as simple foolishness), and partially to the extremely important help of the occidental mathematical community (and especially of SMF, AMS, ISF, IMU).

It is interesting to note that the independent evaluations of about 6000 former Soviet Union mathematicians by the AMS/ISF and by the Russian Basic Research Fund more or less coincided in 80% of the cases, while in other sciences the correlation was minimal.

We may be proud to see that the mathematical scientific community is more objective than the others and that the criteria used by the Russian authorities are at present (temporarily?) scientific and non-discriminative.

2. The brain drain in the present situa-

tion is an evil that one can't avoid: it is only freined by the obstacles created by the West. If the present situation does not change, the future of the Russian mathematical school seems to be similar to that of the great German mathematical school of Klein and Hilbert or of the Italian school of algebraic geometry.

Chebychev, who had spent much time abroad, had friendly personal relations with foreign mathematicians, but never discussed mathematics with them, being afraid that it might be harmful to the originality of his own work.

The importance of the Russian mathematical school for the world mathematical community has always been related to its originality and independence of occidental fashions. The feeling that what one is doing now will become fashionable in twenty years is extremley helpful. Unfortunately, this 20-year period has started to diminish now, and the brain drain is one of the main mechanisms involved in this process.

3. The Marquise de Pompadour's spending on sciences and culture formed about one-and-a-half percent of her spending on dresses and perfumes etc., but it was sufficient to create the century of Enlightenment, the Encyclopaedia, etc. We have no Marquise de Pompadour in Russia, and it seems that a century of ignorance will come. I published a paper on this in the Moscow newspaper *Izvestia* on 16 January 1998; there is an English translation of it in the *London Mathematical Society Newsletter* **259** (April 1998), 18–20.

4. Of course even relatively modest contributions to the libraries and funds, stipends and half-time positions would be extremley useful. Unfortunately the European bureaucracy is even worse than, say, the French one. I can invite some people to Paris using my personal grant from the Institut Universitaire de France. It would be extremly difficult if I tried to use the possibility provided by the University or by the CNRS. And it is completely impossible for me to use for an invitation the European system (which had accordingly been called 'nazi' in French newspapers) independently of the number of years that I have been paying French taxes although I was not born in France.

The international mathematical organisations should stop the shameful discrimination against Russian scientists (as well as against other non-Western ones: Ukrainian, Chinese, Indians, etc.), or should at least protest against it.

I suppose that most of our occidental colleagues can't imagine the degree of the humilations we have to go through at their Consulates and Police stations to come to their conferences, workshops, etc.

I have the feeling that the Western (French?) idea of human rights is the idea of Human Rights of Western (French?) people. Discussing the ethnic origin of a candidate as the reason for voting for or against him has always been (and, I hope, will remain) impossible at the Russian Academy of Sciences, even during its worse years: our antisemites were obliged to invent 'scientific' arguments. French Academy of Sciences members have objected to the election of candidates who are French 'only by passport'.

Having participated in many international committees, selecting speakers or tenured professors, etc., I have become accustomed to hear my Western colleagues proposing to use non-scientific arguments to eliminate the Russian candidates, who otherwise would fill too many places. There were four Russian plenary speakers at the Kyoto International Congress in 1990, three at Zürich in 1994, and none at Berlin in 1998 (I am disregarding the present place of employment in these calculations, considering people like, say, Manin or Kontsevich as Russians). I do not think that the mathematical weight of our school has declined that fast. I explain the result by the same discrimination that I observe in the committees of which I am a member.

Recently I wrote a letter to the Notices of the AMS: 'Is the discrimination against the Russian mathematicians politically correct?' They have eliminated both the dangerous title and my theory explaining discrimination against the inventors, reproduced below:

'. . . there is a sociological reason why the American community is always supporting businesslike development and publicity rather than invention: the society needs to encourage rather the fast propagation of ideas than their creation. A typical example is the story of the telephone (probably unknown to the reader): the USA Supreme Court decided that Bell had appropriated its invention (by Meucci) but only at a time when his priority has no longer any practical usefulness for the inventor. . . '

The elimination of discrimination against 'non-Western' scientists at the governmental level is perhaps a problem that the mathematical community can't solve, but to make the nationalistic arguments at least morally unacceptable in the mathematicians' selection procedures seems to be a reasonable goal.

PS. There were some signs of positive development last year. During my first years in France I was spending more time at the Prefecture de Police than giving my three lecture courses at the University and at the Ecole Normale. Last year I was no longer asked to get permission from the Prefecture to cross the French boundary and am thus able to move freely, essentially within the boundary of the Third Reich.

The English consulate at Paris has recently asked me by their official paper (among two dozen other documents) to provide a copy of the passport of the British citizen inviting me, as well as the description of the religious ceremony accompanying my marriage. It seems however that they are using these only against the blacks, the yellows, and the representatives of the bad religions: they gave me the visa in spite of the absence of the copy of the passport of the Director of the Cambridge Newton Institute, who had already agreed to provide the copy.

Of course, the Western scientific community is completely unaware of all these facts, isn't it? I might provide dozens of these, and in the Moscow newspapers there were published accounts on worse stories of people staying for hours in (sometimes thousands-long) waiting lines at the Western consulates at Moscow.

Comment by Jean-Michel Lemaire, Directeur adjoint, Département Sciences Physiques et Mathématiques, Centre National de la Recherche Scientifique:
[e-mails: jean-michel.lemaire@cnrs-dir.fr, lemaire@math.unice.fr]

When Arnold says that inviting Eastern European mathematicians through CNRS would be 'extremely difficult', I am sorry to say that he simply did not try. CNRS can invite foreign scientists as associate researchers (chercheurs associés). These positions are known in France, for some reason which has nothing to do with the Red Army, as 'postes rouges', with all due reverence to those who keep comparing the French educational system with the Red Army and CNRS with the Academy of Sciences of the USSR.

The application procedure can hardly be simpler: all that is required is an invitation letter signed or approved by the head of the CNRS unit, together with a CV and a research program of the candidate; no form is required, and TeX, RTF, pdf or html files are acceptable.

In the last three years (1996–98), about one-third of the available positions in mathematics and theoretical physics have been granted to Eastern European scientists. The exact figures are the following:
1996 : 69 months out of 216 (1996 was the *annus horribilis* for the CNRS budget)
1997 : 128 months out of 328
1998 : 124 months out of 364

Such figures would suggest affirmative action (according to North American speech, if not practice), rather than discrimination. Actually, no such action, affirmative or not, was taken by CNRS. We just invited the best ones.

Finally, I would like to mention that, during the same period, CNRS has hired 12 mathematicians and theoretical physicists from Eastern Europe on permanent full-time research positions. Moreover, five of the six available senior research positions (Directeur de Recherche) have been granted to Eastern Europeans, two of which gave an invited lecture at ICM 98 in Berlin.

1999 Anniversaries

by June Barrow-Green and Jeremy Gray

Maria Gaetana Agnesi (d.1799)

June Barrow-Green

The name *Agnesi* is familiar to most mathematicians through the cubic curve known as 'the witch of Agnesi' and described by the equation $x^2y = a^2(a - y)$. Indeed, those unaware of its history may have been tempted to speculate as to how the curve acquired its unusual name. Although the truth is rather more prosaic than might be imagined, as will be told below, the name nevertheless serves as a reminder of Maria Gaetana Agnesi, the first European woman mathematician of the modern period.

Maria Gaetana Agnesi was born in Milan in 1718, the eldest of twenty-one children of Pietro Agnesi whose family fortune had been made through silk[1]. She was well educated, her father providing the best tutors locally available in philosophy, languages, natural sciences, mathematics and music. By the age of eleven she had mastered several languages, including French, Latin, Greek, German, Spanish and Hebrew, and in 1738 a volume was published containing 191 philosophical theses she was prepared to defend, challenging all comers. Accounts of her skill in disputation show that she had become well versed in the sciences, references being made to her discussions of the theory of tides, the emanation of light, the properties of geometric curves, and her support for Newtonian philosophy.

However, Agnesi soon became disenchanted with her life as a public display of prodigious talent and, to her father's dismay, decided to enter a convent. After much persuasion she agreed to remain with the family but on the condition that she could abandon the trappings of her former life. Settled at home she devoted herself to the study of religion and mathematics. Her progress in mathematics was greatly advanced by the arrival in Milan of Ramiro Rampinelli (1697–1759), a Benedictine monk and mathematician who had formerly been a professor at Rome and Bologna. Rampinelli became a regular visitor to the household and soon took on the role of Agnesi's teacher.

Agnesi's first mathematical work, a commentary on L'Hôpital's posthumous treatise on conic sections[2], remains unpublished. However, her second mathematical work *Instituzioni Analitiche ad Uso della Gioventù Italiana* [**1**], a textbook on analysis which was privately printed in two volumes in 1748, made her famous. It was written in Italian (as opposed to Latin), partly for her own benefit—she preferred writing in Italian—and partly because she wanted her work to be accessible to the Italian youth, particularly her brothers. Her aim, as she stated in the preface, was to present the material in such a way that it was 'endowed with proper clarity and simplicity . . . [and] proceeds with that natural order which

INSTITUZIONI
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LIBRO PRIMO
Dell' Analisi delle Quantità finite.

L'Analisi delle quantità finite, che comunemente chiamasi Algebra Cartesiana, è un metodo, con cui trattando quantità finite si sciolgono i Problemi; cioè da certe quantità, e condizioni date e cognite, si viene in cognizione d'altre incognite, e che si cercano, per mezzo di alcune operazioni, e metodi, che parte a parte mi propongo di spiegare ne' seguenti Capi.

A CAPO

provides, perhaps, the best instruction and the greatest light'. The preface also includes a moving tribute to Rampinelli, as well as an acknowledgement to an earlier calculus textbook by Reyneau [**4**].

Apart from Rampinelli, one other person had a considerable influence over the *Instituzioni Analitiche*: the mathematician Jacopo Riccati (1676–1754). Riccati was well known to Rampinelli, and on Rampinelli's suggestion Agnesi wrote to Riccati asking for advice and comments on her work. Thus began a fruitful correspondence which lasted from 1745 to 1749 with Riccati sending Agnesi many corrections and annotations. The correspondence also included Riccati's unpublished 'method of polynomials' which he had devised many years earlier, and which, at his behest, Agnesi included in her book with due acknowledgement.

At first sight it seems that the *Instituzioni Analitiche* was a great success. Maria Teresa, Grand Duchess of Austria and a noted feminist to whom Agnesi had dedicated the work, showed her appreciation by sending Agnesi a diamond-encrusted box. Pope Benedict IV, who had himself studied mathematics, wrote personally to congratulate her upon it and shortly afterwards appointed her honorary reader of analysis at the University of Bologna; in 1750 he elevated the appointment to a chair of mathematics. In 1749 the French Academy recommended that the second volume be translated into French, and a translation appeared in 1775. In 1760 John Colson[3] prepared an English translation [**3**], although, partly as a result of his death the same year, it was not actually published until 1801. Colson had been so impressed by Agnesi's work that he had learnt Italian in order to make the translation; and his translation was not restricted just to words, he translated the notation too, from Leibnizian to Newtonian.

However, a closer examination of the sources shows that acclaim for the book was not as widespread as it might appear. Agnesi's work received almost no attention from the great mathematicians of the eighteenth century, and later historians of mathematics largely ignored it. As Truesdell has cogently argued, this was essentially because Agnesi's book, although an undoubted model of clarity, contained nothing new or original, nor were there any applications to mechanics. Although it has been accurately described as 'an exposition by examples rather than by theory', it does not include a single example of the calculus being applied to natural phenomena, in contrast to other Continental books of the period.

The book begins with elementary algebra, moves on to the theory of equations and coordinate geometry, progresses in Volume 2 to the differential and integral calculus (including infinite series, as far as they were known at the time), and ends with the solution of elementary differential equations. The discussion of the curve now known as 'the witch of Agnesi' appears towards the end of Volume 1 [**1**, p. 381]. The curve, which had made its first appearance in the work of Fermat, was first constructed in 1703 by Guido Grandi (1671–1742) who, in 1718, named it 'versiera' from the Latin 'versiora' meaning 'rope that turns a sail'[4]. In her discussion of the curve Agnesi correctly followed Grandi in writing 'la curva . . . dicesi la Versiera'. The name 'the witch' appeared later, and only then as an error of translation. The culprit was Colson: in his translation he had made the simple mistake of confusing 'la Versiera' with 'l'aversiera', and it is the

latter which means 'the witch' [**3**, p. 222].

Despite the fact that Agnesi had been offered the chair in Bologna, she never visited the city to take up the appointment, although her name did remain on the rolls of the university for forty-five years. Almost immediately after the publication of *Instituzioni Analitiche*, possibly as the result of severe constraints imposed upon her by her father, she began to devote herself wholeheartedly to religion. She took over the instruction of her siblings, and engaged herself in helping the poor and infirm. After her father's death in 1752 she became even more fervent in her religious devotion and charitable work. She established a hospice for old women and spent all her money supporting it. In 1771 she became directress of a large poorhouse of the church and died there, destitute, in 1799.

[1] The *Dictionary of Scientific Biography* perpetuates the myth that Pietro Agnesi was a professor of mathematics in Bologna. The correct status of the Agnesi family has been fully documented by Anzoletti [**2**], see Truesdell [**5**, p.115].

[2] Guillaume de L'Hôpital, *Traité analytique des sections coniques*, Paris, 1720; according to Truesdell [**5**, p.123], this work was of 'scant importance' when it was originally published.

[3] John Colson (1680–1760) held the Lucasian chair at Cambridge from 1739 to 1760. He published little of distinction, concentrating most of his efforts on translation; see his biography in *The Dictionary of National Biography* and Truesdell [**4**, p.132 and footnote 42].

[4] For a history of the curve, see G. Loria, *Curve Piane Speciali Algebriche e Transcendenti, Teoria et Storia*, Vol. 1, Milan, 1930.

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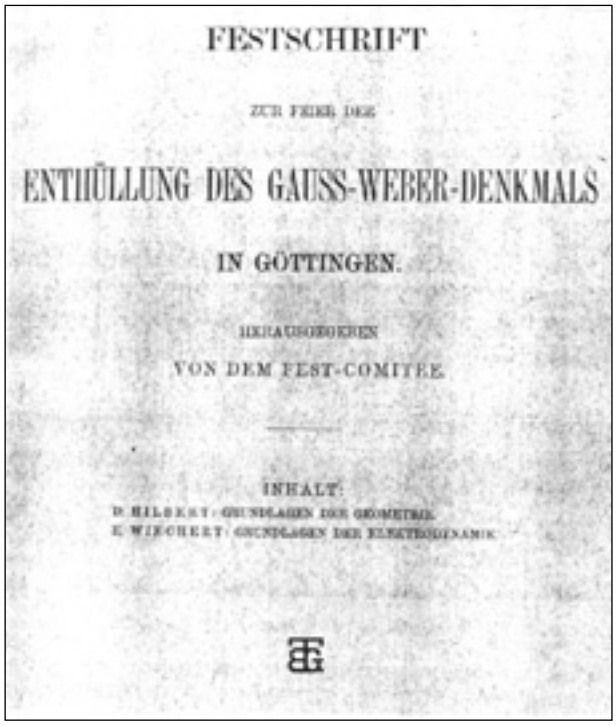
Hilbert's 'Grundlagen der Geometrie' *(1899)*

Jeremy Gray

The first of what were to prove many editions of David Hilbert's *Grundlagen der Geometrie* appeared in 1899. The novel character of the work, and its alleged implications for the move towards abstract axiomatic formulations of mathematics, are sometimes misunderstood, swallowed up in the folk memory of its remarkable author.

Hilbert had been interested in the foundations of geometry since lecturing on projective geometry at Königsberg in 1891, and he followed the debate in the literature on the subject. Did one need continuity assumptions to prove the fundamental theorem of plane projective geometry (there is a map sending any given quadrilateral to any other)? Could the fundamental theorem be derived from Desargues' and Pappus's theorems instead? In 1898 Friedrich Schur proved Pappus's theorem without assuming continuity, and Hilbert's insights began to crystallise. He was now at Göttingen (he had arrived in 1895) and


FESTSCHRIFT

ZUR FEIER DER

ENTHÜLLUNG DES GAUSS-WEBER-DENKMALS

IN GÖTTINGEN.

HERAUSGEGEBEN

VON DEM FEST-COMITÉE.

INHALT:

D. HILBERT: GRUNDLAGEN DER GEOMETRIE.

E. WIECHERT: GRUNDLAGEN DER ELEKTRODYNAMIK.

Klein asked him to write a memoir on the occasion of the unveiling of the Gauss-Weber statue there. Hilbert wrote his *Grundlagen der Geometrie*.

This booklet of some 90 pages divides the axioms of geometry into five groups: incidence, order, parallels, congruence, and continuity. This is not as transparent as it might seem. The parallel axiom is not introduced to facilitate a discussion of non-Euclidean geometry; that had to wait for a separate publication (included in later editions of the book) in which Bolyai-Lobachevskii was specifically described. In 1899 a non-Euclidean geometry for Hilbert was simply a geometry that was not Euclidean. The vexed issue of continuity (in 1899) was wrapped around the Archimedean axiom: given any three points A, A_1, and B on a line, construct a sequence of equal segments AA_1 , A_1A_2 , . . . , $A_{n-1}A_n$ such that B lies between A_{n-1} and A_n. This last point hints at a possibly unexpected feature of the *Grundlagen der Geometrie*: its focus on non-Archimedean geometries. These had been introduced (one might say re-introduced) by Veronese in his Italian book of 1891, which Hilbert probably read in the German translation of 1894, and he footnoted it as a profound work in his *Grundlagen*.

Hilbert then set about giving ingenious accounts of what axioms imply what theorems, and which results are independent of each other. A key tool in this is the introduction of coordinates, based on what Hilbert called the arithmetic of segments. The more axioms one has, the more tightly the coordinates are constrained. Thus if one has enough axioms one can prove Desargues' theorem in the plane. As Hilbert was the first to show (with a needlessly complicated proof that he replaced with one due to Moulton in later editions), there are plane geometries in which Desargues' theorem is false, but it follows from the incidence axioms in three or more dimensions. Segment arithmetic then showed that the coordinates must be taken from a number system that obeys the associative law. If Pappus's theorem is also true, then the number system must be commutative. In 1905 Hessenberg showed that Pappus's theorem implies Desargues', but not conversely.

The *Grundlagen der Geometrie* did indeed exert a major influence on mathematics. His friend Hurwitz hailed it as introducing a new field of axiomatics into the subject (neglecting, as Hilbert had, the strong Italian contribution during the 1890s). It inspired a number of problems in the famous list Hilbert presented in 1900 at the International Congress of Mathematicians in Paris. American mathematicians especially were drawn to the axiomatic foundations of many branches of mathematics. Its philosophical naïveté drew sharp criticisms from Frege, and however much Hilbert seems to have wanted to brush off Frege's comments they may well have alerted him to some of the complexities involved in defining numbers and clarifying the relationship between mathematics and logic, a growing concern of his in later years. Other imperfections, such as the obscure talk about a complete system of axioms, helped Veblen to formulate the concept of categoricity. Subsequent editions did not so much smooth this out as paper over the weak points with new expositions and add on numerous extensions. Far from being a paradigm, the undoubted success of Hilbert's *Grundlagen der Geometrie* owes much to the growing fame of its author and the collaborative and critical nature of work in mathematics.

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Societies Section

The Union of Bulgarian Mathematicians

Sava Grozdev

The Union of Bulgarian Mathematicians (UBM) is a voluntary, creative, non-political organisation whose purpose is to bring together people who are interested in mathematics and computer science or are involved in activities related to those fields. The UBM is self-funded and receives no bounty either from the state or from any social institutions.

The birthdate of the UBM was 14 February 1898 when a group of enthusiastic lecturers from the Department of Mathematics at the Higher School, teachers from the two High schools in Sofia at that time and the Chief Secretary of the Ministry of Education founded, under the leadership of Prof. Emanuil Ivanov, the Physical and Mathematical Society (PMS), a forerunner of the UBM. This happened several months after the First International Congress of Mathematicians at Zürich in August 1897. Thus the UBM is only a few years younger than the renowned Göttingen Mathematical Society instituted by F. Klein and H. Weber in 1892. Generations of mathematicians, physicists and computer scientists are deeply indebted to their patriotic precursors for the alliance which was founded as early as the late 19th century and has been bearing fruit for 100 years.

Since the very beginning of its existence, the UBM has been an open organisation. As a result of the institution of sections in many towns of the country, the UBM gradually became a national enterprise. For this reason at its 40th anniversary the PMS was renamed the Bulgarian Physical and Mathematical Society (BPMS). Initially, apart from the mathematicians, its membership included physicists, engineers, military servicemen, meteorologists, land-surveyors, school and college students (for example, the student section in the town of Stara Zagora had 120 members in 1939, the one in the region of Rajkovo had 200 members in 1940). Mathematicians, physicists, computer scientists and others researching closely related scientific issues and problems of education worked together in the same society until 1971, when they decided to separate and to form two independent organisations — the Society of Bulgarian Mathematicians (SBM) and Society of Bulgarian Physicists. In 1977 a Constituent Congress was held, at which the UBM assumed its current name.

In the last 30 years the number of sections of the UBM has been growing swiftly, eventually reaching 71. With a fervour characteristic of the Renaissance the members of the UBM recruit new sympathisers, and broaden and diversify their activities. In 1998, the year of its anniversary, the UBM had about 5000 members—teachers in mathematics and computer science, university lecturers, and scholars and specialists from all parts of the country. In its 100 years of existence the UBM has been chaired by internationally renowned scholars and established social figures. Among its presidents have been Dr. Ivan Salabashev, Prof. Emanuil Ivanov, Dr. Stefan Lafchiev (for more than thirty years), Acad. Georgi Nadzhakov, Acad. Bojan Petkanchin, Assoc. Prof. Petko Ivanov, Prof. Alipi Mateev, Acad. Ljubomir Iliev (now Honorary President of the UMB), Assoc. Prof. Ljubomir Davidov, Assoc. Prof. Chavdar Lozanov (President at the time of writing).

The activity of the first (and to this date the only) organisation of mathematicians and computer scientists in Bulgaria (whatever its name over the years—PMS, BPMS, BMS, UBM) has been steadily directed towards the fulfilment and the enrichment of Paragraph One of the first charter:

- to contribute towards the academic growth of its members and encourage them to pursue original research;
- to monitor the progress of scientific literature in the areas of physics and mathematics;
- to raise and discuss questions on education and point out means and methods for its improvement in general;
- to develop the general and the instructional Bulgarian terminology of these sciences;
- to critically survey books and textbooks (especially Bulgarian ones) on physics and mathematics;
- to offer moral and material support for the publication of independent research work and of good manuals and textbooks.

At present the activities of the UBM, whose organisation and management are founded on contemporary scientific principles, comprise everything in the country which is related to mathematics and computer science: holding scientific events; supporting the professional training of teachers, researchers and students; analysing problems of education at all stages; organising Olympiads, competitions and contests for students and teachers; popularising Mathematics and Computer science among students and the general public.

Since 1968 the UBM has been organising and holding annual Spring conferences with scientific programmes that include topics in mathematics, computer science, mathematical modelling, mechanics, the teaching of mathematics and computer science, etc. Problems of the structure and practice of contemporary education, instructional texts, professional training, etc., are discussed openly at these events, and discussions terminate in proposing solutions of the most urgent questions. The Spring conferences present an opportunity for mutually useful contacts between high-school teachers and university instructors.

The UBM organises and co-organises scientific events which cover a wide range of directions in mathematics and computer science. Among the most noteworthy ones are the National Seminar on Education in Mathematics and Computer Science, the National Colloquium on Mathematics, the Computer Science Seminar, the Stochastics Seminar and the Seminar on Problems of Education at Technical Higher Schools. In the period 1968–1998 more than 200 scientific conferences, summer schools, symposia, seminars, etc., have been held, with over 30000 attendants from more than 40 countries.

One of the major activities of the UBM is to work with talented students and their teachers. Through its team for out-of-school work in mathematics and computer science, which includes scholars from the Bulgarian Academy of Sciences, university lecturers and outstanding school teachers, the UBM provides scientific guidance for all national olympiads and competitions as well as preparating Bulgarian representatives at International Olympiads, Balkaniads, etc. in mathematics and computer science.

On the international scene the UBM cooperates with kindred organisations in Greece, Luxembourg, the

USA, Macedonia, Canada, as well as individual universities and institutes in Russia, Rumania, the Czech Republic, Germany, etc. Cooperation is based on direct contacts and exchange of specialists. Joint events are also organised. The UBM is a member of the European Mathematical Society and of the American Mathematical Society.

They style mathematics the Queen of Sciences, because the development of any scientific field is unthinkable without the tangible participation of mathematics. The 21st century will be the century of mathematics and computer science, of computers and computer technologies, and this is one of the reasons that the year 2000 has been chosen as World Mathematical Year by UNESCO—World Year of the Queen of Sciences.

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London Mathematical Society : De Morgan House

Ben Garling

The London Mathematical Society was founded in 1865 in University College, London. University College had itself been founded in Bloomsbury, north of central London, in 1826, both as a geographical counterbalance to the Universities of Oxford and Cambridge and as a secular counterbalance to the religious restrictions that then existed in Oxford and Cambridge.

University College had some strong and argumentative characters, but none more so than Augustus De Morgan, Professor of Mathematics from 1827 to 1831, and from 1836 to 1866: he resigned from his Chair twice, on each occasion on a matter of principle. The Society was established as a result of the efforts of his son George and a friend of his, but Augustus soon became heavily involved, and was elected the Society's first President.

The Society was originally intended to be an internal society of University College, but by the inaugural meeting it had been decided that its scope should be wider, and it was named the London Mathematical Society. To begin with it was run from University College, but it very rapidly became a Society meeting the needs of all British mathematicians, and within two years it had moved to premises in Burlington House.

Visitors to London will know Burlington House in Piccadilly as the

home of the Royal Academy; at present large crowds are thronging to the exhibition 'Monet in the twentieth century'. The Royal Academy is set back from Piccadilly; the wings on either side of the courtyard are occupied by learned societies such as the Society of Antiquaries, the Royal Astronomical Society, the Royal Society of Chemistry, the Linnean Society and the Geological Society. Until recently, the Society occupied a single room at the top of the Royal Astronomical Society, and there the Society developed and flourished. The Royal Astronomical Society were gracious hosts; Council met in its Council room, and Society meetings were frequently held in the Linnean Society's lecture room, next door.

It was decided at a retreat that the Society held in Oxford in April 1997 that the Society needed to expand its activities, and the fundamental decision was made that it should acquire premises of its own. The requirements that were imposed were severe: the headquarters should be centrally placed and easy to reach by visitors from outside London, there should be a suitable room where Council could meet, they should be near suitable lecture rooms, and the building should have an appropriate presence. Nevertheless, the Society found such a building, and moved in during February 1998.

The Society's headquarters are situated in Russell Square, the largest of the squares in Bloomsbury. All this part of Bloomsbury is part of the Bedford estate, and was developed by the Dukes of Bedford from the eighteenth century onwards. Russell is the family name of the Dukes of Bedford; Bertrand Russell was a relative.

The headquarters were formally opened in October 1998, and named De Morgan House in honour of Augustus De Morgan, by Sir Michael Atiyah, former President of the Society, De Morgan medallist and Fields medallist. He was supported by other Fields medallist members of the Society living and working in Britain: Alan Baker, Richard Borcherds, Simon Donaldson, Timothy Gowers, Daniel Quillen and Klaus Roth. At the opening, David Larman, head of the Mathematics Department at University College, presented the Society with two pictures of De Morgan. The Society has once again become a close neighbour of University College, and uses its lecture rooms for its meetings.

What does De Morgan House provide? Besides offices, it has a spacious Council Room, called the Hardy Room in honour of G. H. Hardy, active member and generous benefactor of the Society; this doubles as a seminar room for up to 40 people. It has a comfortable and elegant Members' Room, called the Verblunsky room after Professor S. Verblunsky, whose benefaction was used to furnish it. This is a convenient centre for members visiting London — and please remember that reciprocity membership is available to members of the Belgian, Danish, Dutch, Finnish, French, German, Italian, Norwegian, Swedish and Swiss mathematical societies (for details, *e-mail lms@lms.ac.uk*). But above all, De Morgan House provides a firm base from which the London Mathematical Society can expand its present activities, and undertake new tasks, in its endeavours to forward the cause of mathematics.

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Obituary of André Weil

Beyond the frontier of numbers

Jeremy Gray

André Weil, who has died aged 92, was one of the century's greatest mathematicians. He will be remembered not only for his own remarkable achievements, but for his profound conjectures, which helped direct research for a generation. He was also one of the founders of an encyclopaedic group of, largely French, mathematicians, jokingly named "Nicolas Bourbaki" after a general who fought in the Franco-Prussian war.

Weil was born in Paris and graduated from the Ecole Normale Supérieure at the age of 19. He then travelled extensively, spending two years at Aligarh Muslim University in India from 1930 to 1932, before returning to France, where he taught at Strasbourg until 1939. When the second world war broke out he was a conscientious objector, and spent four months in Bonne Nouvelle prison, Rouen, where, as the son of Jewish parents, his life was imperilled. Eventually he was able to make his way to America. During this period he exchanged many letters with his younger sister, Simone Weil, the social activist and mystical philospher who died in England in 1943.

It was also in the difficult years of the early 1940s that Weil began to formulate his profoundest ideas on mathematics. His first significant result, published in 1929, extended the ideas of Henri Poincaré, who had indicated that results in number theory might be obtained by thinking geometrically.

Weil's later conjectures drew together a range of geometric ideas of Italian origin with problems in the theory of numbers much studied by German mathematicians. They extended Poincaré's ideas from one to any number of dimensions, and made sense only by bold analogy with the developing field of topology. But while the conjectures made sense, and could even be verified in simple cases, none of the known topological methods applied, and Weil called for a massive extension of topological methods to the new setting. His four conjectures were eventually solved by later members of Bourbaki — two by Alexandre Grothendieck, and the last by Pierre Deligne — in the early 1970s. The methods invented led to the decisive tools by which Fermat's Theorem and several other major results in mathematics have recently been solved.

Weil was scathing about mathematicians who base conjectures on little more than their own failure to prove a result they would like to be true. His conjectures were precise but profound generalisations of known results, and by putting them in the public domain he carried out the duty of the leading mathematicians of any period: to shape the future of the subject. In this enterprise he was greatly helped by Nicolas Bourbaki.

As a mathematician in his twenties, Weil had become painfully aware of how many of the older generation of French mathematicians had died in the first world war, and how far, as a result, France lagged behind Germany in the study of the subject. He drew like-minded mathematicians around him, and they set themselves the task of writing a one-volume book which would present modern analysis — essentially the calculus — in a useful but rigorous form.

Inspired by the comic traditions of the Ecole Normale Supérieure, Weil jokingly gave the group the name Nicolas Bourbaki. The project grew and came to reflect the interests of its founders, who included such notables as Claude Chevalley and Jean Dieudonné. They were largely dispersed by the second world war, but reunited afterwards in Nancy and Chicago.

By now the project was one of writing the equivalent of *Euclid's Elements*, an entire encyclopaedia of modern, largely pure, mathematics. The group of seven Bourbaki met regularly and circulated drafts to heated debate. Unanimity was required before anything was published. Membership in Bourbaki lapses at the age of 50, and several generations have been through it.

Because of the eminence of individual members their encyclopaedia has had an extraordinary influence in France and French-speaking countries, although it is often criticised for its abstract style, lacking in motivation and application. But pedagogy was never the aim of Bourbaki, whose seminars set the tone for research internationally for many years. In keeping with the original joke, Bourbaki enjoyed a semi-public life, attending conferences, giving papers, denying that he was a collective fiction.

Several Bourbaki, including Grothendieck and Deligne, were awarded Fields medals, the mathematical equivalent of the Nobel prize, but never Weil. This is perhaps because the first were awarded in 1936, and the next in 1950, by which time he was above the notional limit of 40.

After the second world war, Weil became a professor at Chicago and later at the Institute for Advanced Study at Princeton. There he collaborated with a number of famous mathematicians, and through major books and papers over many years, continued to exert considerable influence on the growth of mathematics in America. In later life he took an interest in the history of mathematics. He wrote a fine and sensitive study of number theory from Babylonian times to 1800, and edited some of the work of his great predecessors, Jacques Bernoulli and Pierre Fermat.

In 1994, his lifetime of achievement was acknowledged when he was awarded the Kyoto prize in basic science from the Inamori Foundation of Kyoto, Japan. His wife, Eveline, died in 1986. He is survived by two daughters and three grandchildren.

André Weil, mathematician
born May 6, 1906
died August 6, 1998

[This obituary appeared in The 'Guardian' on 12 August 1998; the photograph is reproduced courtesy of the London Mathematical Society]

Oberwolfach Programme 2000

Mathematisches Forschungsinstitut Oberwolfach
Lorenzhof, D-77709 Oberwolfach-Walke, Germany

Names of organisers are in square brackets. Participants of the meetings at Oberwolfach are invited personally by the director of the institute; the participation is subject to such an invitation. Interested researchers, in particular young mathematicians, can contact the administration of the institute. Since the number of participants is restricted, not all enquiries can be considered. Information is also available on our website http://www.mfo.de

2-8 January: Kombinatorik
[Laszló Lovász (New Haven), Hans Jürgen Prömel (Berlin)]

9-15 January: Kontinuierliche Optimierung und Industrieanwendungen
[Aharon Ben-Tal (Haifa), Arkadii Nemirovskii (Haifa), Josef Stoer (Würzburg), Jochem Zowe (Erlangen)]

16-22 January: Modelltheorie
[Alexander Prestel (Konstanz), Martin Ziegler (Freiburg)]

23-29 January: Mathematik poröser Medien
[Cornelius van Duijn (Amsterdam), Peter Knabner (Erlangen)]

30 January-5 February: The History of the Mathematics of the 20th Century
[Moritz Epple (Mainz), Jeremy Gray (Milton Keynes), Jesper Lützen (Copenhagen)]

6-12 February: Medical Statistics: Current Developments in Statistical Methodology for Clinical Trials
[Helmut Schäfer (Marburg), Richard Simon (Bethesda)]

13-19 February: Geometric Stochastic Analysis
[Kenneth Elworthy (Warwick), Jürgen Jost (Leipzig), Karl-Theodor Sturm (Bonn)]

20-26 February: Darstellungstheorie endlich-dimensionaler Algebren
[Idun Reiten (Dragvoll), Claus Michael Ringel (Bielefeld)]

27 February-4 March: Lattices, Polytopes and Tilings
[Nikolai Dolbilin (Moscow), Rudolf Scharlau (Dortmund)]

27 February-4 March: Sparse Approximation of Non-Local Operators
[Wolfgang Hackbusch (Kiel), Tobias von Petersdorff (College Park), Stefan Sauter (Leipzig)]

5-11 March: Automorphic Forms and Representation Theory
[Stephen Kudla (College Park), Joachim Schwermer (Düsseldorf)]

12-18 March: Mathematische Stochastik
[Peter Bickel (Berkeley), Simon Tavare (Los Angeles), Anton Wakolbinger (Frankfurt)]

19-25 March: Functional Analysis and Partial Differential Equations
[Wolfgang Arendt (Ulm), Philippe Benilan (Besançon), Philippe Clement (Delft), Jan Prüss (Halle)]

26 March-1 April: Nichtkommutative Geometrie
[Alain Connes (Paris), Joachim Cuntz (Münster), Marc Rieffel (Berkeley)]

2-8 April: Arbeitsgemienschaft mit aktuellem Thema (wird in Heft 1/2000 der DMV-Mitteilungen bekanntgegeben)
[organisers to be announced]

9-15 April Diophantische Approximationen
[Hugh Montgomery (Ann Arbor), Yuri Nesterenko (Moscow), Hans Peter Schlickewei (Marburg), Robert Tijdeman (Leiden)]

16-22 April: Gitterlose Diskretisierugen für partielle Differentialgleichungen
[Ivo Babuska (Austin), Michael Griebel (Bonn), Harry Yserentant (Tübingen)]

23-29 April: Representation Theory and Complex Analysis
[Jacques Faraut (Paris), Alan Huckleberry (Bochum), Karl-Hermann Neeb (Darmstadt)]

30 April-6 May: Kodierungstheorie
[Gerard van der Geer (Amsterdam), Henning Stichtenoch (Essen), Vijay Kumar (Los Angeles)]

7-13 May: Stochastic Analysis in Finance and Insurance
[Darrell Duffie (Stanford), Paul Embrechts (Zürich), Hans Föllmer (Berlin)]

14-20 May: Affine Algebraic Geometry
[Hubert Flenner (Bochum), Hanspeter Kraft (Basel), Peter Russell (Montreal)]

21-27 May: Self-interacting Random Processes
[Erwin Bolthausen (Zürich), David Brydges (Charlottesville), Frank den Hollander (Nijmegen)]

28 May-3 June: Discrete Geometry
[Ulrich Brehm (Dresden), Jacob Goodman (New York), Richard Pollack (New York), Jörg Wills (Siegen)]

4-10 June: Optimale Steuerung komplexer dynamischer Strukturen
[Karl-Heinz Hoffmann (München), Günter Leugering (Bayreuth), Jürgen Sprekels (Berlin), Fredi Tröltzsch (Chemnitz)]

11-17 June: DMV-Seminars
[organisers to be announced]

18-24 June: Topics in Classical Algebraic Geometry
[David Eisenbud (Waltham), Joseph Harris (Cambridge), Frank-Olaf Schreyer (Bayreuth)]

25 June-1 July: Geometric Analysis and Singular Spaces
[Jean-Michel Bismut (Orsay), Jochen Brüning (Berlin), Richard Melrose (Cambridge)]

2-8 July: Calculus of Variations
[Gianni Dal Maso (Trieste), Gero Friesecke (Oxford), Frederic Helein (Cachan)]

9-15 July: Harmonische Analysis und Darstellungstheorie topologischer Gruppen
[Roger Howe (New Haven), Eberhard Kaniuth (Paderborn), Gerard Schiffman (Strasbourg)]

16-22 July: Mathematical Aspects of Gravitation
[Gerhard Huisken (Tübingen), James Isenberg (Eugene), Alan Rendall (Potsdam)]

23-29 July: Cohomology of Finite Groups: Interactions and Applications
[Alejandro Adem (Madison), Jon Carlson (Athens), Hans-Werner Henn (Strasbourg)]

30 July-5 August: Arithmetic Algebraic Geometry
[Gert Faltings (Bonn), Günter Harder (Bonn), Nicholas Katz (Princeton)]

6-12 August: Effiziente Algorithmen
[Susanne Albers (Paderborn), Torben Hagerup (Frankfurt), Giuseppe Italiano (Rome), Kurt Mehlhorn (Saarbrücken)]

13-19 August: Jordan-Algebren
[Wilhelm Kaup (Tübingen), Kevin McCrimmon (Charlottesville), Holger Petersson (Hagen), Efim Zelmanov (New Haven)]

20-26 August: Mathematical Continuum Mechanics

[John Ball (Oxford), Richard James (Minneapolis), Stefan Müller (Leipzig)]
27 August-2 September: Komplexe Analysis
[Jean-Pierre Demailly (St Martin d'Heres), Klaus Hulek (Hannover), Thomas Peternell (Bayreuth)]
3-9 September: Analytical and Statistical Approaches to Fluid Models
[Peter Constantin (Chicago), Alexander Mielke (Hannover), Edriss Titi (Irvine)]
10-16 September: Komplexitätskontrolle bei starken Abhängigkeiten
[Ursula Gather (Dortmung), Wolfgang Härdle (Berlin), Joel Horowitz (Iowa City)]
17-23 September: Niedrigdimensionale Topologie
[Michel Boileau (Toulouse), Klaus Johannson (Knoxville), Heiner Zieschang (Bochum)]
24-30 September: Topologie
[Robion Kirby (Berkeley), Wolfgang Lück (Münster), Elmer Rees (Edinburgh)]
1-7 October: Geometrie
[Victor Bangert (Freiburg), Yurii Burago (St Petersburg), Ulrich Pinkall (Berlin)]
8-14 October: Arbeitsgemeinschaft mit aktuallem Thema (wird in Heft 3/2000 der DMV-Mitteilungen bekanntgegeben)
[organisers to be announced]
15-21 October: DMV-Seminars
[organisers to be announced]
22-28 October: Hyperbolic Conservation Laws
[Constantine Dafermos (Providence), Dietmar Kröner (Freiburg), Randall LeVeque (Seattle)]
29 October-4 November: Random Matrices
[Philippe Biane (Paris), Andreas Knauf (Leipzig), Peter Sarnak (Princeton)]
5-11 November: Fortbildungslehrgang für Studienräte
[organisers to be announced]
12-18 November: DMV-Seminars
[organisers to be announced]
19-25 November: Complexity Theory
[Joachim von zur Gathen (Paderborn), Oded Goldreich (Rehovot), Claus-Peter Schnorr (Frankfurt)]
26 November-2 December: Nichtnegative Matrizen, *M*-Matrizen und deren Verallgemeinerungen
[Daniel Hershkowitz (Haifa), Volker Mehrmann (Chemnitz), Hans Schneider (Madison)]
3-9 December: The Mathematics of Discrete Tomography
[Richard Gardner (Bellingham), Peter Gritzmann (München)]
10-16 December: Global Invariant Manifolds in Dynamical Systems
[Wolf-Jürgen Beyn (Bielefeld), Bernold Fiedler (Berlin), John Guckenheimer (Ithaca)]
17-23 December: Thermodynamische Materialtheorien
[Wolfgang Bürger (Karlsruhe), Ingo Müller (Berlin)]

Call for Proposals for Scientific Meetings in the INTERNATIONAL MATHEMATICAL BANACH CENTER Warsaw, Poland

The Institute of Mathematics of the Polish Academy of Sciences announces a competition for organizing scientific meetings in mathematics and applied mathematics at the International Mathematical Banach Center, Warsaw, Poland, for the years 2000-2001. Interdisciplinary meetings related to mathematics are particularly welcome. The meetings can take the form of semesters, mini-semesters, conferences, workshops or intensive schools for graduate students. The Banach Center provides essential financial support; independently, there are other possibilities for obtaining additional funds. *The deadline for applications is **30 April 1999***.
At the beginning of May the Scientific Council of the Banach Center, chaired by Professor Friedrich Hirzebruch, will consider applications. The selected applications will appear in the official program of the Banach Center for 2000-2001.
Independently of the above meetings, the Banach Center organizes 'research groups' (smaller gatherings of 2-15 people). Applications for research groups are independent of larger conferences or semesters and can be submitted at any time, preferably about 4-6 months in advance, and the acceptance procedure is much simpler.
In the age of electronic communication, practically all organizational work can be done via e-mail. Because of this, there are no restrictions on the location of the organizers. Additional information, including application procedures, can be obtained from the following address and Internet site:
Secretary, Banach Center, Mokotowska 25, PO Box 137, 00-950 Warsaw, Poland
tel: (+48)-22-628-0192; fax: (+48)-22-622-5750
e-mail: office@banach.impan.gov.pl or rd@impan.gov.pl
http://www.impan.gov.pl/BC

Forthcoming conferences

compiled by Kathleen A S 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 below, and sent as text files or MSWord files (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. The present issue includes conferences up to September 1999.

April 1999

18-24: Spring School on Functional Analysis, Paseky, Czech Republic
Programme: four series of lectures given by Isaac Namioka (Seattle), *Recent trends in Banach spaces*, Vladimir Fonf (Negev), *Polyhedral Banach spaces*, Jesus Castillo (Extremadura), *Structure of subspaces and quotients of Banach spaces* and Nigel Kalton (Missouri), *title to be announced*; there will also be short communications
Information: contact Jaroslav Lukes, Department of Mathematical Analysis, Sokolovská 83, 186 75 Praha 8, Czech Republic
e-mail: paseky@karlin.mff.cuni.cz
http://www.karlin.mff.cuni.cz/katedry/kma/ss
*[for details see EMS Newsletter **30**, December 1998]*

22-24: Inverse Problems in Stratified Media, Aarhus, Denmark
Organiser: MaPhySto: Centre for Mathematical Physics and Stochastics
Programme committee: J.-C. Guillot (Paris), B. H. Jacobsen (Aarhus), A. Jensen (Aalborg)
Information: *e-mail: matarne@math.auc.dk*
http://www.maphysto.dk/events/InvProbW99/

May 1999

12-20: Advanced Course on Integral Operators and Related Problems, Tbilisi, Georgia
Programme: the course is suitable for advanced graduate student or recent Ph.D.s; there are three series of lectures by Paolo Ricci (Rome) on *Generalised orthogonal polynomials of hypergeometric type*, *Computation of Newton sum-rules for the zeros of orthogonal polynomials*, *Computation of the eigenvalues of second-kind Fredholm operators*, and one series by Dazmir Schulaia (Tbilisi) on *Linear theory of integral equations and their applications*
Information: contact TICMI, I. Vekua Institute of Applied Mathematics of Tbilisi State University, University Str. 2, Tbilisi 380043, Georgia; tel: (+995)-32-305995
e-mail: jaiani@viam.hepi.edu.ge
http://www.viam.hepi.edu.ge/others/TICMI
*[for details see EMS Newsletter **30**, December 1998]*

14-16: BLMS'99 (Joint meeting of the Belgian Mathematical Society and the London Mathematical Society), Brussels, Belgium
Topics: algebraic geometry and mathematical logic; combinatorics and finite geometries; differential geometry and mathematical physics; stochastic mathematics
Programme: four plenary lectures; eight 40-minute lectures in each of the above areas
Speakers: *plenary lecturers*: H. Föllmer (Berlin), W. T. Gowers (Cambridge), M. Kontsevich (IHES), A. Macintyre (Edinburgh); *algebraic geometry*: D. Abramovitch (Boston), A. Borovik (Manchester), Z. Chatzidakis (Paris), M. Coppens (Ceel), T. Gardner (Oxford), F. Loeser (Paris), T. Scanlon (Berkeley), W. Veys (Leuven); *combinatorics*: M. Aigner (Berlin), A. E. Brouwer (Eindhoven), F. Buekenhout (Brussels), W. Haemers (Tilburg), J. W. P. Hirschfeld (Sussex), H. Van Maldeghem (Cent), D. Welsh (Oxford), G. Ziegler (Berlin); differential geometry: J.-C. Alvarez (Louvain), B. Bowditch (Southampton), M. Cahen (Brussels), R. Dijkgraaf (Amsterdam), B. Driver (San Diego), M. Gross (Warwick), D. Joyce (Oxford), A. Reznikov (Durham); *stochastic mathematics*: L. Devroye (McGill), B. Driver (San Diego), P. Embrechts (Zürich), R. Griffiths (Oxford), G. Louchard (Brussels), G. P. Nason (Bristol), D. O. Siegmund (Stanford/Cambridge), J. Teugels (Leuven)
Local organising committee: L. Lemaire, J. Leroy, M. Parker, Campus Plaine ULB
Information: contact Jules Leroy, Campus Plaine ULB, C.P. 218/01, Boulevard du Triomphe, B-1050 Brussels, Belgium; tel: (+32)-2-650-58-45; fax: (+32)-2-650-58-67
e-mail: leroy@ulb.ac.be
http://www.ulb.ac.be/assoc/bms/BLMS'99html
*[For details see EMS Newsletter **30**, December 1998]*

17-21: Méthodes homologiques, Luminy, France
Scope: Hochschild homology and cyclic homology, algebraic *K*-theory, theory of classical groups and representations, Hopf algebras, Hochschild cohomology and the theory of representations of algebras of finite dimension; this colloquium is part of the programme of cooperation between France and several Latin American countries: Argentina, Brazil, Chile, Colombia and Uruguay
Organisers: Claude Cibils (Montpellier) and Max Karoubi (Paris)
Programme committee: T. Lambre (Orsay), A. Solotar (Buenos Aires/Orsay), J. Soto-Andrade (Santiago)
Site: C.I.R.M. (Centre Internat. de Rencontres Mathématiques)
Note: accommodation at C.I.R.M. is limited; requests by 31 March (preferably electronically)
Information: contact Mlle. Bernadette Lacan, Département de Mathématiques, Université de Montpellier 2, F-34095 Montpellier 5, France; fax: (+33)-467-14-35-58
e-mail: lacan@math.univ-montp2.fr
http://www.math.univmontp2.fr/vaquerias/homologiques.html

26-28: Crystallographic Groups and their Generalizations, Kortrijk, Belgium
Scope: recent developments concerning crystallographic groups, and their generalizations; topics include affine crystallographic groups and affine manifolds, almost crystallographic groups and infranilmanifolds, polynomial structures on polycyclic-by-finite groups and polynomial manifolds, discrete subgroups of Lie groups and homogeneous spaces, localisation problems for groups, finitely generated groups, quasi-isometry and rigidity, geometric group theory
Organisers: Paul Igodt, Karel Dekimpe and Wim Malfait (Kortrijk), Yves Felix (Louvain la Neuve)
Programme committee: H. Abels (Bielefeld), Y. Felix (Louvain la Neuve), F. Grunewald (Dusseldorf), P. Igodt (Leuven/Kortrijk)
Information: contact Paul Igodt, K. U. Leuven Campus Kortrijk, Department of Mathematics, Etienne Sabbelaan 53, B-8500 Kortrijk; tel: (+32)-56-24-61-37; fax: (+32)-56-24-69-99
e-mail: Paul.Igodt@kulak.ac.be
http://www.kulak.ac.be/workshop

27-29: Mathematics towards the Third Millenium, Rome, Italy
Aim: to present a wide spectrum of trends of current research that might serve as guidelines for future developments
Speakers: V. Arnold, E. Bombieri, A. Connes, C. Fefferman, P. Griffiths, M. Gromov, M. Kontsevitch, E. Lieb, D. McDuff, D. Mumford, M. Talagrand, K. Uhlenbeck, D. Vogan
Organisers: S. Abeasis, V. Baldoni, G. M. Piacentini Cattaneo, E. Prestini, C. Rossi, E. Strickland, G. Tarantello
Site: Accademia Nazionale dei Lincei, Rome
Information: contact Dipartimento di Matematica, Universita di Roma Tor Vergata, Via della Ricerca Scientifica 00133, Roma, Italy; tel/fax: (+39)-6-2023507
e-mail: math2000@mat.uniroma2.it
http://www.mat.uniroma2.it/~math2000

June 1999

4-9: EURESCO: Geometry, Analysis & Mathematical Physics: Analysis & Geometry, Obernai (near Strasbourg), France
Scope: to review recent developments in

symplectic geometry, contact geometry and Floer homology, Gromov-Witten invariants and mirror symmetry, Donaldson and Selberg-Witten invariants, symplectic analysis in infinite dimensions, moduli spaces
Organiser: Jean-Michel Bismut (Orsay)
Speakers: D. Auroux (Paris), P. Biran (Stanford), Y. Chekanov (Moscow), R. Dikgraaf (Amsterdam), R. Fintushel (Michigan), E. Getzler (Northwestern), E. Giroux (Lyon), V. Giventhal (Berkeley), L. Jeffrey (Toronto), Y. Karshon (Jerusalem), M. Kontsevich (Bures/Yvette), S. Kuskin (Edinburgh), G. Liu (UCLA), E. Meinrenken (Toronto), T. Mrowka (MIT), W. Nahm (Bonn), L. Polterovich (Tel Aviv), Y. Ruan (Wisconsin), M. Schwarz (Stanford), P. Seidel (Bonn), J.-C. Sikorav (Toulouse), K. Uhlenbeck (Austin), S. T. Yau (Harvard)
Information: contact Dr. J. Hendekovic, European Science Foundation, 1 quai Lezay-Marnésia, 67080 Strasbourg Cedex, France; tel: (+33)-3-88-76-71-35; fax: (+33)-3-88-36-69-87
e-mail: euresco@esf.org
http://www.esf.org/euresco

7-11: 11th International Conference on Formal Power Series and Algebraic Combinatorics (FPSAC'99), Barcelona, Spain
Scope: algebraic and bijective combinatorics and their relations to other parts of mathematics, computer science and physics
Organiser: Universitat Politecnica de Catalunya
Programme committee: G. Almkvist, H. Barcelo, F. Bergeron, R. Cori (co-chair), J. M. Fedou, K. Koike, C. Martinez, A. Mikhalev, M. Noy, P. Paule, R. Pinzani, O. Serra (co-chair), R. Simion, D. Stanton, S. Sundaram, J. Y. Thibon, V. Welker, N. Wormald, J. Zeng
Information: contact Marc Noy, Pau Gargallo #5, Dept. Matematica Aplicada II, E-08028 Barcelona, Spain; tel: (+34)-934016927; fax: (+34)-93401728
e-mail: fpsac99@grec.upc.es
www-ma2.upc.es/~fpsac99

7-11: International Society of The Arts, Mathematics, and Architecture (ISAMA99), San Sebastian, Spain
Aim: to relate the arts and architecture with mathematics
Organiser: N. Friedman
Information: tel: (+1)-518-442-4621, fax: (+1)-518-442-4731
e-mail: artmath@csc.albany.edu
http://www.sc.ehu.es/ISMA99/

14-19: MATHTOOLS'99 (Tools for Mathematical Modelling), St Petersburg, Russia
Aim: a multidisciplinary conference on the latest advances in the theory of mathematical modelling and its role in the explanation of some non-linear effects arising in real systems, as well as the demonstration of up-to-date efficient methods for solving applied technical problems; this is the second of a series of conferences initiated in 1996, organized by the State Technical University of St Petersburg
Scope: mathematical modelling; computer algebra; design techniques; numerical methods; parallel and distributed algorithms; computer modelling in dynamical systems; mathematical models in biology, medicine, ecology, etc.; applications to physics, electrotechniques, and electronics; dynamic economic models; general macroeconomic models; market models
Programme: 1-hour invited lectures and 20-minute presentations of contributed papers; invited talks will highlight some of the major accomplishments, trends and problems in the theory
Working languages: English and Russian
Call for papers: papers are selected on the basis of an abstract (1-2 complete pages, hard copy only), which should include the title of the paper, names, addresses and complete affiliations of all authors, and appropriate references
Organising committee: G. S. Osipenko (chair),Yuri Ivanov (secretary)
Scientific committee: G. Tardivel (UK), A. Kasterin (Russia), D. Dytte (Denmark), M. Seppala (Finland), G. Picci (Italy), B. Fuchssteiner (Germany), A. Zhizchenko (Russia), O. Plechova (Russia), J. Hugger (Denmark), F. Topsoe (Denmark), S. Znamensii (Russia), M. Mrozek (Poland), V. Tkachenko (Ukraine), L. Belous (Ukraine), V. Zavadskii (Belorussia), V. Malozemov (Russia), A. Petukhov (Russia)
Proceedings: it is hoped that all invited talks and papers accepted for presentation will be published
Registration fees: participant US$100, student US$25, participant from the former Soviet Union US$25
Site: St Petersburg State Technical University
Deadline: 30 April for abstracts and registration forms
Information: contact Yuri Ivanov, MATHTOOLS'99, Department of Mathematics, State Technical University, Polytechnicheskaya st., 29 St Petersburg 195251, Russia; fax: (+7)-812-5343314, (+7)-812-5341404
e-mail: lab@osipenko.stu.neva.ru or math@math.hop.stu.neva.ru

16-19: Commutative Algebra and Algebraic Geometry, Messina, Sicily
Aim: to inform participants of recent progress in commutative algebra and algebraic geometry and to promote interactions between these fields and their combinatorial aspects
Programme: 1-hour invited expositions of recent developments; contributed talks by participants; poster session for young researchers
Speakers: Luchezar Avramov (Purdue), Hyman Bass (Columbia), Winfried Bruns (Osnabrück), Luca Chiantini (Siena), Dale Cutkosky (Missouri), Joseph Gubeladze (Georgia), Karen Smith (Michigan), Giuseppe Valla (Genova), Chuck Weibel (Rutgers)
Organisers: Gaetana Restuccia (Messina), Jürgen Herzog (Essen)
Scientific committee: L. Ein (Illinois), J. Herzog (Essen), T. Hibi (Osaka), G. Restuccia (Messina), H. Seydi (Dakar), R. Strano (Catania), P. Valabrega (Torino), W. Vasconcelos (Rutgers)
Grants: some support will be available for graduate students
Site: University of Messina, Sicily, Italy
Information: anyone interested in further information should send to the organisers: name, institution, e-mail address and estimated probability of attending; address: Department of Mathematics, Faculty of Science, University of Messina
e-mail: caag@dipmat.unime.it
http://dipmat.unime.it/caag

19-25: Dynamics of Patterns, Anogia, Crete, Greece
[part of the series *Euroconferences in Mathematics on Crete*]
Organisers: N. Alikakos (Athens), J. Ockendon (Oxford), G. Papanicolaou (Stanford)
Main speakers: G. Fusco (L'Aquila, Italy), W. Jaeger (Heidelberg), J. Ockendon (Oxford), E. Presutti (Rome), M. Soner (Princeton), M. Struwe (Zürich)
Fees: registration fee 250 ECU; living expenses (accommodation plus meals) per person per day about 30 ECU (double room) or 38 ECU (single room)
Grants: some funds are available for young researchers; for information, contact Susanna Papadopoulou, Department of Mathematics, University of Crete, Heraklion, Crete, Greece; fax: (+30)-81-393881; *e-mail: souzana@math.uch.gr*
Site: Anogia Academic Village, a conference centre about 45 minutes by car from Heraklion
Information: contact N. Alikakos, Mathematics Department, University of Athens, Panepistimiopolis, 15784 Zografou, Athens, Greece
e-mail: nalikako@cc.uoa.gr

21-27: CIME Session on Computational Mathematics Driven by Industrial Applications, Martina Franca, Italy
Scientific directors: V. Capasso (Milan), H. W. Engl (Linz) and J. Periaux (Paris)
Programme: four series of five lectures: R. Burkard (Graz), *Paths, trees and flows: graph optimization problems with industrial applications*; P. Deuflhard (Berlin), *New computational concepts, adaptive differential equation solvers, and virtual labs*, J. L. Lions (Paris), *Mathematical problems in industry*; G. Strang (MIT), *Wavelet transforms and cosine transforms in signal and image processing*, and series of two lectures by the scientific directors and by R. Mattheij (Eindhoven), *Mathematics of glass*
Information: http://www.math.unifi.it/CIME/
*[for details see EMS Newsletter **30**, December 1998]*

23-25: Bar-Ilan Symposium on The Foundations of Artificial Intelligence (BISFAI99), Ramat Gan, Israel
Scope: bridging theory and practice, theory-based practical implementations and commercial applications
Speakers: to include S. Rosenschein (Stanford) and L. Joskowicz (Israel)
Programme committee: L. Aiello, R. Ben-Eliyahu, Y. Choueka, E. Davis, R. Dechter, R. Feldman, N. Friedman, H. Geffner, D. Geiger, S. Kraus, D. Lehmann, S. Markovitch, J. McCarthy, J. Minker, J. Rosenschein, E. Sandewall, E. Santos, U.

Schild, M. Tennenholtz, B. Webber
Information: http://www-formal.stanford.edu/leora/bisfai/

25-30: EURESCO: Number Theory & Arithmetical Geometry: Arakelov Geometry & Applications, Obernai (near Strasbourg), France
Scope: foundational results in Arakelov geometry: hermitian geometry and analysis on complex manifolds; intersection theory and Riemann-Roch theorem; applications to diophantine approximation; Arakelov geometry of abelian varieties and their moduli spaces
Organisers: Jean-Benoët Bost (Orsay) and U. Jannsen (Cologne)
Speakers: A. Abbes (Paris), J.-M. Bismut (Orsay), J. I. Burgos (Barcelona), P. Cohen (Lille), S. David (Paris), R. Ferretti (Zürich), C. Gasbarri (Cologne), H. Gillet (Chicago), K. Köhler (Bonn), J. Kramer (Berlin), S. S. Kudia (Maryland), K. Künnemann (Cologne), J.-H. Everste (Leiden), V. Maillot (Paris), M. McQuillan (Oxford), D. Roessler (Bures/Yvette), L. Szpiro (Orsay), H. Tamvakis (Philadelphia), E. Ullmo (Orsay)
Information: contact Dr. J. Hendekovic, European Science Foundation, 1 quai Lezay-Marnésia, 67080 Strasbourg Cedex, France; tel: (+33)-3-88-76-71-35; fax: (+33)-3-88-36-69-87
e-mail: euresco@esf.org
http://www.esf.org/euresco

26-2 July: EURESCO: Algebra & Discrete Mathematics: Infinite Combinatorics & their Impact on Algebra, Hattingen, Germany
Scope: combinatorial methods and results in set theory and their application to algebra; recent advances in cardinal arithmetic and the interplay between them and various subfields of algebra, particularly commutative algebra and module theory
Organisers: Saharon Shelah (Jerusalem) and Rüdiger Göbel (Essen)
Speakers: B. Belcar (Prague), A. Blass (Michigan), J. Brendle (Kobe), M. Droste (Dresden), M. Dugas (Waco), M. Dzamonja (Norwich), P. Eklof (Irvine), M. Goldstern (Vienna), R. Grossberg (Pittsburgh), W. Hodges (London), E. Hrushovsky (IHES/Jerusalem), T. Hyttinen (Helsinki), M. Kojman (Negev), P. Komjath (Budapest), S. Koppelberg (Berlin), M. C. Laskowski (Maryland), C. Metelli (Naples), D. Monk (Colorado), O. Spinas (Zürich), S. Thomas (New York), B. Velickovic (Paris), M. Ziegler (Freiburg)
Information: contact Dr. J. Hendekovic, European Science Foundation, 1 quai Lezay-Marnésia, 67080 Strasbourg Cedex, France; tel: (+33)-3-88-76-71-35; fax: (+33)-3-88-36-69-87
e-mail: euresco@esf.org
http://www.esf.org/euresco/

26-2 July: Holomorphic Dynamics, Anogia, Crete, Greece
[part of the series *Euroconferences in Mathematics on Crete*]
Organisers: K. Athanassopoulos (Crete), S. Bullett (London), A. Douady (Paris), B. Harvey (London)
Main speakers: K. Astala (Jyvaskyla, Finland), B. Branner (Lyngby), A. Douady (Paris), J. Hubbard (Cornell), M. Lyubich (Stony Brook, USA)
Fees, Grants, Site: see information for 19-25 June, *Dynamics of Patterns*
Information: contact S. Bullett, School of Mathematical Sciences, Queen Mary & Westfield College, University of London, Mile End Road, London E1 4NS, UK
e-mail: s.r.bullett@qmw.ac.uk

28-30: International Conference on Geometry, Porto, Portugal
[3rd meeting of the project *Algebra, Geometria e Combinatoria* (Praxis 2/2.1/MAT/63/94)]
Organisers: Gabriela Chaves, Peter Gothen, Luisa Magalhaes
Main speakers: Luis Cordero (Santiago de Compostela), Antonio Costa (Madrid), Ron Donagi (Pennsylvania), Teresa Monteiro Fernandes (Lisboa), Ivan Penkov (California), John Rhodes (Berkeley)
Programme: 1-hour invited lectures and 30-minute sessions for shorter communications
Sponsor: Fundaçao para a Ciencia e a Tecnologia
Information: contact Peter Gothen, Dep. Matematica Pura, Faculdade de Ciencias, 4099-002 Porto, Portugal; tel: (+351)-2-3401441/(+351)-2-2008628
e-mail: agc99@fc.up.pt
http://www.fc.up.pt/mp/pbgothen/Congressos/agc99htm

28-1 July: Coordination in Parallel and Distributed Applications and Activities, France
Topics: multisites coordination; dynamic architecture management for multi-component applications; coordination software architecture; coordination models and applications for collaborative work and CSCW; group decision protocols; coordination models for programming languages and application to Java and CORBA; formal and semi-formal techniques for coordination description and analysis
Organisers: Khalil Drira, Raul Jacinto Montes
Deadlines: 5 April for draft papers (about 4 pages); acceptance notified by 1 May; 1 July for camera-ready papers
Information: contact Khalil Drira, LAAS-CNRS, 7 Av. Colonel Roche, 31077 Toulouse Cedex, France; tel: (+33)-5-61-33-63-22
e-mail: khalil@laas.fr
http://www.laas.fr/~khalil/cpdaa

28-2 July: Fourth Slovene International Conference in Graph Theory, Bled, Slovenia
Speakers: Noga Alon (Tel Aviv), Brian Alspach (Canada), Dan Archdeacon (Vermont), Marston Conder (Auckland), Michel Deza (France), Henry Glover (Ohio), Pavol Hell (Canada), Joan Hutchinson (Minnesota), Wilfried Imrich (Austria), Caiheng Li (Australia), Laszlo Lovasz (Yale), Crispin Nash-Williams (Reading), Roman Nedela (Slovakia), Tomaz Pisanski (Ljubljana), Bruce Richter (Ottawa), Gert Sabidussi (Montreal), Paul Terwilliger (Wisconsin), Thomas Tucker (New York), Arthur White (Michigan), Xuding Zhu (Taiwan)
Site: Hotel Golf, Lake Bled in the North of Slovenia, half-an-hour's drive from Ljubljana international airport and the Austrian and Italian borders
Proceedings: to be published as a special issue of *Discrete Mathematics*
Deadline: 2 July for submission of papers
Information: *e-mail: bled.conf@imfm.uni-lj.si*
http://bled.ijp.si/or

28-2 July: Nonlinear Partial Differential Equations, Besançon, France
Aim: Stanislav Nikolaevich Kruzhkov (1936-97), Professor at the M. V. Lomonosov Moscow State University, greatly influenced the theory of non-linear partial differential equations with many important and highly original contributions; this international conference pays tribute to his memory by presenting recent developments in the domains where his ideas were particularly fruitful
Scope: conservation laws; Hamilton-Jacobi equations and viscosity solutions; entropic solutions and renormalised solutions; nonlinear parabolic problems; Korteweg-de Vries equation
Steering committee: N. S. Bakhvalov, M. G. Crandall, C. M. Dafermos, P.-L. Lions, O. A. Oleinik (M. V. Lomonosov Moscow State University) and the European networks (TMR) 'Hyperbolic Systems of Conservation Laws' and 'Viscosity Solutions and their Applications'
Scientific committee: C. Bardos (Paris), G. Barles (Tours), P. Bénilan (Besançon), J. Carrillo (Madrid), V. L. Kamynin (Moscow), F. Murat (Paris), B. Perthame (Paris)
Secretaries: M. Diguglielmo, C. Pagani
Programme: plenary lectures will be delivered by members of the steering committee and by A. Bressan (Trieste), X. Cabré (Barcelona), T. Gallouët (Marseille), A. S. Kalashnikov (Moscow), C. E. Kenig (Chicago), S. Luckhaus (Leipzig), F. Otto (Santa Barbara), E. Yu. Panov (Novgorod), D. Serre (Lyon), I. V. Skrypnik (Donetsk), H. M. Soner (Princeton), P. E. Souganidis (Madison), L. C. Tartar (Pittsburgh), J. L. Vazquez (Madrid); lectures in parallel sessions will be organized on each theme of the conference
Call for papers: participants are invited to send an abstract of 15-20 lines
Registration fees: FF 500, or FF 600 if paid after 16 May
Site: Université de Franche-Comté, Besançon
Deadline: 21 March for submission of abstracts
Information: contact Mme Diguglielmo, Equipe de Mathématiques, Université de Franche-Comté, 25030 Besançon Cedex, France; tel: (+33)-3-81-66-63-40
e-mail: SNKConf@math.univ-fcomte.fr or
http://pegase.univ-fcomte.fr/Actu/SNK99/

28-6 July: CIME-EMS Summer School in Pure Mathematics: Iwahori-Hecke Algebras and Representation Theory, Martina Franca, Italy
Organiser: V. Baldoni and D. Barbash
Information: *e-mail: baldoni@axp.mat.uniroma2.it*

29-9 July: LMS Durham Symposium on Stochastic Analysis, Durham, England

T. J. Lyons (Imperial, London), E. Bolthausen (Zürich), L. Grogg (Cornell)
Main speakers: G. Ben Arous (Lausanne), D. Dawson (Toronto), B. Driver (San Diego), S. Evans (Berkeley), H. Föllmer (Berlin) T. Kurtz (Madison), E. Perkins (Vancouver), L. Saloffe-Coste (Cornell), S. Watanabe (Japan)
Support: this research symposium, organised under the auspices of the London Mathematical Society, is supported by a research grant from EPSRC
Information: Prof. T. J. Lyons, Department of Mathematics, Imperial College, 180 Queen's Gate, London SW2 2BZ, UK
e-mail: t.lyons@ic.ac.uk

July1999

3-9: Computer Vision and Speech Recognition: Statistical Foundations and Applications, Anogia, Crete, Greece
[part of the series *Euroconferences in Mathematics on Crete*]
Organisers: B. Gidas and D. Mumford (Brown University, USA)
Main speakers: Y. Amit (Chicago), O. Catoni (Paris), P. Diakonis (Stanford), O. Faugeras and J. Zerubia (INRIA Sophia Antipolis, France), D. Geman (Palaiseau, France), S. Geman (Brown University, USA), I. Johnstone (Stanford), J. Malik (Berkeley), C. Regazzoni (Genoa), S. Ullmann (Israel)
Fees, Grants, Site: see information for 19-25 June, *Dynamics of Patterns*
Information: contact B. Gidas, Division of Applied Mathematics, Brown University, Providence, Rhode Island 02912, USA
e-mail: gidas@dam.brown.edu

4-11: Paul Erdös and his Mathematics, Budapest, Hungary
Scope: all the fields to which Paul Erdös contributed: number theory, analysis, combinatorics, probability theory, set theory
Programme committee: V. T. Sós (chair), A. Sali (secretary), L. Babai, L. Lovász, B. Bollobás, A. Hajnal, G. O. H. Katona, M. Laczkovich, P. Revesz, A. Sárközy, M. Simonovits, J. Szabados
Information: contact A. Sali, Mathematical Institute of HAS, Budapest, P. O. Box 127, H-1364 Hungary
e-mail: erdos99@math-inst.hu
http://www.math-inst.hu/~erdos99

5: CEMRACS: Centre d'été de mathématique et de recherches avancées en calcul scientifique, Orsay/Luminy, France
Topics: hyperbolic system of conservation laws; kinetic equations (Boltzmann, Vlasov, Fokker-Planck); numerical methods, scientific computing, probability (Monte-Carlo methods); plasma physics
Organisers: ASCI, GdR SPARCH, TMR 'hyperbolic' and TMR 'kinetic'
Site: ASCI, Orsay and C.I.R.M. Luminy
Deadline: 31 March
Information: *e-mail: cemracs@asci.fr*
http://www.asci.fr/cemracs/

5-9: Quadratic Forms and their Applications, Dublin, Ireland
Aim: to bring together mathematicians who are specialists in quadratic forms and related topics or use them in their research
Programme committee: E. Bayer-Fluckiger (Besançon), D. Lewis (Dublin), A. Ranicki (Edinburgh)
Speakers: A. Berge (Bordeaux), J. J. Boutros (Paris), J. H. Conway (Princeton), D. Hoffmann (Besançon), C. Kearton (Durham), M. Kreck (Mainz/Oberwolfach), R. Parimala (Bombay), M. Rost (Regensburg), W. Scharlau (Münster), J.-P. Serre (Paris), M. Taylor (Manchester), C. T. C. Wall (Liverpool)
Organiser: TMR network project '*K*-theory, linear algebraic groups and related structures'
Site: University College, Dublin
Note: some financial support is available for young researchers from EU states
Information: contact Prof. D. Lewis, Department of Mathematics, University College, Dublin; tel: (+353)-1-706-8373
e-mail: dwlewis@ollamh.ucd.ie
http://mathsa.ucd.ie/TMR/quadconf.html

5-9: Fourth International Conference on Industrial and Applied Mathematics (ICIAM 99), Edinburgh, Scotland
Information: http://www.ma.hw.ac.uk/iciam99/

8-24: XXIXth Probability Summer School, Saint-Flour, Cantal, France
Speakers: Erwin Bolthausen (Zürich), Edwin Perkins (Vancouver), Aad van der Vaart (Amsterdam)
Information: contact P. Bernard, Université Blaise Pascal, Mathématiques Appliquées, F63177 Aubiére Cedex, France; tel: 04-73-40-70-52 or 04-73-40-70-50; fax: 04-73-40-70-64
e-mail: bernard@ucfma.univ-bpclermont.fr

9-17: Symposium on Computation in Group Theory and Geometry, Coventry, England
Organisers: David Epstein and Derek Holt
Site: University of Warwick, Coventry
Information: contact Ms. Peta McAllister, Mathematics Institute, University of Warwick, Coventry CV4 7AL, England; tel: (+44)-1203-524403
e-mail: peta@maths.warwick.ac.uk
http://www.maths.warwick.ac.uk/~dbae/symposium99html

12-16: 17th British Combinatorial Conference, Canterbury, England
Main speakers: W. T. Tutte (Rado lecturer), Simeon Ball (Eindhoven), Jeff Dinitz (Vermont), Martin Dyer (Leeds), Klaus Metsch (Giessen), Janos Pach (New York), Robin Thomas (Georgia), Carsten Thomassen (Lyngby), Nick Wormald (Melbourne)
Organisers: D. A. Preece and J. D. Lamb (University of Kent at Canterbury)
Programme: nine 1-hour lectures and contributed talks in parallel sessions
Information: http://speke.ukc.ac.uk/cbs/ms/bcc17/

12-17: Workshop on Model Theory and Permutation Groups, Trento, Italy
Aim: to give an overview of some common ground between model theory and permutation groups
Programme: three overlapping series of lectures: *A short course on permutation groups* (Peter M. Neumann, Oxford); *An introduction to model theory* (David M. Evans, Norwich, and Dugald Macpherson, Leeds); *Research topics and open problems* (D. Evans and D. Macpherson); the lectures will progress from introductory material on permutation groups and model theory to recent research and open problems
Information: http://www.science.unitn.it/~puglisi/workshop.html

12-18: Third International Conference on Symmetry in Nonlinear Mathematical Physics, Kiev, Ukraine
Topics: classical Lie analysis of equations of mathematical physics; reduction techniques and exact solutions of non-linear partial differential equations; non-classical conditional and approximate symmetry; symmetry in non-linear quantum mechanics, quantum fields, gravity, fluid mechanics, mathematical biology, mathematical economics; representation theory; q-algebras and quantum groups; symbolic computations in symmetry analysis; dynamical systems, solitons and integrability; supersymmetry and parasupersymmetry
Programme committee: A. Nikitin and A. Samoilenko (co-chairs, Ukraine), J. Beckers (Belgium), G. Bluman (Canada), J.-M. Cervero (Spain), P. Clarkson (UK), H.-D. Doebner (Germany), G. Goldin (USA); B. K. Harrison (USA), N. Ibragimov (SAR), R. Jackiw (USA), M. Lakshmanan (India), P. Olver (USA); M. Shkil, I. Skrypnyk, I. Yehorchenko, R. Zhdanov and V. Boyko (Ukraine)
Organisers: Institute of Mathematics of the National Academy of Sciences of Ukraine and Ukrainian Pedagogical University
Information: contact A. Nikitin, Institute of Mathematics, National Academy of Sciences of Ukraine, 3 Tereshchenkivska Street, Kyiv 4, Ukraina; tel: (+38)-044-224-63-22 or (+38)-044-250-08-96; fax: (+38)-044-225-20-10
e-mail: nonlin@apmat.freenet.kiev.ua or appmath@imath.kiev.ua
http://www.imath.kiev.ua/~appmath/first_in.html

16-18: ESA'99: Seventh Annual European Symposium on Algorithms, Prague, Czech Republic
Scope: research in the use, design and analysis of efficient algorithms and data structures as carried out in computer science, discrete applied mathematics and mathematical programming
Topics: approximation algorithms, combinatorial optimisation, computational biology, computational geometry, databases and information retrieval, graph and network algorithms, machine learning, number theory and computer algebra, on-line algorithms, pattern matching and data compression, symbolic computation
Information: *e-mail: nesetril@kam.ms.mff.cuni.cz*
http://www.ms.mff.cuni.cz/esa99/

19-29: LMS Durham Symposium on Quantum Groups, Durham, England
Organisers: A. N. Pressley (King's, London), A. Sudbery (York), S. Donkin (QMW, London)
Main speakers: J. Bernstein (Tel Aviv), E. Effros (UCLA), E. Frenkel (Berkeley), T. Koorwinder (Amsterdam), P. Littlemann (Strasbourg), M. Kashiwara (Kyoto), A. Varchenko (Chapel Hill)

Support: this research symposium, organised under the auspices of the London Mathematical Society, is supported by a research grant from EPSRC
Information: Prof. A. N. Pressley, Department of Mathematics, King's College, Strand, London WC2R 2LS, UK
e-mail: udah207@kcl.ac.uk

24-30: Groups of Tree Automorphisms and Lattices, Anogia, Crete, Greece
[part of the series *Euroconferences in Mathematics on Crete*]; the dates given in the first announcement of this conference have been changed
Main speakers: H. Bass (Columbia, USA), M.Burger (Zürich), P. de la Harpe (Geneva), A. Lubotzky (Israel), S. Mozes (Israel), F. Paulin (Paris)
Organisers: H. Bass, A. Lubotzky, S. Mozes, M. Picardello (Rome)
Fees, Grants, Site: see information for 19-25 June, *Dynamics of Patterns*
Information: contact S. Mozes, Department of Mathematics, Hebrew University of Jerusalem, Givat Ram, 91904 Jerusalem, Israel
e-mail: mozes@math.huji.ac.il

26-6 August: Structure Formation in the Universe, Isaac Newton Institute, Cambridge, England
Topics: inflation; cosmic defects; high redshift observations; cosmological parameters; large scale galaxy and mass distribution; quantum cosmology; baryon and dark matter content; CMB experiments and statistics
Organisers: R. G. Crittenden, V. A. Rubakov, P. J. Steinhardt, N. G. Turok
Speakers: A. Albrecht, R. Bond, F. Bouchet, A. Doroshkevich, G. Efstathiou, R. Ellis, M. Fukugita, A. Guth, S. Hawking, C. Hogna, R. Juskiewicz, N. Kaiser, E. Kolb, T. Kibble, O. Lahav, A. Lasenby, J. Ostriker, L. Page, J. Peacock, M. Rees, V. Rubakov, P. Shellard, J. Silk, A. Starobinsky, A. Szalay, P. Steinhardt, M. Turner, N. Turok
Deadline for applications: 31 March
Information: *e-mail: h.hughes@newton.cam.ac.uk*
http://www.newton.cam.ac.uk/programs/sfu.html

August 1999

1-6: 1999 ASL European Summer Meeting (Logic Colloquium '99), Utrecht, The Netherlands
Scope: logic broadly; a featured topic will be computational logic
Programme committee: C. G. Jockusch (chair), E. Barendsen, J. van Eijck, S. Goncharov, W. Hodges, D. de Jongh, A. Kechris, P. Koepke, M. Lerman, D. Marker, J. van Oosten, A. Pitts, A. Visser
Local organisers: J. van Eijck (chair), P. Blok, P. Dekker, M. de Rijke, Y. Venema
Invited speakers: S. Abramsky, L. Beklemishev, D. Haskell, D. Miller, J. Rutten, P. Speissegger, A. Weiermann
Deadline: 2 April for abstracts of contributed papers, to Prof. W. Hodges, School of Mathematical Sciences, Queen Mary and Westfield Colleges, London E1 4NS, UK; *e-mail: w.hodges@qmw.ac.uk*
Travel grants: contact Prof. W. Hodges (address above)
Information: Association for Symbolic Logic, 1409 West Green Street, Urbana, IL 61801, USA; tel: (+1)-217-244-7902; fax: (+1)-217-3339576
e-mail: asl@math.uiuc.edu
http://www.math.uiuc.edu/~asl/

1-7: EQUADIFF 99, Berlin, Germany
Scope: one of a series of conferences devoted to all mathematical aspects of differential equations
Organisers: B. Fiedler, H-G. Bothe, P. Deuflhard, K. Doppel, F. Duzaar, H. Gajewski, K. Gatermann, K. Groeger, R. Kornhuber, R. Lauterbach, K. Schneider, R. Seiler, J. Sprekels
Information: contact Mrs. R. Loehr, Freie Universität Berlin, Mathematisches Institut I, Arnimallee 2-6, D-14195 Berlin, Germany
e-mail: equadiff@math.fu-berlin.de
http://www.math.fu-berlin.de/~equadiff/

2-6: Fifth International Conference on Finite Fields and Applications, Augsburg, Germany
Information: http://www.Math.Uni-Augsburg.DE/fq5/

9-14: György Alexits Memorial Conference, Budapest, Hungary
Topics: function series, Fourier analysis, summability, approximation and expansions, interpolation, inequalities
Organiser: János Bolyai Mathematical Society
Programme committee: K. Tandori (honorary chair), L. Leindler, F. Schipp and J. Szabados (co-chairs), S. Fridli (secretary), F. Msricz, V. Totik, P. Virtesi
Information: contact S. Fridli, Department of Numerical Analysis, Eötvös L. University, Muzeum krt. 6-8, Budapest, H-1088 Hungary; tel: (+36)-1-2669-833, ext. 3113
e-mail: fridli@ludens.elte.hu

10-15: International Conference on Mathematical Logic, Novosibirsk, Russia
Scope: model theory, computability theory, proof theory, logic foundation of computer science
Programme committee: Yu. L. Ersdhov (chair), S. I. Adiyan, B. Cooper, E. Engeler, S. S. Goncharov, A. Macintyre, L. L. Maksimova, Yu. V. Matiyasevich, A. Nerode, H. Ono, E. A. Palyutin, M. G. Peretyatkin, A. Prestel, A. A. Razborov, H. Schwichtenberg, R. Soare, M. A. Taitslin
Deadline: abstracts (at most 1 page in 12-point font) should be sent by 1 June to A. N. Ryaskin, Conference on Mathematical Logic, Institute of Mathematics, Novosibirsk, 630090, Russia
Information: tel: (+7)-383-2-356237; fax: (+7)-383-2-357808
e-mail: ryaskin@math.nsc.ru

19-25: Topology and Dynamics: Rokhlin Memorial, St Petersburg, Russia
[in memory of Vladimir A. Rokhlin (1919-84)]
Scope: algebraic and differential topology; algebraic, real algebraic, and Riemannian geometry; smooth and symplectic dynamics, ergodic theory; applications
Programme: 1-hour talks and 25-minute communications
Programme committee: A. Vershik (St Petersburg, chairman), A. D. Alexandrov (St Petersburg), V. Arnold (Moscow/Paris), M. Gromov (Paris), F. Hirzebruch (Bonn), S. Novikov (Moscow/Maryland), Ya. Sinai (Moscow/Princeton), S. Smale (Berkeley), V. Turaev (Strasburg), O. Viro (St Petersburg/Uppsala)
Organisers: St Petersburg State University, St Petersburg Mathematical Institute of Russian Academy of Science, St Petersburg Mathematical Society and Euler International Mathematical Institute
Local Organisers: N. Netsvetaev and A. Vershik
Sponsors: support from RFBR (Russia) and Intas (EC) is expected
Proceedings: the proceedings will be published
Site: Euler International Mathematical Institute, St Petersburg Mathematical Institute of the Russian Academy of Science
Deadline: 1 April for submission of talks
Information: contact M. Zvagel'skii, 191011 Steklov Institute of Math. (POMI), nab. reki Fontanka 27, St Petersburg, Russia
e-mail: rokhlin@euler.pdmi.ras.ru
http://www.pdmi.ras.ru/EIMI/1999/rokhlin/

20-26: Eleventh International Congress of Logic, Methodology and Philosophy of Science, Krakow, Poland
Information: http://www.uj.edu.pl/Phils/congress/

22-29: Summer School on Quantum Groups, Hesselberg, Germany
Topics: Hall algebras of quiver algebras, quantum groups, crystal and canonical bases
Programme: the meeting is in two parts: in the first part the participants lecture on introductory topics; the second part is a workshop where specialists in the area lecture on recent topics
Organisers: K. Erdmann (Oxford), D. Happel (Chemnitz), S. Koenig (Bielefeld)
Support: provided by the TMR scheme
Information: contact Steffen Koenig, Fakultät für Mathematik, Universität Bielefeld, D-33501 Bielefeld, Germany
e-mail: koenig@mathematik.uni-bielefeld.de
http://www.mathematik.uni-bielefeld.de/~sek/summerseries.html

23-4 September: Generalized Dirac Operators and their Geometric Scattering Theory, Warsaw, Poland
Aim: to bring together researchers from both the mathematical physics and the geometric analysis branch of scattering theory, in order to compare methods and get an overview of the most recent results in both fields
Topics: scattering and spectral theory on complete non-compact manifolds; harmonic analysis on locally symmetric spaces; Hodge and de Rham cohomology of complete non-compact spaces; scattering theory for N-body Schrödinger operators; distribution of resonances
Programme committee: B. Bojarski, J. Bruening, J. Eichhorn, T. Friedrich, E. Melrose, W. Mueller
Organiser: Banach Centre of the Polish Academy of Science, together with the

above committee
Site: Banach Centre, Warsaw, Poland
Information: contact Prof. Thomas Friedrich, Institut für Mathematik, Humboldt-Universität zu Berlin, Ziegelstrasse 13a, Unter den Linden 6, D-10099 Berlin, Germany; tel: (+49)-30-2093-1825; fax: (+49)-30-2093-1824
e-mail: friedric@mathematik.hu-berlin.de
http://www-irm.mathematik.hu-berlin.de/~pahlisch/Banach-99html

29-4 September: Linear series and lower dimensional varieties, Bedlewo, Poland
Aim: to present recent progress in linear series, centred around the Fujita Conjecture and the classification of algebraic varieties
Organisers: T. Bauer, S. Di Rocco, T. Szemberg
Programme committee: E. Ballico, Y. Kawamata, R. Lazarsfeld, A. J. Sommese, J. Wisniewski
Conference fee: 300 PLN
Notes: the number of participants is limited to 50, and early registration is recommended; grants covering living expenses are available; participants wishing to give a talk should submit an abstract with their application
Information: *e-mail: workshop@im.uj.edu.pl*
http://www.im.uj.edu.pl/~workshop/

30-1 September: Sixth International Symposium on Generalized Convexity and Monotonicity, Karlovassi, Samos, Greece
Topics: problems related to theoretical, algorithmic, computational and modelling issues in connection with generalisations of convexity and monotonicity, as they arise in mathematical programming, economics, management science, engineering, numerical mathematics, variational inequalities, equilibrium problems
Invited speakers: J. Jahn (Erlangen), P. Pardalos (Florida), A. Prekopa (Rutgers)
Deadlines: 31 March: early registration; 30 June: late registration and titles and abstracts of talks; 30 September: submission of manuscripts
Information: contact T. Vigli-Papadaki, Department of Mathematics, University of the Aegean, Karlovassi 83200, Samos, Greece; tel: (+30)-273-33914/34750; fax: (+30)-273-33896
e-mail: gc6@math.aegean.gr
http://kerkis.math.aegean.gr/~gc6/GC6.htm

September 1999

3-7: Summer School on Differential Geometry, Coimbra, Portugal
Programme: courses on *Geometry of submanifolds,*
Dirk Ferus (Berlin) and *Poisson and symplectic geometry*, I. Vaisman (Haifa); 1-hour lectures by David R. J. Chillingworth (Southampton), Sheila Carter (Leeds), Jean Pierre Francoise (Paris) and Bernd Wegner (Berlin); 20-minute contributed talks
Organisers: Joana M. Nunes da Costa, F. J. Craveiro de Carvalho, A. M. d'Azevedo Breda, Bernd Wegner
Site: Universidade de Coimbra, Portugal
Information: contact Francisco J. Craveiro de Carvalho, Universidade de Coimbra, Portugal
e-mail fjcc@mat.uc.pt

5-11: XX International Seminar on Stability Problems for Stochastic Models, Lublin-Nalczów, Poland
Scope: limit theorems of probability theory and mathematical statistics, characterisations of probability distribution and their stability, theory of probability metrics, limit theorems and characterisation problems in stochastic analysis, stochastic processes and queueing theory, applied statistics, actuarial and financial mathematics
Programme: invited and contributed talks and poster sessions
Organising committee: V. M. Zolotarev (chair), M. Arato, A. Balkema, V. E. Bening, R. Jajte, V. V. Kalashnikov, A. V. Kolchin, V. Yu. Korolev, V. M. Kruglov, K. Kubacki, E. Omey, A. Plucinska, Z. Rychlik, L. Stettner, D. Szynal, K. Urbanik
Publication: to appear in two volumes in the *Journal of Mathematical Sciences* series (Plenum)
Registration fee: US$50; accommodation and meals are about US$30 per person per day (double room)
Information: K. Kubacki, Institute of Mathematics UMCS, Pl. Marii Curie-Sklodowskiej 1, 20-031 Lublin, Poland
e-mail: stabil@golem.umcs.lublin.pl
http:stabil.umcs.lublin.pl/ or
http://bernoulli.mi.ras.ru/
*[for details see EMS Newsletter **30**, December 1998]*

6-13: Advanced Course on Function Spaces and Applications, Tbilisi, Georgia
Programme: the course is suitable for advanced graduate student or recent Ph.D.s; there are two series of lectures: Alois Kufner (Czech Republic) on *New aspects in weight theory* and George Jaiani (Tbilisi) on *Hardy's inequality and related topics*
Information: contact TICMI, I. Vekua Institute of Applied Mathematics of Tbilisi State University, University Str. 2, Tbilisi 380043, Georgia; tel: (+995)-32-305995
e-mail: jaiani@viam.hepi.edu.ge
http://www.viam.hepi.edu.ge/other/TICMI
*[for details see EMS Newsletter **29**, September 1998]*

6-21: EMS Summer School in Applied Mathematics: Numerical Simulation of Flows, Heidelberg and Freiburg, Germany, and Zürich, Switzerland
Organiser: Gabriel Wittum (Heidelberg)
Information: *e-mail: wittum@iwr.uni-heidelberg.de*

14-18: International Conference on Analytic Methods of Analysis and Differential Equations (AMADE), Minsk, Belarus
Scope: integral transforms and special functions; differential equations and applications; integral, difference, functional equations and fractional calculus
Organising committee: I. V. Gaishun and A. V. Kozulin (Belarus) and V. A. Il'in (Russia)
Programme: 45-minute plenary talks; 20-minute reports and 10-minute communications
Proceedings: it is hoped to publish these in the journal *Integral Transforms and Special Functions*
Information: contact AMADE, Department of Mathematics and Mechanics, Belarusian State University, Fr. Skaryny Avenue 4, 220050 Minsk 50, Belarus
e-mail: amade99@im.bas-net or amade99@mmf.bsu.unibel.by

15-19: GD'99 Seventh International Symposium on Graph Drawing, Prague, Czech Republic
Scope: algorithms, graph theory, geometry, topology, order theory, graphic languages, perception, applications, practical systems
Topics: algorithms, models and techniques for drawing graphs, visualisation of structural information, perception issues relating to diagram understanding, geometric and topological graph theory, planarity issues, intersection and visibility representations of graphs, tools and systems for graph drawing, user interfaces for viewing graphs, interactive exploration of large graphs, applications of graph drawing
Organiser: J. Kratochvil (Prague)
Deadlines: 26 May: submission of papers; 15 July: notification of acceptance; 31 July: registration; 15 September: final version of papers
Site: Stirin Castle, Prague, Czech Republic
Information: *e-mail: gd99@kam.ms.mff. cuni.cz*
http://www.ms.mff.cuni.cz/gd99/

16-22: Fourth International Workshop on Differential Geometry and its Applications, Brasov, Romania
Topics: Riemannian and pseudo-Riemannian geometry, complex and quaternionic geometry, symplectic and contact geometry, foliation theory, topological aspects
Organising committee: R. Iordanescu, Gh. Pitts, D. Papuc, D. Acu
Programme: 50-minute and 30-minute invited talks; short oral communications and poster sessions
Deadline: 1 July for receipt of abstracts
Grants: there are fifteen grants (to cover meals and accommodation) for participants under 35
Information: *e-mail: riordan@stoilow.imar.ro, gh.pitis@info.unitbv.ro, danpapuc@info.uvt.ro or dacu@science.sibiu.ro*

20-26: International Symposium on Classical Analysis, Kazimierz Dolny, Poland
Topics: several complex variables, Riemannian and Hermitian geometry, spectral theory in Hilbert space, probability, mathematical physics
Invited speakers: K. Goebel, J. Kisyñski, J. Lawrynowicz, E. Ligocka, J. Siciak, M. Skwarczyñski
Programme: invited lectures and 45-minurte scientific communications in English
Information: contact T. Mazur, Department of Mathematics, Technical University, Malczewskiego 29, 26-600 Radom, Poland; fax: (+48)-48-26333 or (+48)-48-23969
e-mail: mazurt@kiux.man.radom.pl or krupa@alpha.sggw.waw.ps

Recent books

edited by Ivan Netuka and Vladimír Soucek

Books submitted for review should be sent to
Ivan Netuka, MUUK, Sokolovská 83, 186 75 Praha 8, Czech Republic.

M. Alber, B. Hu and J. Rosenthal (eds.), ***Current and Future Directions in Applied Mathematics***, *Birkhäuser, Boston, 1997, 261 pp.; DM 78, ISBN 0-817-63956-X and 3-764-33956-X*
This book contains survey articles and general thoughts and views on applied mathematics by the plenary speakers and panellists of a Symposium on Current and Future Directions in Applied Mathematics, held at the University of Notre Dame in the Spring of 1996. The first part of the book consists of reflections by several participants at the Symposium (R. Brockett, Ch. I. Byrnes, A. Friedman, J. Gunawardena, D. Holm, M. Ali Khan, B. Marcus, J. E. Marsden, C. F. Martin) on changes and important trends in both research and education. In the second part, the plenary speakers (A. M. Bloch, J. E. Marsden and G. Sanchez, R. Brockett, C. I. Byrnes, H. J. Landau and A. Lindquist, P. Constantin, N. M. Ercolani, R. E. Ewing, M. A. Khan and Y. Sun, J. E. Marsden and J. M. Wendlandt) provide surveys in their research fields, as well as new research results.

This book will be a useful guide to research workers, students and teachers involved with the applications of mathematics. (kn)

H. Amann and J. Escher, ***Analysis I***, *Grundstudium Mathematik, Birkhäuser, Basel, 1998, 445 pp., ISBN 3-7643-5974-9 and 3-7643-5976-5*
This textbook is the first volume of a planned three-volume course of analysis. It contains five chapters. The first one is devoted to basics like logic, set theory, mappings, relations and operations, and also to an introduction of the real and complex number systems, linear and affine spaces and algebras. The combined approach to elementary and relatively advanced parts appears also in the following chapters; the second one starts with elements of metric and normed spaces and deals also with basics studied traditionally in elementary courses. In such a way it is possible to include in the third chapter the study of continuous functions and the notion of topology, in the fourth the Lagrange mean-value theorem and the Banach fixed point theorem, and in the fifth the pointwise convergence of sequences of functions, together with the Stone-Weierstrass theorem.

All topics are explained with great care and with full details that could help less experienced readers, but on the other hand only readers with a good background and some knowledge of technical matters will really be able to appreciate them. Sometimes topics are done in reverse order: first in a very general setting and then for a special case. Of course, it helps to save some space and time but beginners could have difficulties in coping with this approach. It is good that the 'divorce' of real and complex variable parts does not take place here and that all material is accompanied by many remarks, examples, exercises, etc. The pictures are nice and instructive, and well-organized indices help the reader to find easily the required parts of text. The book can be recommended for libraries, teachers and students who want to reach a deep level of understanding from the very beginning. There are more condensed courses covering more or less the same (traditional) material; this one will be appreciated by those who like to have things done in detail. (jve)

S. Bagdasarov, ***Chebyshev Splines and Kolgomorov Inequalities***, *Operator Theory, Advances and Applications, Vol. 105, Birkhäuser, Basel, 1998, 205 pp.; DM 178, ISBN 3-7643-5984-6 and 0-8176-5984-6*
This monograph gives an extensive account of structural, limiting and extremal properties of perfect ω-splines generalizing standard polynomial perfect splines in the theory of Sobolev classes. Special attention is paid to the qualitative description of Chebyshev ω-splines and ω-polynomials associated with the Kolmogorov problem of n-widths and sharp additive inequalities between the norms of intermediate derivatives in functional classes with a bounding modulus of continuity ω. The author pursues three main goals: (i) to introduce the notion and give the formulae for the perfect ω-splines in W^rH^ω; (ii) to describe various extremal properties of perfect ω-splines by emphasising new phenomena and old features inherited from polynomial perfect splines; and (iii) to show examples of applications of the general theory of perfect splines in examples related to the computation of N-widths of classes $W^r H^a$ (**I**) and the author's solution of one of the most celebrated problems of real analysis—the Kolmogorov problem of sharp inequalities for intermediate derivatives in the Hölder classes W^rH^a ($\mathbf{R}_+$) and W^rH^a (**R**).

This book has seventeen chapters and two appendices. It is warmly recommended to mathematicians specializing in approximation theory, functional and convex analysis, optimization, topology and integral equations. (kn)

H. G. W. Begehr, H. Koch, J. Kramer, N. Schappacher and E.-J. Thiele (eds.), ***Mathematics in Berlin***, *Birkhäuser, Berlin, 1998, 200 pp., DM 28, ISBN 3-7643-5943-9 and 0-8176-5943-9*
This book contains twenty-two short articles on leading personalities in German mathematics living and working for some time in Berlin. Two introductory overviews are devoted to mathematics at the Prussian Academy of Sciences from 1700 to 1810 and in Berlin from 1810 to 1933, but the period covered extends up to the present day. This period is one of the most interesting parts of the history of mathematics; the book helps the reader to understand the events which so influenced world history.

Contributions cover the foundation of Berlin University, the 'golden age' of mathematics, the competition between Berlin and Göttingen, the Nazi period, the post-war development of mathematics in a divided Berlin and the situation after the reunification.
This book will be of considerable interest not only for the historians of mathematics but also for the whole mathematical community. (jve)

J. Bertoin, ***Lévy Processes***, *Cambridge Tracts in Mathematics* ***121****, Cambridge University Press, 1998, 266 pp.; £17.95, ISBN 0-521-56243-0 / 0-521-64632-4*
Lévy processes are processes with independent and stationary increments. They include as important examples Poisson, Wiener and Cauchy processes and, more generally, stable processes. They constitute an important class of space-time homogeneous Markov processes and of semimartingales. The probabilistic modelling applies Lévy processes in the study of queues, insurance risks, in mathematical finance, etc. They should be met by anybody interested in potential theory.

The monograph fills a gap in modern probabilistic literature and provides an updated and concise reference text, in as self-contained way as possible. Standard probability and Fourier analysis are the only prerequisites required by the author, but a reader familiar with more sophisticated presentations of Markov processes, with continuous stochastic analysis, will undoubtedly gain more from the text.

The preliminary material presents an elementary treatment of infinitely divisible distributions, Poisson and Wiener process, and martingales. Chapter I presents Lévy processes in connection with the Markov property, and the related potential theory is summarized in Chapter II. The increasing Lévy processes-subordinators are studied in Chapters III and IV. The next two chapters are devoted to local times and fluctuation theory, while Chapter VII is a fascinating study of Lévy processes with no positive jumps. The text concludes in Chapter VIII by listing consequences of the scaling property of stable processes. Each chapter is accompanied by a set of exercises and comments that provide additional information on the topic. (jste)

A. Beutelspacher and U. Rosenbaum, *Projective Geometry: From Foundations to Applications*, *Cambridge University Press, Cambridge, 1998, 258 pp.; £15.95, ISBN 0-521-48364-6 and 0-521-48227-1.*

As the authors write in the preface, projective geometry is a jewel of mathematics. The first four chapters of this book are devoted to classical projective and affine geometry, including finite spaces. They cover synthetic projective geometry, analytic geometry, collineations, quadratic sets and quadrics. The next chapter describes applications of projective geometry in the theory of codes, and the last chapter presents an introduction to cryptography. In this way the book contains both the foundations of the projective geometry and also some applications of this theory. It is interesting that the first author was responsible for introducing the code for numbers on German bank notes. (lbo)

P. E. Bland, *Topics in Torsion Theory*, *Mathematical Research **103**, Wiley-VCH, Berlin, 1998, 160 pp.; DM 128, ISBN 3-527-40131-8*

This booklet is devoted to some aspects of ring and module theory related to a (hereditary) torsion theory. The first part is a survey of the basic properties of torsion theories. In the next part the Jacobson radical, simple modules and chain conditions are related to a torsion theory. The classical Hopkins-Lewitzki theorem stating that right artinian rings are right noetherian is generalized in the third part. The fourth part is devoted to the relative injectivity, projectivity and flatness, with special emphasis on generalized Baer and Fuchs conditions. Injective hulls, and projective and torsion free covers relative to a torsion theory are treated in part 5. The last part investigates the relative versions of some classical properties of rings—namely, simple, semisimple, primitive, semiprimitive, prime and semiprime rings. (lbi)

G. Brewka, J. Dix and K. Konolige, *Nonmonotonic Reasoning: An Overview*, *Lecture Notes **73**, CSLI Publications, Stanford, 1997, 179 pp.; £14.95, ISBN 1-881-52683-6 and 1-881-52684-4*

Non-monotonic reasoning leads to conclusions which do not grow monotonically with increasing information. A formalization of this reasoning, nonmonotonic logics, is treated in Chapters 2–5 of this book. Model preference logics (such as the closed-world assumption, the minimalization of circumscription and modal conditional logics) are discussed in Chapters 2 and 3, while Chapter 4 is concerned with fixed-point logics, including default logics and auto-epistemic ones. Abductive inference methods are treated in Chapter 5. In Chapter 6, semantics for programs from the viewpoint of logic programming (negation-as-finite-failure) and from the viewpoint of non-monotonic reasoning are presented. A relationship between these semantics and nonmonotonic logics is discussed in Chapter 7. The book is an interesting overview of the topic described; proofs of assertions are not presented. A very extensive bibliography is included. (jml)

M. Bronstein, J. Grabmeier and V. Weispfenning (eds.), *Symbolic Rewriting Techniques*, *Progress in Computer Science and Applied Logic **15**, Birkhäuser, Basel, 1998, 288 pp.; DM 148, ISBN 3-7643-5901-3, ISBN 0-8176-5901-3*

Symbolic rewriting techniques are methods for deriving consequences from systems of equations. They are of great use when investigating the structure of the solutions. Such techniques appear in many areas of research within computer algebra: the Knuth-Bendix completion for groups, monoids and general term-rewriting systems; the Buchberger algorithm for Gröbner bases; the Ritt-Wu characteristic set method for ordinary differential equations, and the Riquier-Janet method for partial differential equations.

This book is a collection of fourteen papers on symbolic rewriting techniques, presented at a workshop at the Centro Stefano Franscini in Ascona in April 1995. The workshop brought together forty researchers from various areas of rewriting techniques, the main goal being the investigation of common threads and methods. The papers are on the following topics: parallel completion techniques; Gröbner bases, an alternative algorithm; symmetrization based completion; reduction of G-invariant polynomials for a permutation group G; noncommutative Gröbner freaks; implementing non-commutative Gröbner basis systems; string rewriting and Gröbner bases for monoid and group rings; Gröbner fans and projective schemes; normalized rewriting; syntactic termination orderings; iterated Ore extensions; torsion group of elliptic curves; finite group presentation; and degree four identities for alternative rings.

Some of the papers are of interest to both algebraists and computer scientists: for example, the techniques described in the paper on string rewriting, or that on non-commutative Gröbner freaks. Other papers may be of interest to specialists in computer science. (tk)

J.-Y. Chemin, *Perfect Incompressible Fluids*, *Oxford Lecture Series in Mathematics and its Applications **14**, Clarendon Press, Oxford, 1998, 187 pp.; ISBN 0-19-850397-0*

This book is concerned with some recent mathematical results obtained for perfect incompressible fluids. The Euler equations are derived from a variational principle. The following topics are presented: Littlewood-Paley theory, Biot-Savart's law, resolution of the Euler equations with smooth initial data, the study of solutions with bounded vorticity, a presentation of vortex patches problem, the problem of vortex sheets, wave fronts, analytic and Gevrey regularity of solutions of the Euler equations, and singular vortex patches. All results are treated for the Euler equations in two- or three-dimensional space. The flow problems in domains with non-empty boundaries are not investigated.

The book contains a number of very interesting results, but reading it requires a deep knowledge of various areas of mathematics. It will be of

interest mainly to specialists in partial differential equations. (mf)

D. Cvetkovic, P. Rowlinson and S. Simic, *Eigenspaces of Graphs*, *Encyclopedia of Mathematics and its Applications* **66**, *Cambridge University Press, 1997, 258 pp.; £45, ISBN 0-521-57352-1*

This book describes how the spectral theory of finite graphs can be strengthened by exploiting properties of the eigenspaces of adjacency matrices associated with a graph. One objective is to describe graphs by algebraic means as far as possible. The book deals mainly with eigenspaces of graphs, and the emphasis is on those parts of spectral theory where the structure of eigenspaces is a dominant feature. For the most part, the eigenspaces considered are those of a (0,1)-adjacency matrix of a finite undirected graph. The discussion of graph spectra in the first chapter reveals the limitations of the spectrum as a means of characterizing a graph, and motivates the search for further algebraic invariants such as the graph angles in Chapters 4 and 5.

Angles also have a role in Chapter 6, where the theory of matrix perturbations is applied to adjacency matrices. Graph angles arise from a geometric approach to eigenspaces and lead to the notion of a star partition of vertices, an important concept which is relevant to the current study of the graph isomorphism problem. Specialists in graph theory and mathematical chemistry will welcome this treatment of important new research. (mloe)

G. David and S. Semmes, *Fractured Fractals and Broken Dreams: Self-Similar Geometry through Metric and Measure*, *Oxford Lecture Series in Mathematics and its Applications* **7**, *Oxford University Press, Oxford, 1997, 212 pp.; £35, ISBN 0-198-50166-8*

This book is an introduction to an interesting and well-motivated topic with many open questions. The central notion is a kind of self-similar metric space called a BPI ('big pieces of itself') space. The class of BPI spaces includes the usual examples of fractal sets and is intended to include also a variety of their deformations. Roughly speaking, an Ahlfors regular space of dimension d is BPI if, for any pair of balls, there exist pieces of them of substantial proportion (with respect to the d-dimensional Hausdorff measure) which are in some sense uniformly bilipschitz equivalent.

A corresponding notion of the BPI equivalence of two spaces is introduced. It turns out that uniformly rectifiable spaces are exactly those BPI spaces that are BPI equivalent to Euclidean space. BPI equivalence is an equivalence relation that gives rise to many natural questions: what is the number of different equivalent classes?, how do they behave with respect to different deformations?, and so on. An interesting relation between BPI spaces of the same dimension is the property of 'looking from one space down to the other', which means that a non-trivial piece of the latter space is the Lipschitz image of a closed piece of the first one. A challenging problem is whether the equivalence defined naturally using this relation is the same as BPI equivalence. Many questions remain open concerning properties of the order on the BPI spaces induced by this relation.

Besides basic notions, the book gives a number of examples of BPI spaces, counter-examples to some 'too optimistic' conjectures, and partial answers to many questions. Used and developed methods include the study of various covering and cutting properties of spaces. The reader needs no more preparation than some basic knowledge of metric spaces and measures on them. (ph)

P. Drábek (ed.), *Topological and Variational Methods for Nonlinear Boundary Value Problems*, *20th Seminar in Partial Differential Equations, Pitman Research Notes in Mathematics Series* **365**, *Addison Wesley Longman, Harlow, 1997, 155 pp.; $45, ISBN 0-582-30921-2.*

This volume contains the proceedings of the International Spring School on non-linear analysis, function spaces and applications, held in Cholin. It was the 20th conference in the series of seminars organised each year in various parts of the Czech Republic by the Department of Mathematics of the University of West Bohemia and by the Union of Czech Mathematicians and Physicists. Every four years (since 1978), this seminar transforms into an International Spring School. The main goal of the seminar is to present a complete survey of some particular recent topics in PDEs to a wider mathematical audience, including non-specialists. The preface contains a list of speakers and topics since 1976.

There are five contributions in this volume. J. Berkovits, *Some extensions of topological degree theory with applications to nonlinear problems*, gives three different extensions of degree theory which can be applied to different types of problem. The basic use of degree theory in applications is explained; as an example, the wave equation with different kinds of non-linearities is considered. In the contribution of J.-P. Gossez, *Some remarks on the antimaximum principle*, a relation between the antimaximum principle and the Fucík spectrum of differential operator is exhibited and the extension of this principle to the case of p-Laplacian operator is given. S. I. Pohozhaev, *The fibering method in nonlinear variational problems*, gives in his lectures a detailed explanation of the one-parametric fibering method in the context of another methods of non-linear analysis. He presents its applications to existence problems: the existence of multiple solutions, lower bounds on a number of solutions, and questions of non-existence of solutions. The material presented by A. Szulkin, *Index theories for indefinite functionals and applications*, is concerned with different index theories and their application to the problem of determining the number of periodic solutions to certain systems of ordinary differential equations. The contribution of I. V. Skrypnik, *Topological characteristics of fully nonlinear parabolic problems*, presents applications of topological approach developed by the author to the local solvability and conditional solvability of the initial-boundary value problem for an arbitrary T for fully non-linear parabolic equations. (oj)

A. Engel, *Problem-Solving Strategies*, *Problem Books in Mathematics, Springer-Verlag, New York, 1998, 403 pp.; DM 68, ISBN 0-387-98219-1*

All over the world there are mathematical competitions for high-school students and there is also the International Mathematical Olympiad. The author often led the German delegation at the IMO and was also the Chairman of the Jury at the 30th IMO. In all such contests the participants solve some problems in elementary mathematics.

This book contains about 1300 problems. They are divided into fourteen chapters on the box principle, inequalities, sequences, functional equations and geometry. In each chapter there are some problems with solutions and then a lot of problems with hints leading to the solution. The problems are selected from competition problems from the USSR, Hungary, Germany and other countries, and also from the IMO. As the author writes in the preface, there can never be enough problems for training for such mathematical competitions. The book is designed not only for trainers and pariticipants of contests, but also for high-school teachers

wishing to enrich their teaching with some interesting non-routine problems, and for individuals who are interested in solving challenging problems. (lbo)

K. Engel, *Sperner Theory*, *Encyclopedia of Mathematics and its Applications* ***65***, *Cambridge* University Press, 1997, 417 pp., £50, ISBN 0-521-45206-6

This book presents Sperner theory from a unified point of view. The presentation is very good and the book should be understandable for a non-specialist. It brings combinatorial methods together with various other methods, and the covered area is very large. The main emphasis is on the main results and methods, and most of the results are given with complete proofs.

The book is divided into eight chapters. Chapter 1 starts with Sperner's theorem which answers the question: 'what is the maximum possible size of a family of pairwise unrelated (with respect to inclusion) subsets of a finite set?'; this chapter also contains main examples of Sperner theory. Chapter 2 deals with extremal problems for finite sets and describes basic methods to solve these problems; Chapter 3 considers profiles of families of subsets of $[n]$ belonging to certain classes, from the point of view of linear programming. Chapter 4 deals with the flow-theoretic approach in Sperner theory; it starts with Dilworth's theorem followed by the max-flow min-cut theorem, the first of several min-max theorems described in this chapter. Chapter 5 is on matchings and symmetric chain orders, and the partition lattice approach in Chapter 4 and the algebraic approach in Sperner theory can be considered as a link between the flow-theoretic material which is described in detail in nearly 100 pages in Chapter 6. Chapter 7 deals with limit theorems and asymptotic estimates. Chapter 8 on Macaulay posets describes a theory based on the Kruskal-Katona theorem. (jval)

R. Feres, *Dynamical Systems and Semisimple Groups: An Introduction*, *Cambridge Tracts in Mathematics* ***126***, *Cambridge University Press, 1998, 245 pp.; £35, ISBN 0-521-59162-7*

The author develops in a detailed and self-contained way many aspects of Lie theory, topological dynamics and ergodic theory, while the prerequisites involve just a first-year graduate course in mathematics. The main purpose of the book is to introduce the rigidity theorems of Margulis and Zimmer at a level addressed primarily at non-experts and graduate students.

In fact, the book covers two 'subcourses'. The first presents the modern theory of dynamical systems, in Chapters 1, 2, 8 and 9, introducing topological dynamics and ergodic theory; the other provides a complete exposition of smooth actions, vector fields, Lie groups, Lie algebras and semisimple groups, including the structure theory, in Chapters 3, 5 and 7. A special role is played by Chapters 4 and 6, which offer an elementary survey of algebraic geometry and algebraic actions, and the development of invariant geometric structures. The use of differential-geometric language is one of the interesting features of this book. The main rigidity theorems are stated and proved in Chapter 10.

The exposition is based on courses taught by the author at Pennsylvania State University and Washington University, St Louis. The book can be recommended for a wide audience, including anyone interested in dynamical systems, Lie theory and differential geometry. (jsl)

Y. Fong, U. Knauer and A.V. Mikhalev (eds.), *First International Tainan-Moscow Algebra Workshop*, *Proceedings of an International Conference held at National Cheng Kung University. Tainan, Taiwan, 23 July–22 August, 1994, Walter de Gruyter, Berlin, 1996, 349 pp.; DM248, ISBN 3-110-14864-1*

The volume begins with three invited survey articles by leading experts on current trends in their areas: P. M. Higgins on *Ramsey's theorem in algebraic semigroups*, A. A. Mikhalev on *Combinatorial aspects of the theory of Lie superalgebras*, and A. V. Mikhalev on *Isomorphisms and anti-isomorphims of endomorphism rings of modules*. The second part of the volume consists of twenty-two original research papers which present new results including solutions of some long-standing problems in rings and near-rings, Lie algebras, quantum groups, semigroups and combinatorics. (jtu)

M. Gardner, *The Last Recreations. Hydras, Eggs, and Other Mathematical Mystifications*, *Springer-Verlag, New York, 1997, 392 pp.; DM 39.90, ISBN 0-387-94929-1*

The name of Martin Gardner, a columnist of *Scientific American* and author of many excellent publications on recreational mathematics, suggests the likelihood of an exceptional book in its genre and indeed, the book comes up to the reader's expectations.

It touches almost all the main problems which have inspired mathematicians in the last two centuries or more. The four-colour map problem, river crossings, dinner-guest problems, the finite group problem, the Dirichlet drawer principle and many more are explained with their history of successful, as well as erroneous, solutions. If the origin of a new theory is connected with a solution of a problem (such as the theory of knots or non-Euclidean geometry) or if a theory is used to solve some puzzle, its basic facts are explained in a very lucid way. Though many parts of the book demand the reader's full concentration, no specialist knowledge of mathematics is needed for an understanding.

All essential facts are accompanied by references and each of the twenty-three chapters ends with a list of reference books and articles. While reading about problems and puzzles, the reader will meet many outstanding personalities who have entered the history of mathematics. The philosophy of mathematics is also discussed whenever appropriate. All is flavored by Gardner's special way of narrating the natural sciences. (jtro)

J. Gunawardena (ed.), *Idempotency*, *Publications of the Newton Institute, Cambridge University Press, Cambridge, 1998, 443 pp.; £55, ISBN 0-521-55344-X*

The aim of this volume is to provide an up-to-date survey on various areas of mathematics where semirings with an idempotent addition operation appear. Most of the papers record the workshop organized by Hewlett-Packard's Basic Research Institute in the mathematical sciences, but there are also some others, written especially for this book. It has become widely known only recently that linearization of certain non-linear optimization problems is possible over semirings with idempotent addition, but not over the standard number systems. These methods appear, for example, in the theory of computation, pure and applied probability and mathematical physics, and a systematic study of the subject has emerged.

The full list of the contributions reflects the diversity of the research: J. Gunawardena, *An introduction to idempotency*; J.-E. Pin, *Tropical semirings*; D. Krob, *Some automata-theoretic aspects of min-max-plus semirings*; F. D'Alessandro and J. Sakarovitch, *The finite power property for rational sets of a free group*; H. Leung, *The topological approach to the limitedness problem on distance automata*; G. Mascari and M. Pedicini, *Types and dynamics in partially additive categories*; S. Gauber and J. Mairesse, *Task resource models and (max,+)-automata*; G. Cohen, S. Gaubert and J.-P. Quadrat, *Algebraic system analysis of*

timed Petri nets; F. Baccelli and J. Mairesse, *Ergodic theorems for stochastic operators and discrete event networks*; B. Gaujal and A. Jean-Marie, *Computational issues in recursive stochastic systems*; R. D. Nussbaum, *Periodic points of nonexpansive maps*; A. Göurel, O. C. Pastravanu and F. L. Lewis, *A system theoretic approach for discrete-event control of manufacturing systems*; D. D. Cofer and V. K. Garg, *Idempotent structures in the supervisory control of discrete event systems*; R. A. Cuninghame-Green, *Maxpolynomials and discrete-event dynamical systems*; V. N. Kolokoltsov, *The stochastic HJB equation and WKB method*; S. Samborskii, *The Lagrange problem from the point of view of idempotent analysis*; V. N. Kolokoltsov and V. P. Maslov, *A new differential equation for the dynamics of the Pareto sets*; M. Akian, J.-P. Quadrat and M. Viot, *Duality between probability and optimization*; P. Del Moral, *Maslov optimization theory: topological aspects*; P. Del Moral and G. Salut, *Random particle methods in (max,+)-optimization problems*; E. Wagneur, *The geometry of finite dimensional pseudomodules*; E. A. Walkup and G. Borriello, *A general linear max-plus solution technique*; V. P. Maslov, *Axiomatics of thermodynamics and idempotent analysis*; and G. L. Litvinov and V. P. Maslov, *The correspondence principle for idempotent calculus and some computer applications*.

The articles cover both practical and theoretical aspects and the whole volume seems to be essential reading for everybody interested in the area. (jsl)

L. Hörmander, ***Lectures on Nonlinear Hyperbolic Differential Equations***, *Mathematics and Applications* ***26***, *Springer-Verlag, Berlin, 1997, 290 pp.; DM 48, ISBN 3-540-62921-1*

This book is a revised and enlarged version of lecture notes given by the author at the University of Lund during 1986–87. The nature and the notion of 'hyperbolicity' is studied, starting from the basic concepts of existence and uniqueness for systems of ODEs where the 'hyperbolic behaviour' of these—namely, the property of blowing up in finite time—is emphasised. Through the classical examples connected with Burgers' equation, the reader is driven into the wild world of first-order systems of conservation laws in one dimension. The Young measure technique and compensated compactness are studied in the context of these. Further, non-linear perturbations of the linear wave equation and of the Klein-Gordon equation are studied. The linear results—namely, the asymptotic properties of solutions—are studied as an introduction to non-linear results obtained for small and smooth data. The last chapters are devoted to a study of microlocal analysis of singularities of solutions of non-linear differential equations by means of the paradifferential calculus.

This handy monograph is well written and its concise style will be appreciated both by postgraduate students and by specialists in the field. (mr)

J. W. Jerome (ed.), ***Modelling and Computation for Applications in Mathematics, Science, and Engineering***, *Numerical Mathematics and Scientific Computation, Clarendon Press, Oxford, 1998, 215 pp.; £55, ISBN 0-198-50080-7*

This book contains articles based on a workshop held at Northwestern University in May 1996. It includes the following papers: *Mathematics, computational chemistry and battery building* (M. Ratner), *Transport of multispecies contaminants with biological and chemical kinetics in porous media* (M. F. Wheeler, C. Dawson and J. Eaton), *Equidistribution and extremal energy of N points on a sphere* (Y. M. Zhou), *Some reduced-dimension models based on numerical methods* (T. F. Dupont and A. E. Hosoi), *Viscous approximation to transonic gas dynamics: flow past profiles and charged-particle systems* (I. M. Gamba and C. S. Morawetz), *Two-carrier semiconductor device models with geometric structure and symmetry properties* (G.-Q. Chen, J. W. Jerome, C.-W. Shu and D. Wang), *Approximation issues for applications in optimal control and parameter estimation* (H. T. Banks and R. H. Fabiano), *Zero distribution, the Szegö curve, and weighted polynomial approximation in the complex plane* (I. E. Pritsker and R. S. Varga), and *Existence and the singular relaxation limit for the inviscid hydrodynamic energy model* (Gui-Qiang Chen, J. W. Jerome and Bo Zhang).

From this survey we see that the book contains a large amount of interesting material. It will be of interest to researchers and students of applied mathematics, scientists and engineers engaged in applied mathematics and scientific computing. (mf)

G. Keller, ***Equilibrium States in Ergodic Theory***, *London Mathematical Society Student Texts* ***42***, *Cambridge University Press, 1998, 178 pp.; £13.95, ISBN 0-521-59534-7 and 0-521-59420-0*

This book may serve as a guide or reference book for both mathematicians and physicists working with dynamical systems. The theory of equilibrium states and its mathematical tools are gradually explained and applied to important topics in a clear and self-consistent form, accompanied by a huge number of examples and exercises.

The first chapter deals with finite systems and opens the world of states, entropy and equilibrium of physical systems. Gibbs measures and the famous Ising model are introduced in their special form for finite systems. The ergodic theory and ergodicity of measures preserving dynamical systems are discussed in the following chapter. Two chapters are then devoted to an explanation of entropy, information, pressure, free energy and equilibrium states for general systems, and many results from the first chapter are here generalized and explained in a geometrical way. In the fifth chapter, the relationship between Gibbs measures and equilibrium states is discussed and the equilibrium states for the general Ising model are studied as an important case. Applications of the general theory to Sinai-Bowen-Ruelle measures, fractals generated by iterated function systems, and pressure of systems and maximal dimesion measures are the subjects of the last chapter. The mathematical prerequisities used in the main part of the book are summarized in the appendix.

This book is intended as a guide for a one-semester course on equilibrium states and ergodic theory, but will also be of use to many students and researchers in the field. (dh)

S. Kotz and N. L. Johnson (eds.), ***Breakthroughs in Statistics***, *Vol. III, Springer Series in Statistics, Springer-Verlag, New York, 1997, 559 pp.; DM 114, ISBN 0-387-94989-5 and 0-387-94988-7*

N. L. Johnson and S. Kotz have co-edited the internationally acclaimed ten-volume *Encyclopedia of Statistical Science*, published by J. Wiley. Their work inspired them to publish a chronicle of lives and achievements of the most influential personalities in the field, spanning nearly four centuries. This book collects more than 110 names with texts partially written by 75 experts from around the world, and contains many authentic photos and illustrations. I find the book extremely useful for students; it enables them to find when and in which situations famous results connected with names of individual persons were found.

It is interesting to see that many persons considered as Americans were of European origin and that many of them had a wide range of scientific interests, being originally educated as

pure mathematicians, physicists, astronomers, economists, biologists and geneticists. This fact again illustrates that statistics as a science has deep roots in other sciences. Statistical personalities have been classified into seven sections: forerunners (23 persons), statistical inference (24), statistical theory (19), probability theory (17), government and economic statistics (17), applications in medicine and agriculture (8), and applications in science and engineering (6); some persons belong in several of these categories. Individual entries are more concerned with lives of persons than with technical details of their work, which can be found more easily in the literature. Only four women are included, some of them contributing pioneering work in their periods (e.g. Florence Nightingale). I find the book fascinating and recommend it to every statistician and probabilist. As Karl Pearson says in the preface: 'It is impossible to understand a man's work unless you understand something of his environment.' (jju)

R. Kress, ***Numerical Analysis***, *Graduate Texts in Mathematics* ***181***, *Springer, New York, 1998, 326 pp.; DM 78, ISBN 0-387-98408-9*

This excellent book is intended as an introduction to numerical analysis for students in mathematics, physics and engineering. The first part, Chapters 2 to 7, covers numerical linear algebra and is concerned with the solution of systems of linear and non-linear equations. The necessary functional analytic tools are presented in Chapter 3. The second part of the book, Chapters 8 to 12, covers numerical analysis and deals with interpolation, numerical integration, and the numerical solution of differential and integral equations. Each chapter concludes with a set of problems, intended as exercises and applications of the material in the chapter.

The reader is encouraged to test all the algorithms in this book on a computer. The references at the end of the book are intended as a possible guide to some of the literature covering the topics of individual chapters more exhaustively. The book is written in a nice style. The text is presented in a concise and easily understandable fashion and can be successfully mastered in a one-year course. (kn)

N. V. Kyurkchiev, ***Initial Approximations and Root Finding Methods***, *Mathematical Research* ***104***, *Wiley-VCH, Berlin, 1998, 180 pp.; DM 128, ISBN 3-527-40132-6*

Chapters on the calculation of roots of polynomials can be found almost in all books dealing with computational or applied mathematics. All numerical methods for the solution of non-linear equations can also be used for polynomial equations. But the special and easy case of polynomials has inspired many mathematicians and engineers to create new and special methods. Thus polynomials have been studied for a long time and the collected knowledge on this area is comprehensive. The classical methods, such as the Lehmer-Schur algorithm combined with Newton's method and those of Bairsow, Laguerre, etc., are widely used methods for successively determining all roots.

This book concentrates on further iterative procedures which are often based in the theory of non-linear equations. The author describes the Weierstrass method and its various modifications, applies the Euler-Chebyshev algorithm on polynomials, investigates two-sided and multi-point methods, deals with choosing initial approximation and discusses multiple roots. I appreciate that the author did not avoid multiple and clustered complex zeros during numerical tests.

This book is designated for graduate students in computational and applied mathematics, for mathematicians, engineers and research workers. (jzi)

W. B. R. Lickorish, ***An Introduction to Knot Theory***, *Graduate Texts in Mathematics* ***175***, *Springer-Verlag, New York, 1997, 201 pp., 114 fig.; DM 89, ISBN 0-387-98254-X*

This book is a clearly written introduction to the theory of knots and links of simple closed curves in three-dimensional space. Since knot theory is a rapidly developing branch of mathematics and it has expanded enormously, such an introduction cannot present all the latest developments. The book under review contains the following topics: basic notions, Seifert surfaces, the Jones and bracket polynomials, Seifert matrices and the Alexander polynomials, covering spaces, the Conway polynomials, cyclic branch covers, connections between the Arf invariant and the Jones polynomial, fundamental groups, obtaining 3-manifolds by surgery on S3, 3-manifold invariants from the Jones polynomials, and the Kauffman and HOMFLY polynomials. Almost all the presented results are proved. The methods used are basic differential topology, algebraic topology and combinatorics.

The book is directed towards a broad audience of research workers and graduate students. The only prerequisities are a knowledge of the fundamental group and simple homology theory. (mc)

R. Lowen, ***Approach Spaces: The Missing Link in the Topology-Uniformity-Metric Triad***, *Oxford Mathematical Monographs, Clarendon Press, Oxford, 1997, 253 pp.; £ 60, ISBN 0-198-50030-0*

This book is a result of ten years work of the author and his coauthors in the investigation of approach spaces (sets together with a function measuring distances from points to sets). The category of approach spaces (morphisms are 'contractions') contains naturally embedded categories of topological spaces, uniform spaces and metric spaces (with contractions as morphisms). The approach structures allow us to refine some known concepts to get (for example) a measure of compactness and a measure of connectedness, giving the right concepts for all three basic subcategories. At the end, the author explains completions and compactifications of approach spaces. Two appendices are included, one about the theory of categories, and the other about some concrete structures used earlier in the text.

The book is useful for those interested in generalizations of continuous structures and their categorical behaviour, or in finding open problems on categories of continuous structures. (mh)

Y. I. Manin, ***Gauge Field Theory and Complex Geometry***, 2nd edn., *Grundlehren der mathematischen Wissenschaften* ***289***, *A Series of Comprehensive Studies in Mathematics, Springer-Verlag, Berlin, 1997, 346 pp.; DM 174, ISBN 3-540-61378-1*

This is the second edition of an excellent and fundamental book on the Radon-Penrose transform in the framework of complex geometry and on its supersymmetric extension. The main body of the book is the same as in the first edition. The first two chapters treat in detail the geometry of flag spaces and double fibrations of such spaces, together with the Radon-Penrose transform. A systematic description of superalgebras and superspaces can be found in Chapters 3 and 4. The last chapter is devoted to supersymmetry and gravitation.

Recent developments in the field are described in the new part—an appendix (45 pages) written by Sergei Merkulov. It consists of two sections: the first describes several analogues of the Penrose non-linear graviton construction; the second contains two new

examples (Riemannian supermanifolds in dimension 3/2 and quaternionic supermanifolds in dimension 4k/(2k+2)), illustrating well a general theory explained in the book.

The book should certainly be a part of the library of anybody interested in recent substantial interactions between complex geometry and mathematical physics. (vs)

C. Müller, *Analysis of Spherical Symmetries in Euclidean Spaces*, *Applied Mathematical Sciences* ***129***, *Springer-Verlag, New York, 1998, 223 pp.; DM 128, ISBN 0-387-94949-6*

The orthogonal group is clearly the most important symmetry group because of its principal role in Euclidean geometry. The fact that the Laplace equation is invariant with respect to rotations led from the very beginning to an extended use of special functions (associated with representations of the group of rotations) in mathematics and mathematical physics.

This book presents a systematic discussion of a general theory of such functions, based on a direct elementary computational approach. It is not restricted to the physical dimension 3, but treats the case of a general dimension. The Fourier and Radon transforms are intertwining maps for the action of the orthogonal group, it has direct consequences for the theory of special functions treated in this book. The main topics discussed are sperical harmonics, Legendre and Gegenbauer polynomials, and Bessel and Hankel functions. The theory is extended to the complex unit sphere and a complexification of the Funk-Hecke formula is given. The last part contains a discussion of several integral transforms (the Fourier, Gauss, Weierstrass and Radon transforms), together with a lot of examples and explicit formulas. Recently, a very efficient and systematic approach to the theory of special functions using the representation theory was developed by N. Ja. Vilenkin and others. In this book, tools coming from the representation theory of the orthogonal group are not used.

This book is well adapted to the needs of applied mathematicians, physicists and engineers, is written in their usual language and certainly will be very useful for them. (vs)

M. Pollicott and M. Yuri, *Dynamical Systems and Ergodic Theory*, *London Mathematical Society Student Texts* ***40***, *Cambridge University Press, 1998, 179 pp.; £14.95, ISBN 0-521-57599-0 and 0-521-57294-0*

The authors have chosen four nontrivial results as an invitation to modern dynamical systems theory: J. Franks' version of the Poincaré-Birkhoff theorem on the fixed points of an area-preserving homeomorphism of an annulus, the variational principle for topological entropy, Fustenberg's conjecture on ergodic measures for commuting transforms of the circle and Szemeredi's theorem on arithmetic progressions.

Most of this book is devoted to topological dynamics and ergodic theory on a level required for understanding proofs of the above-mentioned main results. Three working examples (interval maps, homeomorphisms of the circle and shifts) are explained in detail. The book is suitable for beginning graduate students, since only basic facts from topology, measure theory and linear algebra are needed. The absence of exercises is a main defect of the book. (jmil)

J. Ramanathan, *Methods of Applied Fourier Analysis, Applied and Numerical Harmonic Analysis*, *Birkhäuser, Boston, 1998, 327 pp.; DM 138, ISBN 0-8176-3963-2 and 3-7643-3963-2*

The aim of this book is to provide a mathematical introduction to harmonic analysis, with special emphasis on those topics that find direct application in engineering and the sciences. Basic material on Fourier series, Hardy spaces and Fourier transform are interweaved with material that discusses discrete Fourier transform and fast algorithms, spectral theory of stationary processes, control theory, and wavelets. The book consists of nine chapters on periodic functions, Hardy spaces, prediction theory, discrete systems and control theory, harmonic analysis in Euclidean space, distributions, functions with restricted transforms, phase space, wavelet analysis; there are two appendices on the discrete Fourier transform and on Hermite functions. Problems of varying difficulty are given at the end of each chapter; some ask the reader to fill in details while others explore topics related to those presented in the text.

This book is an excellent text/reference for graduates and professionals in mathematics, engineering and the physical sciences. It is also suitable as a general self-study resource for professionals and practitioners in harmonic analysis, fast Fourier transforms, algorithms, signal processing, electrical engineering and scientific computing. (kn)

R. Remmert, *Classical Topics in Complex Function Theory*, *Graduate Texts in Mathematics* ***172***, *Springer-Verlag, New York, 1998, 349 pp..; DM 79, ISBN 0-387-98221-3*

This short review is not aimed at those who already know Remmert's *Theory of Complex Functions*, the translation of the second or third edition of *Funktionentheorie I* (FI) by the same author. The book under review is a translation of *Funktionentheorie II* (FII). The book is a very carefully written classical advanced course on complex function theory. Although FII can be read independently of FI, it is highly recommended that FI is available; the references in FII refer to the third edition of FI. As stated in the Preface, the choice of material is rather classical (the theorems of Weierstrass and Mittag-Leffler, the Riemann mapping theorem, Runge's theorem), but the reader will also find many other interesting topics.

As with FI, great care is taken to explain the historical background and to relate the treatment to the theory of several complex variables. Thus the name index contains more than 150 names (for 29 of them a short biography is also provided) and all chapters contain fairly representative bibliographies (mostly involving references to original works). The author presents the material from many aspects, with clear compact proofs and numerous historical remarks all over the text. Thus the book is a truly ideal source for both teachers and students. For a mathematician who collects books that represent the classical parts of mathematics, it is a book which should not be overlooked. (jve)

World Directory of Mathematicians, 11th edn., *The International Mathematical Union, Providence, 1998, 1093 pp.*

In 1100 pages this book presents a picture of the world of mathematicians. In this 11th edition, 53911 mathematicians are listed, with their addresses and (sometimes) e-mail addresses. This is the main part of the publication (936 pages). Other very useful data are presented: the list of members of the International Mathematical Union, the list of mathematical organizations and a geographical list of mathematicians from 69 countries. Needless to say, this is an extremely useful publication for every mathematical department or library. (in)

UNIVERSITY OF CAMBRIDGE

KUWAIT PROFESSORSHIP OF NUMBER THEORY AND ALGEBRA

NOTICE

The Board of Electors to the Kuwait Professorship of Number Theory and Algebra invite applications for this Professorship, which will be newly established from 1 October 2000, following a generous benefaction from the Kuwait Foundation for the Advancement of Sciences. It is hope that the successful candidate will take up appointment on 1 October 2000 or as soon as possible thereafter.

The appointment will be subject to the Statutes and Ordinances of the University.

Candidates for the Professorship should send their applications, marked 'Confidential', together with the names of two referees to the Secretary General of the Faculties, from whom further information is available, at the University Offices, The Old Schools, Cambridge, CB2 1TT, so as to reach him no later than 31 May 1999.

Informal enquiries should be made to Professor John Coates (J.H.Coates@dpmms.cam.ac.uk, Tel +44 (0)1223 337994, Fax +44 (0)1223 337920).

The University follows an equal opportunity policy.