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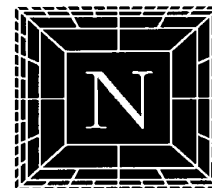
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**EUROPEAN MATHEMATICAL SOCIETY****NEWSLETTER No. 44****June 2002**

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**NOTICE FOR MATHEMATICAL SOCIETIES**

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

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EURESCO Conference:

*Discrete Painlevé Equations and the Solvability of Difference Equations*

Giens, near Toulon (France)

*webpage: http://www.esf.org/euresco/02/***1–5 July***Congrès de Mathématiques Appliquées à la mémoire de Jacques-Louis Lions*

Collège de France, Paris (France)

*e-mail: congres.jllions@ann.jussieu.fr**webpage: http://acm.emath.fr/congres-jllions***15 August**Deadline for submission of material for the September issue of the *EMS Newsletter*Contact: Robin Wilson, *e-mail: r.j.wilson@open.ac.uk***28–30 September**

Executive Committee meeting in Stockholm (Sweden), at the invitation of the Swedish Mathematical Society

**30 September**

Deadline for proposals for 2004 EMS Lectures.

Contact: David Brannan, *e-mail: d.a.brannan@open.ac.uk***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***31 December**

Deadline for bids for the Fifth European Mathematical Congress, 5ecm, in 2008

Contact: EMS Secretariat, *e-mail: makelaim@cc.helsinki.fi*

Deadline for Raising Public Awareness Article Competition

Contact: Vagn Lundsgaard Hansen, *e-mail: V.L.Hansen@mat.dtu.dk***2003****8–9 February**

Executive Committee meeting in Nice (France), by invitation of the local organisers of AMAM2003.

**10–13 February**

AMAM2003: EMS-SMAI-SMF Meeting in Nice (France)

*Mathématiques Appliquées - Applications des Mathématiques (Applied Mathematics - Applications of Mathematics)*Contacts: Doina Cioranescu, *e-mail: cioran@ann.jussieu.fr*and Mireille Martin-Deschamps, *e-mail: mmd@math.uvsq.fr**webpage: http://acm.emath.fr/amam/***1 March**

Deadline for proposals for 2004 EMS Lectures.

Contact: David Brannan, *e-mail: d.a.brannan@open.ac.uk***7–12 July**

CIME-EMS Summer School at Bressanone/Brixen (Italy)

*Stochastic Methods in Finance*

Organisers: Marco Frittelli and Wolfgang J. Runggaldier

**2004****25–27 June**

EMS Council Meeting, Stockholm (Sweden)

**27 June - 2 July**

4th European Congress of Mathematics, Stockholm

# Editorial

## *The 6th Research and Technology Development Framework Programme of the European Commission*

LUC LEMAIRE (EMS Vice-President)

### The EMS and the EU

Most of this text will be a practical guide, describing how the European mathematical community can contribute to, and benefit from, the 6th Framework Programme of the European Commission (known as FP6), which starts at the end of 2002 and applies until 2006. But let me first give some impression of the interactions between the European Commission and the EMS during the preparation of FP6.

Philippe Busquin, the Commissioner for Research, was appointed during the summer of 1999. A physics graduate from the Université Libre de Bruxelles, he brought ambitious ideas for European research – namely, the European Union political agenda. Following the four-yearly rhythm

of the Framework Programmes, he started building a first project for FP6, and submitted it to open debate. Needless to say, the EMS took part in that debate through an initial position paper on research in mathematics, and in the idea of a European Research Area, and by numerous reactions to the successive proposals issued by the Commission. On various points, we received very positive reactions, and it seems in particular that the ‘return mechanism’ for researchers working abroad was based on an initial suggestion of the EMS.

We are currently examining with all the relevant key bodies, societies and companies, and with the European Commission, the possibilities for developing a world-

wide on-line library for mathematics.

### The structure of FP6

Leaving aside the EURATOM programme on nuclear energy and the programme of activities of the Joint Research Centre, FP6 has two main components:

- integrating and strengthening the European Research Area;
- structuring the European Research Area.

The first of these aims at the development of priority themes: these being quite specific, mathematics *per se* does not figure in this part.

Now, mathematics can (or must) play a role in research on these themes, so mathematicians need to have a close look at these programmes. The second one is essentially the follow-up of *Training and mobility of researchers* and *Infrastructures*, with a large scope and hopefully an increased budget. Mathematics will continue to be part of that programme.

Here is a description of these two parts, from the point of view of mathematics. The full documents used at the time of writing this summary can be found on the web site of the Commission, <http://europa.eu.int/comm/research/nfp>. They are the *Amended proposal for council decision of January 30, 2002* (241 pages!), the *Introduction to the instruments available and Provisions for implementing networks of excellence* (February 28, 2002). Documents will continue to appear on this site, and may contain modifications with respect to the present description.

Finally, a note on vocabulary to avoid confusion. In the Fifth Framework Programmes, mathematics was present under *Research networks*, or *Research training networks*: it is still present in FP6 under the name *Marie Curie research training networks*. On the other hand, FP6 now has *Networks of excellence* that are not related to the training networks, and are a new instrument of the research policy.

### Integrating and strengthening the ERA

This component, with the large budget of 12855 million euros for four years, aims mostly at seven priority themes:

- 1.1.1. Genomics and biotechnology of health
- 1.1.2. Information Society technologies
- 1.1.3. Nanotechnologies and nanosciences, knowledge-based multifunctional materials, and new production processes and devices
- 1.1.4. Aeronautics and space
- 1.1.5. Food quality and safety
- 1.1.6. Sustainable development, global



EMS Vice-President Luc Lemaire with European Commissioner Philippe Busquin

change and ecosystems

## 1.1.7. Citizens and governance in a knowledge based society

There is also a line covering a wider field of research in which mathematics could play a role:

### 1.2.1. Supporting policies and anticipating scientific and technological needs

The numbering is that of the official EU documents, and will probably be used systematically in all calls for proposals.

The way that funding by the EU will occur here is mostly by two new financial 'Instruments':

- integrated projects;
- networks of excellence.

Documents (still open to discussion) define the operation of these instruments. For instance, a network of excellence would be a group of centres working on some aspect of one of the priority themes and planning to collaborate substantially on that theme.

There is a fear that a concentration of financial support on such networks would restrict funding to a small number of very large laboratories, thereby creating a vacuum in between. Certainly, the administration of a network will require substantial work (and staff). Still, some recommendations appear in the 28 February 2002 document of the Commission, only partially answering those fears.

In particular, 'it is important that these networks do not act as "closed clubs", and each network will be given a mission to spread excellence across its boundaries'. Also, 'each network of excellence is expected to have ambitions goals and to assemble the critical mass to achieve these goals. The critical mass will vary from topics to topics'. This could be good news for mathematics (and the social sciences), where the critical mass is much lower than in the experimental sciences.

To continue with the description of a network of excellence, it would include a programme of jointly executed research, a set of integrating activities (co-ordination of activities, creation of research facilities of common interest, and perhaps relocation of staff) and activities for spreading excellence (training of researchers from outside the network and raising public awareness).

Integrated projects are organised differently, and 'should be directed at obtaining specific results applicable in terms of, for instance, products, processes or services', so that they will probably be further away from fundamental research.

Now, where could mathematics fit in? Certainly, any application in an EC programme must fit the terms and rules of that programme, so this part of FP6 is not suitable to obtain funding for mathematics in general.

However, different branches of mathematics have a role to play in the seven priority themes. For groups of mathematicians working in these areas, the strategy must be to contact the networks that are already in the process of building up, to

see how they could be integrated in interdisciplinary projects. Clearly, the building up of the networks must start from the themes as they appear in the list of priorities (such as genomics) and not from the general needs of sciences like biology, informatics, chemistry or mathematics.

Priority 1.2.1 (anticipating scientific needs), sometimes nicknamed the eighth priority, could open a new avenue for some mathematicians. Why not, for instance, propose a network of mathematics modelling, which would come as support to the seven main priorities? We can only urge appropriate groups of modelling centres to take this initiative.

## Structuring the ERA

This part of the programme, with a planned budget of 2655 million euros (for four years), will be more familiar to the mathematics community. Indeed, it is an enlarged and improved version of *Training and mobility*, the Commission having recognised the crucial aspect of human resources for the future.

So, among this list, let us note:

### 2. Human resources and mobility

(i) Host-driven actions: Marie Curie research training networks, Marie Curie host fellowships for early stage research training, Marie Curie host fellowships for the transfer of knowledge (allowing for invitation of high level researcher), Marie Curie conferences and training courses (funding of conferences and of participation of young scientists).

(ii) Individual-driven actions: Marie Curie intra-European fellowships, Marie Curie outgoing international fellowships (allowing young scientists from the EU and 'associated countries' to work in third countries (outside the EU and associated states) with a mandatory second phase in Europe, Marie Curie incoming international fellowships (to attract top-class researchers from third countries).

(iii) Excellence promotion and recognition: grants, prizes and Marie Curie chairs (to attract top-class researchers for a period of three years).

(iv) Return and reintegration mechanisms, directed at researchers having completed a Marie Curie fellowship, or having spent at least five years outside Europe.

Then come two more components:

3. Research infrastructures
4. Science and society

The EMS will aim at further developing infrastructures like *Zentralblatt-MATH* (as was already done with a grant from the FP5 infrastructure line) and will also contribute to the digitisation of the mathematics literature and its distribution on-line.

A programme on raising awareness of science is included in Science and society.

## Opening to third countries

We are very happy to see a new opening in

this programme, not only to the associated states of the EU, but also to the 'third countries' (all other countries world-wide). This opening will take various forms, already explicit in the host-driven and individual-driven actions described above.

On the other hand, specific co-operation activities often exclude mathematical development, being restricted to urgent problems of food safety, water pollution, health and resources. Still, a specific line for Russia and the CIS countries includes 'stabilisation of R & D potential', certainly a crucial point for mathematics.

## What next?

For priorities 1.1.1–1.1.7, the Commission has already concluded a 'Call for expressions of interest', aimed at potential networks of excellence or organisers of integrated actions. This should allow the Commission to be more precise when formulating their calls for proposals (in early 2003), and may hopefully allow interested researchers to identify on a website the interdisciplinary groups planning for the setting-up of networks. It is then up to interested mathematicians to contact those potential organisers.

Concerning the structuring part, the calls for proposals should come out at the end of 2002 or in early 2003.

The important point is to check regularly the websites where calls appear, probably on <http://www.cordis.lu/rtd2002> or <http://europa.eu.int/comm/research/nfp.html>.

The official launch of FP6 will be marked by a large meeting in Brussels on 11–13 November 2002.

## A regular column

Some writers or journalists get to write a regular column (daily or weekly) in various newspapers. It now appears that I have such a four-yearly column (having likewise described FP5 in issue 32 of this *Newsletter*). I look forward to preparing a description of FP7 for issue 60 in June 2006 – a renewed adventure for me.

## Journal of the European Mathematical Society (JEMS)

The next issue of JEMS (Vol. 4, No. 2) will contain the following articles:

**Kai Cieliebak**, *Handle attaching in symplectic homology and the Chord Conjecture*

and

**Colette Moeglin**, *Sur la classification des séries discrètes des groupes classiques  $p$ -adiques: paramètres de Langlands et exhaustivité.*

# Berlingen 2

## Second EMS Brainstorming Meeting

David Salinger (EMS Publicity Officer)

In April, the Society organised a brainstorming meeting of the Executive Committee, EMS officers and representatives from the various national societies who are its corporate members. The place was Berlingen, on the Swiss shore of Lake Constance.



Four topics were on the menu: the future of *Zentralblatt-MATH*, European participation in the world maths digitised library, the Society's policy on meetings, and the policy of the EMS Publishing House. The meeting was also to draft 'expressions of interest' for support for some of these activities within the European 6th Framework Programme (see Luc Lemaire's editorial in this *Newsletter*).



Renzo Piccinini & Mina Teicher

### *Zentralblatt-MATH*

Currently, *Zentralblatt-MATH* is run by a governing body representing the Society, Springer-Verlag, and FIZ Karlsruhe (the latter being a German national organisation). To ensure its future, the organisation needs other European partners and continuing funding from the European Union, which the Society will apply for. An evolution, already partly under way, was envisaged towards a more devolved structure, with local editorial boards.

### *Maths digitised library*

Various projects are afoot to make back issues of mathematical journals and books available electronically. One such, the EMIS Electronic Library of Mathematics, is available free at [www.emis.de](http://www.emis.de) and there are several other significant projects in hand.

However, the new project discussed at Berlingen is an ambitious one, initiated by the AMS, but requiring international partners, to 'digitise' all past mathematical literature. The project, according to a paper by John Ewing of the AMS, is to make the digitised material freely available. But to

make it useful there will have to be indexing systems and search engines: these should be supplied at a commercial rate. The EMS wants to be the European partner in this enterprise and, (having taken advice from the EU) will submit an expression of interest 'parallel to' the 6th Framework programme.

### *Meetings*

The Society intends to continue its Summer Schools, EMS Lectures and Diderot Forums, and will seek EU funding for them. It is seeking to expand the EMS



Susan Hezlet & Carles Casacuberta

lectures to small conferences centred on the lectures. It is also starting to hold joint meetings with its member societies. The first one will be in Nice next February, held jointly with both French Societies, SMF and SMAI: the subject will be Applied Mathematics and Applications of Mathematics. The following joint meeting will be with the Portuguese mathematical society, in September 2003. The meetings programme will form a bid to the 6th Framework Programme. If the bid is successful, the Society will be able to have an office (possibly in Brussels) to co-ordinate its meetings.

A question raised at Berlingen was



Peter Moss & Jean-Pierre Bourguignon

whether we should hold an annual meeting, in January, rather like that of the AMS, which also serves as a useful place for recruiting young members of staff. After discussion, the idea was rejected, partly because of the difficulty of finding a time that would be convenient for all European Universities, but also because the conditions of the job market are so diverse across Europe that it is doubtful whether an EMS meeting could usefully help recruitment. Nonetheless, there is a noticeable stimulus to the Society's activities at events like the 3ecm, when the Executive Committee, subcommittee chairs and representatives of the national societies can meet. We hope that the Abel conference in Norway in June will give a similar impetus.

### *EMS Publishing house*

The EMS Publishing House now has an independent existence as (part of) a trust based in Zürich, with support from the Technische Hochschule: ETHZ. The Publications Committee, which includes the managing director Thomas Hintermann, should have an advisory role in the Publishing House's policy.

One of the purposes of founding the Publishing House was to have a restraining influence on journal prices, which have been rising well ahead of inflation. It was clear that, in the short term, pricing policy would be subordinate to the practicalities of building a viable operation. However, a preference was stated for having low prices, rather than for generating a large surplus to finance the EMS. It was agreed that there ought to be substantial discounts for EMS members. The Publishing House would consider distributing material from small European mathematics publishers, if this were commercially viable. A number of issues, particularly in the area of electronic publishing, were identified for further discussion.

Our President, Rolf Jeltsch, worked us hard, but we were permitted an hour's walk up the hillside overlooking the lake, where it narrows into the river Rhein.





# International Congress of Mathematicians 2002

*This year's ICM is being held in Beijing, China, from 20 to 28 August.*



*The twenty plenary lecturers are:*

Noga Alon (Israel), Douglas Arnold (USA), Alberto Bressan (Italy), Luis Caffarelli (USA), Sun-Yung Alice Chang (USA), David Donoho (USA), Ludwig Dmitrievich Faddeev (Russia), Shafi Goldwasser (USA/Israel), Uffe Haagerup (Denmark), Michael Hopkins (USA), Victor Kac (USA), Harry Kesten (USA), Frances Kirwan (UK), Laurent Lafforgue (France), David Mumford (USA), Hiraku Nakajima (Japan), Yum-Tong Siu (USA), Richard Taylor (USA), Gang Tian (USA/China) and Edward Witten (USA).

*There are also 167 invited speakers – those from Europe are:*

**Logic:** Elisabeth Bouscaren (France), Jan Denef (Belgium), Moti Gitik (Israel), Daniel Lascar (France)

**Algebra:** Alexei Igorevich Bondal (Russia), Dmitri Olegovich Orlov (Russia), Zlil Sela (Israel)

**Number theory:** Henri Cohen (France), Jean-Marc Fontaine (France), Annette Huber (Germany), Ilya Piatetski-Shapiro (Israel), Emmanuel Ullmo (France)

**Differential geometry:** Paul Biran (Israel), Paul Seidel (France)

**Topology:** Yuri Vitalievich Chekanov (Russia), Emmanuel Giroux (France), Ulrike Tillmann (UK)

**Algebraic and complex geometry:** H. Esnault (Germany), Lothar Goettsche (Italy), Richard Pink (Switzerland), Miles Reid (UK), Vadim Schechtman (France), Burt Totaro (UK)

**Lie group and representation theory:** Patrick Delorme (France), Michael Harris (France), Marie-France Vigneras (France)

**Real and complex analysis:** Nicolas Lerner (France), Michael McQuillan (France)

**Operator algebras and functional analysis:** Semyon Alesker (Israel), Philippe Biane (France), Vincent Lafforgue (France), Rafal Latała (Poland)

**Probability and statistics:** Girard Ben Arous (Switzerland), Jean Bertoin (France), Erwin Bolthausen (Switzerland), Kurt Johansson (Sweden), Andrei Yurievich Zaitsev (Russia), Ofer Zeitouni (Israel)

**Partial differential equations:** Luigi Ambrosio (Italy), Tero Kilpeläinen (Finland), Vladimir Maz'ya (Sweden), Tristan Rivière (Switzerland)

**ODE and dynamical systems:** Alain Chenciner (France), Michael Benedicks (Sweden), Christian Bonatti (France), Eduard Feireisl (Czech Republic), Bernold Fiedler (Germany), Leonid Pavlovich Shilnikov (Russia), Dmitry Treschev (Russia)

**Mathematical physics:** Jean Bricmont (Belgium), Jean-Pierre Eckmann (Switzerland), Nikita Aleksandrovich Nekrasov (France)

**Combinatorics:** Imre Barany (Hungary/England), Aart Blokhuis (Netherlands), Philippe Flajolet (France), Nathan Linial (Israel), Bruce Reed (France/Canada), Günther Ziegler (Germany)

**Mathematical aspects of computer science:** Uriel Feige (Israel), Ran Raz (Israel)

**Numerical analysis and scientific computing:** Albert Cohen (France), Rolf Rannacher (Germany), Christoph Schwab (Switzerland)

**Application of mathematics in the sciences:** Yann Brenier (France), Nicole El Karoui (France), Alexander Mielke (Germany), Felix Otto (Germany), Alfio Maria Quarteroni (Switzerland/Italy)

**Mathematics education and popularization of mathematics:** Jean-Luc Dorier (France), Vagn Lundsgaard Hansen (Denmark), Jan De Lange (Netherlands), Gabriele Kaiser (Germany), Ivan Yaschenko (Russia), Celia Hoyles (UK), Hans Niels Jahnke (Germany), Nitsa Movshovitz-Hadar (Israel)

**History of mathematics:** Umberto Bottazzini (Italy), Moritz Eppe (Germany)

## EUROPEAN SCIENCE FOUNDATION (ESF)

The European Science Foundation is the European association of over 70 major national funding agencies devoted to scientific research in 27 countries. The EMS and the ESF, through its Physical and Engineering Sciences Committee (PESC), have recognised that they share common interests, and are developing closer links. PESC's remit covers physics, chemistry, mathematics, information and computer sciences and the engineering sciences. PESC's activities can be separated into three broad areas:

- giving expert scientific advice on strategic issues, including undertaking independent review of major research and infrastructure programmes and proposals
- initiating strategic science activities, such as ESF Scientific Forward Looks, which are foresight exercises, and ESF

Collaborative Research Programmes (EUROCORES), which is a major transnational basic research funding programmes

- networking activities, which provide funds for European scientists to network over a range of time scales.

In this latter category, three 'instruments' are available:

*Exploratory workshops* enable scientists to come together to discuss topical and emerging issues, usually with the objective of identifying future directions and collaborations. An annual ESF-wide call for proposals is made, with a closing date in May, for events to be held during the following year. PESC normally supports at least 10 of these events at an average budget of 10k euros.

*Scientific networks* are normally interdisciplinary and are aimed at coordinating activities to stimulate and consolidate the community in particular fields. There are two ESF-wide closing dates (31 May and 30 November) each year. Normally between 2 and 4 new networks are supported in the

PESC area each year, with funding on average at 75k euros per annum over 3 years.

*Scientific programmes* are longer-term activities on specific themes, and typically bring together teams working in 7 to 10 countries. These activities are funded on an *à la carte* basis by ESF member organisations, with an average budget of 100k euros per annum over 5 years. PESC normally recommends between 4 and 6 new programmes each year, and operates a two-stage application procedure, with outline proposals being sought in October.

PESC has supported a small number of workshops, networks and programmes in various branches of mathematics, but would welcome an increased number of proposals.

To find more information about PESC and ESF, visit the website [www.esf.org/pesc](http://www.esf.org/pesc)

To contact the PESC secretariat, e-mail [pesc@esf.org](mailto:pesc@esf.org)

To be informed of PESC news, programmes and closing dates, ask [pesc@esf.org](mailto:pesc@esf.org) to put you on the PESC electronic mailing list.



# EMS Summer School in Eilat, Israel

24-28 February 2002

Mina Teicher

The EMS Summer School *Computational Algebraic Geometry and Applications*, supported by the EMS, the EU (under the EAGER program), and the Emmy Noether Research Institute, took place in Eilat (Israel) from 24 to 28 February 2002. It was organised by Mina Teicher and Boris Kunyavskii (Bar-Ilan University, Ramat Gan, Israel) and directed by W. Decker (University of Saarbrücken, Germany). There were about 40 participants: 10 from Israel, 22 from other EMS member states and the rest from other countries (USA, Canada, Korea and Vietnam). Almost all the participants were young researchers (Diploma, PhD students and post-doctoral fellows). A few of the participants were researchers and students from computer science departments, interested in studying new computational tools for computer vision based on algebraic geometry. Most students brought along a laptop computer; some computers were available for the other students.

The school program included morning lecture courses given by G. Pfister (University of Kaiserslautern) and W. Decker, as well as afternoon computer exercise sessions prepared in advance by the lecturers: beforehand, the students had down-loaded the necessary software and scripts from W. Decker's Internet web-site. For the first two days the participants were briefly introduced to the algebraic-geometric problems under consideration and the



Mina Teicher

problem-oriented software (SINGULAR, MACAULAY2). From the third day, the students were subdivided into two groups, according to their wishes and their technical and mathematical level. The beginners group studied Gröbner basis techniques in detail, while the advanced group managed more sophisticated topics such as sheaf cohomology (including the computation of Beilinson monads) and the identification of complex surfaces using the adjunction method.

There was a very intense working atmos-

phere at the school. The nice weather and blue sky, the beauties of the Red Sea and the Eilat mountains, and the various resort attractions all failed to compete with algebraic geometry. One could see students practising in the lecture room as late as 10 p.m.

The school took place in a beautiful resort, right on the beach of the Red Sea! During the long lunch break the students could dive and wine. On Monday night, the participants were invited to a Purim costume party in the hotel hall. The conference tour to Corral Island was held on a perfect sunny day: this charming island, surrounded by deep blue waters, corals and beautiful fish, is located about 15 km south of Eilat, in Egyptian territorial waters (we needed a one-day island visa to Egypt). We arrived there on an old sailing ship (crossing the border in the water). A small boat took us to the island where we hiked to the top of the hill (with its semi-restored castle) and saw a spectacular view of clear sky, red mountains, deep blue water, curved bays, and our classic ship with its sails winding in the northern (typical of the Red Sea) wind. From the top one could see four different countries (Israel, Egypt, Jordan and Saudi Arabia) meeting in a multiple point. The view was breathtaking. The rest of the time was devoted to diving, snorkelling and a barbecue lunch. We returned to Eilat and one of the famous red sunsets of the Red Sea.



# *EMS lectures for 2003*

## *Call for proposals*

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

The EMS Lectures may be in pure or applied mathematics, or may span both areas; however, for 2003 the Society would prefer to appoint at least one lecturer in pure mathematics, in order to retain a reasonable balance. With this activity, the Society aims to encourage European mathematicians (especially young ones) to meet and study together current developments in mathematics and its applications. The lectures should take place over several days (up to 5 days) in each of at least two loca-

tions, in order to give as many people as possible the opportunity to attend. The EMS will give some preference to lecturers who visit institutions that might not normally attract prominent lecturers or seminar speakers, and would prefer the geographical locations of the lectures to be significantly distant from each other (for example, North and South Europe, or East and West Europe), in order to maximise the impact of the lectures.

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

Topics (which may be single or compos-

ite) for the lecture series, the sites, and the organisers of the schools will vary from year to year, to cover a wide range of the subject.

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

Please send proposals for series of EMS Lectures in 2003, to:

Professor D. A. Brannan, Faculty of Mathematics and Computing, The Open University, Walton Hall, Milton Keynes MK7 6AA, UK.

Fax: +44 1908 652140; e-mail: d.a.bran-nan@open.ac.uk

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

David A. Brannan, Secretary

## *New deadline for Article Competition*

Last year the European Mathematical Society announced a competition to inspire the writing of articles with a mathematical theme addressing a general audience. The deadline for submissions was originally set as 31 December 2001. In response to comments, and to give more time for suggestions of a wider range of articles, the Society has decided to *accept submissions in any European language* and to *extend the deadline for submission of articles to 31 December 2002*.

The advertisement of the competition is repeated below, with the appropriate changes incorporated.

Vagn Lundsgaard Hansen  
Chair, Raising Public Awareness of  
Mathematics Committee (RPA)

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

During World Mathematical Year 2000, many articles on mathematics addressing

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

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

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

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

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

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

Articles should be sent *before 31 December 2002* to the Chairman of the RPA Committee of the EMS:

Professor Vagn Lundsgaard Hansen,  
Department of Mathematics, Technical  
University of Denmark, Matematiktorvet,  
Building 303, DK-2800 Kongens Lyngby,  
Denmark. e-mail: V.L.Hansen@mat.dtu.dk



# EUROPEAN CONGRESS OF MATHEMATICS 2008

## Call for Bids for the 5ECM

Outline bids from possible organisers of the 2008 Congress are now invited, and should reach the EMS Secretariat by December 31, 2002. The address of the Secretariat is Mrs Tuulikki Mäkeläinen, Department of Mathematics, University of Helsinki, P.O. Box 4, FI-00014 Helsinki, Finland (Tel: +358-9-1912 2883; Fax: +358-9-1912 3213; Email: [tuulikki.makelainen@helsinki.fi](mailto:tuulikki.makelainen@helsinki.fi)).

The information below may be helpful to possible organisers. Informal discussions are welcomed, and may be addressed to the Secretary (David Brannan; Email: [d.a.brannan@open.ac.uk](mailto:d.a.brannan@open.ac.uk)) or any other member of the Executive Committee.

### General information on ECMs

European Congresses of Mathematics are organised every four years: The first Congress was held in Paris in 1992, the second in Budapest in 1996, and the third in Barcelona in 2000. In 2004 the Congress will be held in Stockholm. The next free slot for a Congress is the year 2008. The Congress must be in Europe.

Experience of previous Congresses suggests that the attendance might be expected to be around 1000 mathematicians. The duration has so far been 5 days. 10 EMS Prizes to young outstanding European mathematicians are awarded at the opening ceremony.

The Congress programme should aimed to present various new aspects of pure and applied mathematics to a wide audience, to offer a forum for discussion of the relationship between mathematics and society in Europe, and to enhance co-operation among mathematicians from all European countries. The standard format of previous ECMs has been:

- About 10 Plenary Lectures;
- Section Lectures for a more specialized audience, normally several held simultaneously;
- Mini-symposia;
- Film and mathematical software sessions;
- Poster Sessions;
- Round Tables.

An exhibition space for mathematical societies, booksellers, etc. is required. No official language is specified and no interpretation is needed.

Proceedings of the previous ECMs have been published by Birkhäuser Verlag.

### Decision process for 5ECM

- (i) Bids were invited via this notice in the EMS Newsletter in 2001, and via letters to the EMS member societies sent out in 2001 by the EMS Secretariat; the deadline for bids is 31st December 2002. These bids need only be outline bids giving a clear idea of the proposal and possible sources of financial and local support.
- (ii) Early in 2003 the Executive Committee ('EC') of the EMS will consider the bids received. It will invite one or more of the bids to be set out in greater detail so that it can decide which bids are sufficiently serious options to be considered further. The deadline for such 'worked up' bids is 30th June 2003.
- (iii) The EC will then create a short-list of sites that appear to offer the best possibilities for a successful Congress.
- (iv) The EC will then appoint a Site Committee to visit the short-listed sites between July and December 2003 to check a range of items in connection with the development of the Congress. For example:
  - Size and number of auditoriums; location and equipment.
  - Room for exhibitors.
  - Hotel rooms and dormitories; location, prices, number in different categories and transportation to lectures.
  - Restaurants close to Congress site, number and prices.
  - Accessibility and cost of travel from various parts of Europe.
  - Financing of the Congress; support to participants from less favoured countries in particular.
  - Financing for the EMS Prizes.
  - Experience in organizing large conferences.
  - Timing of the Congress.
  - Social events.
  - Plans to make publicity for Mathematics on the occasion of the Congress.
- (v) In 2004 the EC will make a recommendation for the site to the EMS Council on the basis of the bid documents and the Site Committee report. The Council will reach its decision prior to 4ECM in 2004.

### Relations between the EC and the Organizing Committee of 5ECM

After the Council decision, the local organisers will be asked to present a draft budget and an outline of the programme of the Congress. The actual Congress organisation is the responsibility of the local organisers.

At least two committees must be appointed, namely the Scientific Committee and the Prize Committee. The Scientific Committee is charged with the responsibility for conceiving the scientific programme and selecting the speakers. The Prize Committee is charged with the responsibility of nominating the EMS Prize-winners.

For each of these committees the Chairs are suggested by the local organisers and agreed after consultation with the EC. In turn, the members of the committees are suggested by the Chairs, and are approved after consultation with the EC.

The local organisers are responsible for seeking financial support for the Congress and for the meetings of its committees. However the EMS commit to provide some financial support for the travel of Eastern European mathematicians to the ECM, and would also assist and advice in seeking sources of funds, in particular from the EU. The EMS and the local organisers should be partners in the effort to find funding support for the prizes.

The level of the registration fees is of great importance to the success of an ECM. The EC asks that it should be involved before a final decision on the level of fees is made; members of the EMS normally receive a reduction of some 20% on the registration fees.

The EC would wish to be informed of progress at its regular meetings. The EC would be pleased to offer advice to the local organisers on matters such as the scientific programme, budgetary developments, registration, accommodation, publications, web site, etc. Publicity for the ECM via the EMS Newsletter and the EMIS site is strongly recommended.

Marta Sanz-Solé and David Brannan

# Women and Men in Mathematics:

## Then and Now – Part 1

Andrea E. Abele, Helmut Neunzert, Renate Tobies and Jan Krüsken

[This article is a translation of 'Frauen und Männer in der Mathematik' which appeared in DMV-Mitteilungen 2/2001. It is in two parts: Part 2 will appear in the next issue.]

*Studying mathematics is becoming increasingly popular with women but the top mathematical jobs are still filled by men. Why is this? Don't women want these jobs, can't they get them or are they hindered from getting them? The Volkswagen Foundation is supporting an interdisciplinary project entitled 'Women in mathematics: factors determining mathematical careers from a gender comparative perspective' which addresses these questions and endeavours to explain the reasons for the divergence between the career paths of women and men who have graduated in mathematics.*

Mathematics has become more popular with women. While, for example, in 1925 19%, and in 1950 20%, of first-year mathematics students in Germany were women [9, 4], this figure had risen to 37% in 1987 and 47% in 1998 [8]. The number of women obtaining a doctoral degree (PhD) in mathematics has doubled from 11% in 1988 to 22% in 1998. However, the number of women professors is less than 4%, and outside academia few women hold top mathematical positions. While the percentage of women amongst first-year students of mathematics is the same as that for other subject areas, the percentage of women mathematics professors is less than half of the average percentage of women professors in all subjects (3.4% to 9%) [8].

To some extent, the low number of women in top mathematical positions is a result of a time lapse compared to other subjects. Since the percentage of women studying and graduating in mathematics increased later than in other subjects, it seems reasonable to assume that the number of women in top mathematical positions will also increase later. Extrapolating into the future, there will also be a very small share of women (about 8%) in top mathematical positions. Such a low number might elicit questions, that may provocatively be formulated as: are women not willing to pursue top mathematics careers, are they not capable of doing so, or are they hindered by external conditions?

These are the questions we are addressing in an interdisciplinary research project, which was launched in 1998 at the Universities of

Kaiserslautern, (mathematical and historical aspects: H. Neunzert and R. Tobies) and Erlangen-Nürnberg (psychological aspects: A. Abele and J. Krüsken) and is supported by the Volkswagen Foundation. We are following a double strategy by collecting both historical and present-day data and comparing them. From a historical perspective we look at women and men who chose mathematics as a profession at the beginning of the 20th century and analyse their career paths. The comparative data is drawn from a longitudinal study with women and men who graduated in mathematics in 1998. By juxtaposing historical and current data, we hope to gain insights that apply to the period under investigation, but also serve to illustrate continuity and change over the years. The focus of our interest is gender comparison, as well as a general description of career paths in mathematics.

The historical analysis is based on recently discovered material from the Archive for Historical Education Research in Berlin. We analysed personal records of 3040 Prussian mathematics teachers who passed their mathematics exams between 1902 and 1940, of whom 462 (15.2%) were women. This 'historical sample' included Dr. Margarete Kahn, a student of Hilbert's (1880-1942), Dr. Clara Löbenstein (b. 1883) and the mathematics professors Helmut Hasse (1898-1979), Erich Kamke (1890-1961) and Konrad Knopp (1882-1957), and is representative because Prussia was the largest of the German states. At that time, students passing a mathematics exam could either take a *Staatsexamen*, an examination on one major and one or two minor subjects taken under the supervision of the state which was (among other things) the entrance exam for an occupational career as a teacher, or they could pass a doctoral examination (an academic degree). Our historical sample includes persons who passed the *Staatsexamen* as well as those who passed a doctoral examination.

Nowadays, there are two ways of studying mathematics and two different final exams. Mathematics students can either pass the *Staatsexamen* (as in the historical sample) or they can pass the 'diploma' (which did not exist prior to 1942). The diploma is the final exam of a course of studies that focus primarily on one subject, such as mathematics, and is

a university degree. *Staatsexamen* graduates can become teachers, whereas diploma graduates cannot usually become teachers but work in other fields. The doctoral exam, which could previously be passed without a prior *Staatsexamen*, can only be taken today as a second academic degree – after the first academic degree (*Staatsexamen* or diploma) and two or three years of doctoral studies. The doctoral degree examination consists of a written dissertation and an oral exam.

For our analysis we conducted written interviews with graduates of mathematics from 48 German universities, who had either passed a *Staatsexamen* or a diploma. This 'modern sample' consists of 392 women (178 diploma graduates and 214 *Staatsexamen* graduates) and 699 men (431 diploma graduates and 268 *Staatsexamen* graduates), and is representative of German mathematics graduates in 1998. On average, the questionnaires were completed nine months after graduation; further interviews are planned three and five years after graduation.

The questionnaire data provided by our modern sample and the archive records data of our historical sample are, of course, only partly comparable. In our modern sample we asked questions on the socio-economic background of the students, their parents, their mathematical interest development, their courses of study, and their plans for career and private lives: we have no such information on our historical sample. On the other hand, the teacher records in the historical sample contain information on long-term career development which our modern sample cannot yet deliver. In the historical sample, there is also no differentiation between *Staatsexamen* and diploma, because the latter was not introduced until 1942. This differentiation, however, is extremely important in the modern sample. Some data, however, are available for both samples, such as father's profession, the respective ages of students at the beginning and end of studies, and examination grades.

This paper is a report on some of the data analysed so far. Our presentation is directed at three comparisons:

- the time comparison 'then and now';
- the degree comparison 'diploma versus *Staatsexamen*';
- the gender comparison 'women versus men'.

The gender comparison can be conducted with all data. The then-now comparison is possible only when comparable data are available from both samples. The diploma-Staatsexamen comparison is possible only for the modern sample.

*In Part 1 we consider the first of these comparisons; the others will be discussed in Part 2.*

### Then and now

*Historically, the socio-economic background of women students was different from that of men; today this is not the case.*

In the historical sample, women more often had fathers with an academic education than men (45% to 27%). In the modern sample, the parents' educational level is generally higher (40% have fathers, and 21% have both parents with an academic education) and there is no difference between women and men with regard to the fathers' level of education (42% of women and 39% of men have fathers with an academic education). However, these figures are not specific to mathematics students but apply to students from all subject areas. In the past, women students came more often from educated and wealthy backgrounds than men [3, 5, 6], because an academic education for a daughter was costly and not customary. Today the general level of education has risen considerably and the support given to daughters is more or less equal to that for sons.

*Historically, education opportunities were very different for women and men; today, they are the same.*

At the beginning of the 20th century the education system was very different. Education was sex-segregated, and until 1908 the only opportunities open to women for a mathematics or natural science education were of a private nature. A decree, signed on 18 August 1908, made Prussia the first German state to introduce mathematics and natural science courses in its 'Higher Secondary Schools for Girls'; Bavaria followed in 1910. From 1908, new educational opportunities for girls emerged, such as colleges offering the humanities (with Greek and Latin), *Realgymnasium* (with more mathematics and science, plus Latin and modern languages) and *Oberrealschulen* (no ancient languages, but modern languages and more mathematics and science courses). After 1909, there was also a so-called 'fourth way' to obtain the *Matura*, the prerequisite school-leaving certificate for univer-

sity admission from the *Oberlyzeum* (private secondary schools for girls), where young women could obtain teaching certificates for intermediate and higher secondary girls' schools in the public sector. The introduction of mathematics and natural science courses had repercussions for the choices of study. According to the figures provided by the Prussian statistics, mathematics was the third most popular choice (after philology and medicine) between 1909 and 1919 [11, pp. 22ff.]. As the legacies of several women mathematicians make clear, apart from an interest in mathematics the decision was taken because new possibilities opened up for earning a living, as women were now allowed to take up careers as mathematics or natural science teachers at public secondary education institutions for women.

Co-education of girls and boys is the norm today. Whether secondary school mathematics is less motivating for girls than for boys is the subject of much discussion (see [7]), but is not the subject of our project. In the modern sample there are no differences between women and men with regard to the types of schools they had attended, or the level of courses they had completed. 64% said that mathematics was their favourite subject at school, and women said so even more than men (67% versus 61%). Regardless of gender, all respondents in our modern sample attested that their interest in mathematics dated from an early age: 46% during primary school, and a further 32% by the middle of secondary education. 17% had had a mathematical role model and for 38% someone had promoted their interest in mathematics (a 'mentor').

*Study duration has lengthened in recent times and study behaviour has changed.*

While students in the historical sample studied less than 10 semesters, study duration in our modern sample has increased to roughly 12 semesters, for both women and men. The age at which women conclude their studies is nearly the same in both samples (historically 27.1, today 26.8 years), a result of the compensating tendencies to study longer today, and historically to have taken courses prior to entering university. In the historical sample, for example, 44% of the women gained admission to university by taking the 'fourth way', described above, after having obtained a teaching certificate: some even worked as teachers before enrolling at university. The age of men

at graduation in the modern sample is higher than in the historical sample (27.6 years to 25.8). This is partly due to the fact that nowadays young men usually complete their civil or military service *before* taking up their studies, whereas in the historical sample, they usually completed it *after* graduation.

At the beginning of the 20th century, students changed university more often than today. In the historical sample 65% of the students changed university at least once, regardless of gender, while today's figure is only 10%. On the other hand, the percentage of students who (partially) pursue their studies in another country was a lot smaller in the historical sample than today: (women 20%, men 16%). A clear change in the way women and men study can be seen in the fact that in the present sample 93% had a part-time job in addition to their studies, whereas in the historical sample only 12% of the women and 7% of the men worked parallel to their studies, or had the chance to do so. However, these changes are not specific to mathematics, but are evident in all subjects [5].

*The achievements of women and men were, and are, equal.*

Historically and currently women and men achieve the same examination results (see Table 1 below): the grades run from 1 (very good) to 6 (insufficient). In the modern sample there is only a difference between Staatsexamen and diploma exams, which is a result of different grading and examination practices. A comparison of the grades reached in the Staatsexamen in the two samples show a remarkable similarity at the beginning and the end of the 20th century.

In the modern sample we also collected data on school grade point averages. Our sample had a better grade-point average ( $M = 1.9$ ) than the respective year's cohort ( $M = 2.4$ ) indicating that mathematics students achieve higher grades than other school leavers. There were only two gender differences: men reported more informatics and computer science experience than women, and women reported more additional qualifications than men, such as speaking more than one foreign language and having further job qualifications.

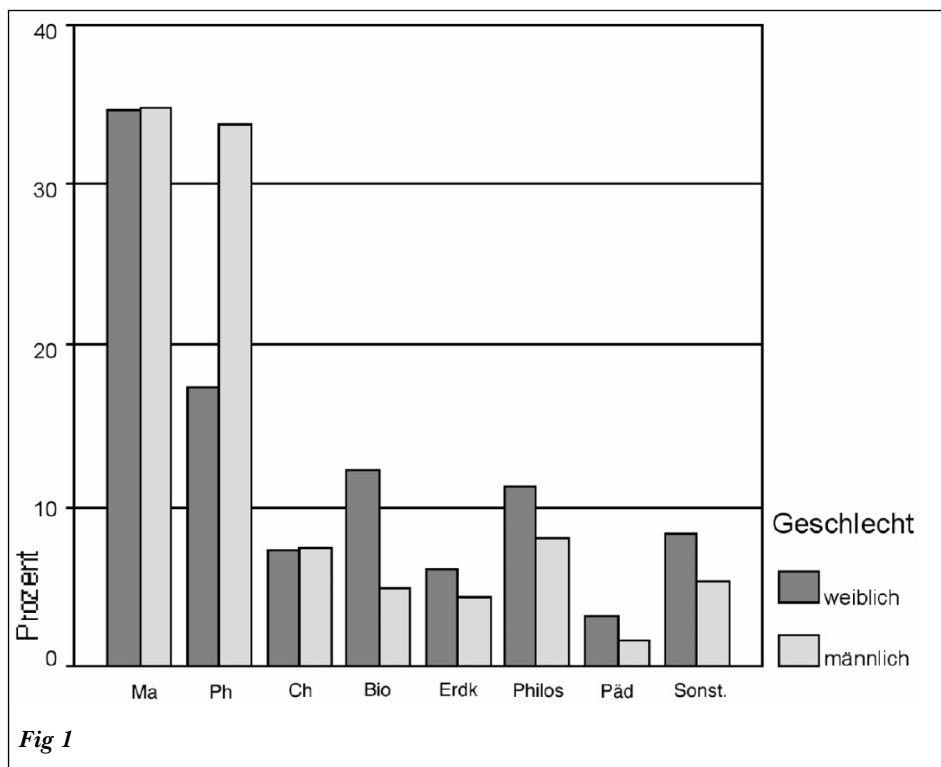
*Both historically and at present there are slight gender differences in the minors chosen by women and men with majors in mathematics.*

In the historical sample, teachers with majors in mathematics had degrees in

**Table 1. Examination grades in mathematics**

	1902/1940		1998/1999			
	Women	Men	Staatsexamen		Diploma	
	N=381	N=1864	Women N=205	Men N=206	Women N=176	Men N=428
Grade*	2.17	2.21	2.14	2.12	1.67	1.60

\* Grades with honours weighted with 0.75, others according to grade scale. Rounded to two decimal places.



one to four minors as well. Usually, they acquired a teaching certificate for three subjects. Regardless of gender, the most likely combination was mathematics, physics and chemistry (women 40%, men 38%). Women chose physics more often as a minor, men more often as a second major. Today, Staatsexamen students usually take only two subjects and the most frequent combinations are mathematics and physics, or mathematics and chemistry. In contrast to the historical sample, Staatsexamen women today choose physics less frequently as a minor than Staatsexamen men (women 20%, men 45%). However, among the diploma graduates men and women hardly differed in the percentage of physics chosen as a minor (women 16%, men 17%).

Nowadays, subject areas such as probability theory and statistics are well liked among students, and (independent of gender) many graduates have passed their written exams in these areas. Historically, they were not available at the German universities. In the historical sample there was a great gender difference in the choice of 'applied mathematics', introduced in 1898 (3% women, 21% men), but this may be due to the fact that women at that time had almost no chance of pursuing a career and earning money in areas outside the educational system. In 1898 mathematics included representative geometry, technical mechanics and geodesy (combined with probability). The range of choice of mandatory subjects was extended in the following two decades to include astronomy, insurance and finance mathematics, statistics, hydrodynamics and aerodynamics [10]. An education in applied mathematics prepared students for jobs at higher technical education institutions or in indus-

try and the private sector.

Today there are specific studies and diploma certificates for different orientations within mathematics – for instance, mathematics directed towards applications in technical fields or in economics. Within these new diploma courses men more often chose informatics (computer engineering) as a minor (men 42%, women 32%). Conversely, women chose economics as a minor more often than men (women 32%, men 25%).

These slight differences in the choice of study minor between men and women, both historically and currently, may be interpreted as pragmatic behaviour. Applied mathematics was not a promising career perspective for women at the beginning of the 20th century, and so they chose this specialisation less frequently than men. Today, informatics and economics are equivalent minors with regard to future career prospects, and women and men are comparably pragmatic. However, it

seems that there is a slight gender difference in interest for application of mathematics to economics (women more interest) or to the natural and technical sciences (men more interest).

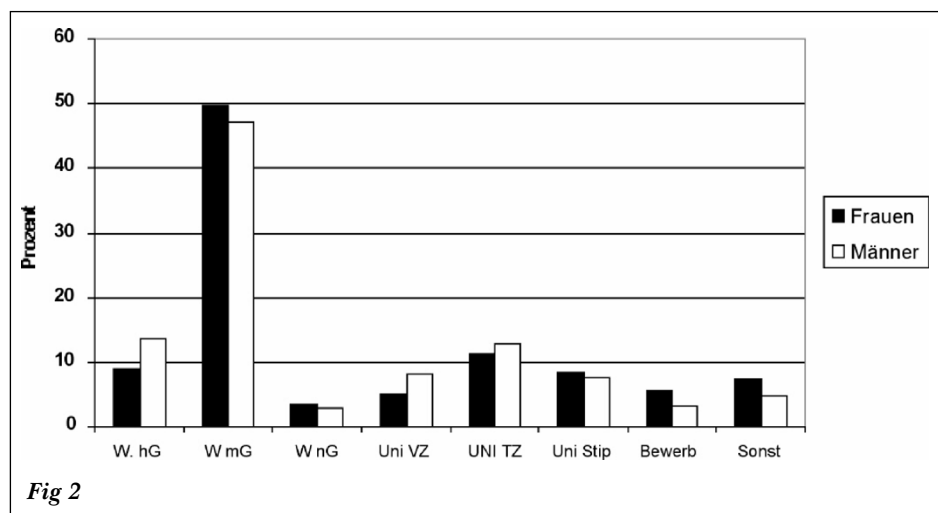
*The number of women and men obtaining a doctoral degree has remained similar.*

In the historical sample, 104 women (22.5%) and 676 men (26.2%) were awarded a PhD. Of these, one-third passed the doctoral examination with mathematics as major, and two-thirds with other majors. Men often chose physics as a non-mathematical major, while women chose biology and philosophy as often as physics (see Figure 1).

Regarding publications after the PhD, there were only small gender differences. The record cards of 12 women (2.6%) and 121 men (4.7%) recorded such work.

Of course, participants of our modern sample may not yet have passed their PhD exams yet. We therefore asked them whether they intended to pass a doctoral exam. They indicated their intention on a 5-point likelihood scale ranging from 'not at all' to 'certain'.

Regarding diploma graduates, 21% of women and 25% of men declared their intention as 'certain', which neatly corresponds to the historical data. If we add the answers of 'certain' and 'very probable', then 24% female diploma graduates and 32% male diploma graduates intended to pass a PhD. These percentages also correspond very well with the percentages of doctoral degrees actually awarded in recent years (see [8, 10]). Among the Staatsexamen graduates, however, only 9% of both women and men assessed their intention of passing a doctoral exam as 'certain' or 'very probable'. Irrespective of gender, the most important reason for wishing to take a doctoral exam was interest in science. There were also no gender differences in the content area of the dissertation (as the written part of the doctoral study): probability theory/statistics, numerics and optimisation were the most named areas. This contradicts the occasionally heard assertion that women choose future-oriented



areas of mathematics less often than men (see [3]).

*Career entry is similar between women and men.*

In the historical sample there were no gender differences up to graduation (Staatsexamen, PhD), and nor were there gender differences in the number of students working as research assistants at the university, usually before graduation (11 women, 2.4%; 93 men, 3.6%). There were no gender differences either in the *Studienassessor* examinations taken by 84.2% of the women and 85.7% of the men: this last-named examination no longer exists. At that time, however, it was an exam at the end of two years' practical work and didactic training as a teacher after graduation. It was thus the first step on the career ladder of a Gymnasium teacher.

In the modern sample, nine months after their graduation, 77% of the diploma students had a job, 6% had firm prospects of work, 8% had a PhD grant, 4% were still looking for work and 5% were currently not looking for work (they intended to go on with further courses, had to serve their military or civil service, or had private reasons for not wishing to have a job at that time). There are no gender differences in these numbers, and nor were there gender differences with respect to areas of work (university versus private sector) or salary (see Figure 2). Our study participants had an extremely rapid and successful start to their careers.

There were no gender differences either with regard to the Staatsexamen graduates. In the German educational system, Staatsexamen graduates who want to become teachers have to undergo a mandatory second part of practical training as a schoolteacher, which concludes with the so-called 'second Staatsexamen'. In our sample, three-quarters of the Staatsexamen graduates were in this second part of practical training, 5% had decided not to work as teachers and had other appointments in mathematics, and 17% wanted to become teachers but had decided to postpone the second part of training because they first wanted to realise other plans.

*Historically, women were discriminated against in their further careers.*

Despite achieving the same degree with the same grades, and despite a similar transition from university to the working world, the women's further career development in our historical sample was less successful than their male colleagues' career development. For example, while the careers of 36% of the women mathematicians ended at the level of *Studienassessor*, only 16.3% of the men 'got stuck' at this level. 59.1% of the women in our historical sample achieved permanent positions in higher education institutions, as opposed to 71.9% of the men.

Women also had to wait longer than men to obtain a permanent teaching position. These Prussian women teachers were almost exclusively unmarried and childless (only 1% of the female teachers were married then [5]), because the law decreeing the 'celibacy' of female civil servants and subsequent laws made the combination of career with marriage/family virtually impossible for women [11, p. 38]. An analysis of the reasons as to why some of the female teachers left their jobs also shows that career and family were then virtually incompatible. The most important reason to quit one's position was marriage (for women) and bad health (for men). In view of the virtual impossibility of combining work and family, few women in the historical sample would voluntarily step off the career ladder. Our data clearly shows that women teachers were strongly discriminated against at the beginning of the 20th century, also with regard to differences in salary (see [3, 5, 6]).

Today's legislation no longer discriminates against women; data from our modern sample's further career development will show whether there are other (and perhaps more subtle) forms of discrimination that still hinder women in their careers.

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# Coping with publishers and copyright

Wilfrid Hodges (Queen Mary College London)

## Executive summary for authors of research papers in journals

The number of mathematical papers that are stored or circulated as electronic files is increasing steadily. It is important that copyright agreements should keep in step with this development, and not inhibit mathematical authors or their publishers from making best use of the electronic medium together with more traditional media. While most mathematicians have no desire to learn the subtleties of copyright law, there are some general principles that they should keep in mind when discussing copyright for research papers with their publishers.

1. A copyright agreement with your publisher is a bargain struck between his interests and yours. You are entitled to look out for your interests. Most journal publishers have a standard copyright form, and may be unwilling to vary it for individual authors. But nothing prevents you from asking, if you see room for improvement. Pressure from authors may lead publishers to change their standard contracts.

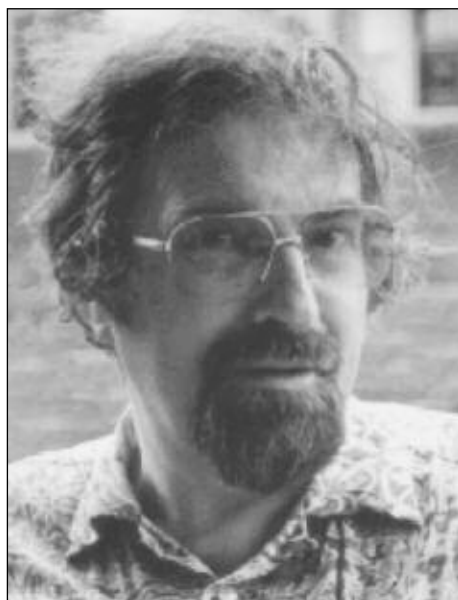
2. Three groups of people have an interest in your paper:

- Yourself and your employer (who may in some countries be automatically the original copyright holder and hence a party to the copyright agreement);
- The journal publisher;
- Users of paper who are not parties to the copyright agreement, including readers and libraries.

One of the main purposes of your copyright agreement is to control how your publisher or you make the paper available to this third group. Publishers will hardly allow individual authors to dictate agreements with libraries. But if you know that a certain journal publisher makes life hard for libraries, you can take this into account when choosing where to submit your paper.

3. There is no ideal copyright agreement for all situations. But in general your agreement should contain the following features:

- You allow your publisher to publish the paper, including all required attachments if it is an electronic paper.
- You give your publisher rights to authorise other people or institutions to copy your paper under reasonable conditions, and to abstract and archive your paper.
- Your publisher allows you to make reprints of the paper electronically available in a form that makes it clear where the paper is published.



- You promise your publisher that you have taken all reasonable steps to ensure that your paper contains nothing that is libellous or infringes copyright.

- Your publisher will authorise reprinting of your paper in collections and will take all reasonable steps to inform you when he does this.

4. Should you grant full copyright to the publisher? In some jurisdictions it is impossible to transfer full copyright from author to publisher; instead the author gives the publisher an exclusive right to do the things that publishers need to do, and these things need to be spelt out in the agreement. This way of proceeding is possible in all jurisdictions, and it has the merit of being clear and honest about what is allowed or required.

The copyright checklist was written by Wilfrid Hodges, was approved and is recommended by the Committee on Electronic Information and Communication of the International Mathematical Union (IMU). The executive summary was endorsed by the Executive Committee of the IMU in its 68th session in Princeton, NJ, 14-15 May 2001.

## What do you want from your publisher?

*An annotated checklist for mathematical authors*  
A copyright agreement with your publisher is a signed undertaking that he will do or not do certain things, and you will do or not do certain other things. If you are wondering how to get a fair deal in this agreement, you should start by asking what you want your publisher to do for you, and what you are prepared to let your publisher ask

from you. The checklist below may help you to make sure that you have not missed any important points.

The agreement is a bargain struck between your interests and those of your publisher. For example, both you and your publisher have a common interest in stopping your work being plagiarised by other people. But if your publisher is expected to take plagiarists to court at his expense, he may well feel entitled to redress the balance by asking you for something else that he wants but you may not.

Changes in the law and technology are continually altering the balance between author and publisher. So you shouldn't feel inhibited about telling your publisher if you feel that some change in the copyright form sent to you by your publisher would make it a fairer deal. (Your publisher is not inhibited about changing his form where he feels it's appropriate.) Because of the costs involved, the publisher is more likely to be willing to discuss the contract for a book than for a journal article; but even for journal articles, pressure from authors may lead a publisher to change his standard contract.

So far as possible, we have avoided legal terminology in the checklist. This is for two reasons. The first is to make the points clearer and more direct. The second is that there are still enormous differences between one legal system and another, though the differences are gradually narrowing under the pressure of international trade. For example 'copyright' in the USA and its nearest equivalent in France, 'droit d'auteur', are really quite different concepts; and the German and British legal systems make different assumptions about who is the initial owner of a work. Different legal systems have different ways of delivering the balance that you want.

We assume you are a mathematician and not a lawyer. So how can you draft a clause that gets the effect you wanted? You can start from what your publisher proposes, using your common sense. The points in the checklist below all carry notes about things to look out for, and in several cases we point out things that matter in particular countries. We hope these resources will be enough for you; if not, you may need to find a friendly lawyer.

*P is Publisher (assumed male).*

## 1. Things you might allow P to do

*Publish your work.*

Make sure that it's clear what the 'work' is, especially if it involves electronic items.

There is also a question whether it is 'your' work. Of course you will know if you



stole it from someone. But even if you wrote the paper entirely on your own, you may not realise that your employer can claim ownership of your mathematical work.

In France and Germany this can't arise. But in any English-speaking country you would be wise to check your contract of employment to see what it says about the copyright in works that you wrote as part of your employment, particularly if you are working for a government agency. Be warned also that your contract of employment need not be the end of the story, because the law in different countries makes different assumptions about copyright ownership if your contract of employment is not specific about it. For example, in Canada the assumption is that your employer holds the copyright unless your contract of employment says otherwise; though as author you have certain rights over the publication of articles written by you. If you are a US public servant and the work was done as part of your official duties, then there is no copyright in it within the US, though there may be outside the US; if you are in this position you probably know where to seek advice on the matter.

In France it is essential that your copyright agreement says explicitly that P is allowed to publish the work.

*Distribute free copies under certain conditions.*  
This raises no legal problems.

*Authorise other people or institutions to publish copies of your work.*

For example, you probably want to allow offprint services to distribute offprints of your work, and to charge a fee for copies.

*Authorise other people or institutions to make copies of your work under certain restricted conditions.*

This is a very important clause. Students and researchers need to be able to make photocopies of your written papers or parts of your books. If your work is electronic, then nobody can load it onto their computer or bring it up on their screen without copying it (from disk or Internet to RAM, from RAM to screen); so for electronic works this clause is absolutely essential.

Usually P takes responsibility for negotiating licences for colleges and libraries; though P may contract this out to an agency. Your contract must give P permission to do this, though P will notice if you ask him to accept a contract that doesn't. You should try to avoid details at this point, because there are many subtleties that you probably aren't aware of. (For example, should electronic access from the college be controlled by password, IP address or domain name?) Librarians and publishers both complain bitterly that the other side often makes unreasonable demands; it's best that you keep out of these fights.

*Authorise other people to make derivative uses of your work, such as reviewing or indexing.*

For normal scientific reviewing, fair use or equivalent rules will usually allow the small amount of copying that may be involved.

But creating an abstract, or quoting more extensively than is required for purposes of scholarly comment, may fall outside these rules. If you grant P the right to handle such matters, dealing with requests for uses such as these will generally fall to P's 'rights and permissions' department.

## 2. Things you might require P to do

*Pay you*

This normally applies only to books. There are some journals and conference proceedings for which you have to pay P.

*Anything under 1 above*

It's up to P what he will accept along these lines; but he will not usually accept an obligation to publish without a clause that the work must be of acceptable quality. But in any case you and P have a common interest in having people or libraries buy the work.

*Advertise the publication of your work adequately*

This applies to books rather than journal papers. It is not a thing that publishers will normally accept as an obligation. Nevertheless one does meet authors who have a grievance about the way their work was advertised. There is nothing to prevent you asking for such a clause, particularly if P is one of those charming publishers who threaten to give your book less favourable treatment if you don't go along with their other requests on the copyright form.

*Let you know when other people ask for or are given permission to republish the work*

You can reasonably ask to be informed if a chapter of your book is going to appear in someone's collection; you can't reasonably ask to be informed every time an offprint is issued.

Also P will be a fool to give you a cast-iron guarantee in this clause. By the time P needs to send you the information, you may have left the country and be impossible to trace. Any clause of this kind should require P only to use 'best endeavours' (or some similar phrase) to get the information to you.

*Update the electronic format of electronic material as the advance of technology requires*

You are in uncharted territory here. It is more sensible to require this for electronic material in a standard text format than it is for graphics files that may need some particular software application to run them. P may reasonably insist on a 'best endeavours' clause in any case.

Some publishers say explicitly that they will not patch up your files if these are incompetently written. This is a very reasonable requirement, and you should assume too that P will not sort out the mess if you have used an outdated format (for example, an obsolete version of TeX).

*Take legal proceedings against plagiarists*

P would be stupid to accept this obligation without very severe restrictions. Legal proceedings are expensive and sometimes the

chance of conviction is low. Also, as it stands this is an obligation into the indefinite future (or at least until the copyright lapses, which in North America is normally 70 years after the death of the author); why should P lumber himself with this? You should rest in the knowledge that plagiarism is a threat to P as well as to you.

Note that in most countries P will not be in any position to take plagiarists to court if P doesn't have a legal interest in the work. But the details vary from country to country.

## 3. Things you might require P not to do

*Alter your work.*

By international agreement you as author have a moral right to claim authorship of your work and to object to any distortion, mutilation or other modification of it which would be prejudicial to your honour or reputation. Like all moral rights, this stays with you for ever and it doesn't need to be stated in the copyright agreement; but different countries have taken different steps to safeguard this right.

In any event the moral right is rather vague. You may want to demand something stricter, for example that no change is made in the text of your paper. Don't be surprised if P puts restrictions. For example, P has to protect himself against possible libel or plagiarism by you; he may insist on being able to make alterations that are necessary for legal reasons, and he won't want to be delayed by having to check with you first. (This arises particularly with electronic files that P keeps on his website. He can hardly alter journals already delivered to libraries.) In return you can reasonably insist that any such emergency alteration is approved by an academic editor.

Don't be surprised either if P insists on being able to make purely electronic or formatting adjustments; this is reasonable.

## 4. Things P might want you to do

Guarantee that the work has not previously been published, and that you are not simultaneously offering it to another publisher.

As it stands, this prevents P from publishing a work of yours which has already been published, even when the person who holds the necessary authority has authorised P to republish. But if P knows that this is the situation and still wants to publish, P will presumably withdraw the clause.

There can be a tricky scenario when the previous publication was on paper, very likely before electronic publication was invented, and the proposed new publication is electronic. Both you and P need to be sure that the previous publisher can't stop you making the new publication. This may depend not only on the text of the earlier copyright agreement, but also on the legal system of the country in question. Unless you are extremely sure of your situation, find the copyright agreement with the previous publisher and show it to a reliable lawyer.

Guarantee that you are legally entitled to give P the rights that you are claiming to give him.

Caution here. Unless you are *very* sure of

the full facts, you should never do more than guarantee that you have taken all reasonable steps to make sure you are entitled.

For example, an electronic paper may contain software that some company issued as freeware, but later the company changed its mind and demanded that users of the software should pay for a licence. You (and hence P) may still be legally liable, though you may be able to plead in mitigation that you didn't know about the change. This is very uncommon, but the fact that it can happen at all should warn you to take care with a clause like (b).

Guarantee that the work contains no libel or other material that shouldn't be published.

You can agree to this more safely than (b), but you should still be careful, particularly in Britain where the libel laws are stiff.

Include a confidentiality clause, or ask for part of the agreement to be by a verbal understanding rather than a written contract.

There *might* be a good reason for these, but common sense suggests you should be extremely suspicious. If you do have grounds for suspicion, you might ask for a clause saying that no oral statement should be taken into account apart from the text, which should be taken to constitute the entire agreement.

## 5. Things P might want you not to do

*Publish the work yourself.*

This includes keeping the work on a public website after P has published it. If you have given somebody else an *explicit* licence to include it in their website, then in general you can't prevent them keeping the work on their site; but usually in such cases the licence is implicit, so that you can write to the owner withdrawing the licence, and the owner is then obliged to remove the work from the site.

The legal terminology of most countries allows three possibilities:

- (i) If you have given an 'exclusive licence' to P, then this prevents you from publishing the work yourself or authorising anyone else to publish it. P on the other hand can do with your work what you license him to do, and nothing more.
- (ii) If you give P a 'non-exclusive licence', this entitles you to publish the work yourself and authorise other people to publish it; but in this case P may very well ask you to promise not to authorise third parties to publish the work, except under strict conditions (see (c) below). Again P can do whatever you license him to do. (Don't be bullied by publishers who warn you that if you opt for this kind of agreement they will be inhibited in disseminating your book. With their agreement, you can license them to do whatever you want them to do.)
- (iii) If you have 'assigned copyright' to P, then all authority over the work passes to P. This prevents you from publishing the work yourself or authorising anyone else to publish it; except that P may give you in return a (non-exclusive)

licence to publish under certain conditions. Recently many publishers have been moving towards this arrangement, that you assign copyright but receive a carefully circumscribed exclusive licence, as a way of heading off demands from authors that they should retain copyright. A typical clause of this kind might allow you

- to make copies for classroom teaching,
- to make copies for distribution to colleagues in your own institution,
- to use the work in later publications of your own (including lectures),
- to keep the work on your own website.

In Germany, (iii) is technically impossible, but German publishers sometimes refer to (i) as 'transfer of copyright'.

In the US (where the terminology of (i)-(iii) does apply), your legal rights and those of P don't depend on copyright being registered with the Copyright Office. But if you are a US resident and want to use your copyright as a basis for suing someone, you must have registered; moreover, if you want to sue for statutory damages and attorney's fees, you must have registered either before the plagiarism occurred, or within three months of first publication. In cases (i) and (ii), you hold the copyright and you will need to register it yourself. In case (iii), P holds the copyright and may ask you to state in the contract that you allow P to register it.

*Authorise someone else to publish or copy the work.*

This has become a real problem, where a publisher holds the copyright on a book that is out of print and is unwilling to republish it (or to republish it with changes that you want to make), though other publishers are willing. So in case (a)(iii) you should consider insisting on a clause that P will agree to grant a licence to another publisher on reasonable terms if the book goes out of print.

If you insist on being able to authorise further publication or copying yourself, bear in mind that for people who want to publish or copy, P may be much easier to find than you, particularly if P is a famous publishing house. You can make yourself a little easier to reach by entering into a collective licensing scheme, such as those run by the UK Copyright Licensing Agency or the US Copyright Clearance Center, or any similar Collection Society. Some publishers specifically exclude registration with a licensing agency even if you retain copyright; this is a bit of a cheek and you might want to press them on it.

*Publish a revised or upgraded version of the work yourself.*

This possibility arises very easily if the work is published electronically; you are bound to be tempted to correct false theorems, and maybe to attach relevant programs when they become available. But it can also arise with printed work, for example if you retain copyright, and then later you allow

another publisher to include some of the work in a published collection, and you update the work for this new publication.

If you do retain copyright and P is asking for a restriction of this kind, you will need to agree with P a way of drawing a line between the kinds of revised publication that will devalue P's version unacceptably and those that won't. You are on your own here – there are no standard agreed formulations. (But some may emerge as it becomes commoner for authors to retain copyright.)

*Publish (or authorise someone else to publish) the work without its including an acknowledgment that the first publication was by P, with a full reference to that publication.*

This is a common clause in contracts that allow you to publish the work yourself. It seems very reasonable. Sometimes P will require that the acknowledgment is in a suitably prominent place, for example on the first page.

*Revoke the contract.*

It's normal to make copyright agreements irrevocable by either party. But if you and the publisher agree, there is nothing in the law to prevent you granting copyright or licence for a limited period or in a restricted area of the world, or simply leaving it open for either party to revoke the contract after first publication.

## 6. Other considerations

*Which country's laws apply?*

A copyright contract should contain a 'jurisdiction clause', saying what jurisdiction applies; sometimes it does this by saying where the parties can sue. If both publisher and author are in the same country (or the same legal jurisdiction, e.g., a state of the US, or Scotland), the law makes the default assumption that the laws of that country or jurisdiction apply. The legal situation is very complicated if publisher and author are in different countries and the contract contains no jurisdiction clause.

Define your terms. There are any number of anecdotes about authors getting caught out by not realising how a word in the contract might be interpreted. For example, your contract should probably define what it counts as 'publication', or avoid the word altogether; otherwise you may find in US law that a free distribution doesn't count as publication. Your definitions don't have to agree with some standard legal definition; they do their job if they make clear what the parties to the contract had in mind.

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# *Bento Caraça (1901-48): A beautiful mind*

Natália Bebiano (Coimbra)



Bento de Jesus Caraça was born in Vila Viçosa, Alentejo, Portugal. He studied economics at the Instituto Superior de Ciências Económicas e Financeiras, University of Lisbon, where he later taught infinitesimal analysis as Assistant (1919), becoming Extraordinary Professor (1927) and Full Professor of Higher Mathematics (calculus, analytical geometry, probabilities and applications) in 1929.

In mathematics, he published influential undergraduate textbooks, *Interpolação e Integração Numérica* (1933), *Cálculo Vectorial* (1937), and *Lições de Álgebra e Análise* (1935-40). About these books, the mathematician Sebastião e Silva wrote:

*For the first time, mathematics has been presented by someone who lives the profession with the soul of an apostle and of an artist.*

Caraça was also the author of *Conceitos Fundamentais da Matemática* (1942), which has become a central reference for scientific popularisation in Portugal. This remarkable best-seller, also very popular in Brazil, aims to provide a core of knowledge for a wide audience of non-specialists, who could be fascinated by the ideas, concepts and beauty of mathematical topics. The book consists of three parts, entitled Numbers, Functions and Continuity. The genesis of the concepts is analysed, and mathematics is presented in an historical

context as a product of human social activity.

Caraça also wrote biographies of notable and inspiring people, such as Abel, Galois, Galileo, Leonardo da Vinci, Romain Rolland and Rabindranath Tagore, and philosophical texts about culture.

Caraça was a gifted speaker. He contributed to newspapers and magazines and promoted relevant cultural events in Portugal, artistic meetings, scientific conferences and courses, with the main purpose of promoting people's culture.

Most of these events took place at the Universidade Popular Portuguesa, an institution where progressive intellectuality and enlightened members of the working classes could discuss cultural and scientific topics. Bento Caraça was president of Universidade Popular for many years, and his activity here was very emblematic, focused on the culturalisation of people and on the defence of democratic values. Another remarkable responsibility was the *Biblioteca Cosmos*, one of the most significant cultural achievements of the twentieth century in Portugal. Under Caraça's leadership *Cosmos* published over 114 titles covering different fields of knowledge in about eight years.

He introduced methods of Econometrics in Portugal. In 1938, he founded *Centro de Estudos de Matemática Aplicados à Economia*, of which he was chairman. In 1940 he founded the *Sociedade Portuguesa de Matemática*, of which he was president for two years (1942-44), and founded and edited the journal *Gazeta de Matemática*.

In 1946, Caraça was expelled from his university teaching position. He was persecuted by the political police under the dictatorship and imprisoned at Aljube. There were many cases of political persecution, and victims included university teachers – in particular, mathematicians. Bento Caraça died on 25 June 1948. Crowds of people of all social classes joined together in the streets of Lisbon in a spontaneous tribute to the Master and to the citizen.

Caraça was a man of culture devoted to the pursuit of knowledge, and a talented teacher. In his classes he had a singular style, his fascinating way of presenting subjects was so rare that he was seen in the academic community as an idol. He was a pioneer of Portuguese organisations for peace and international movements against World War II. He participated in an artistic and literary movement known as neo-realism. His scientific and philosophic work can be characterised by a questionability of the man himself and his position in a contemporary world, putting complex demands to human existence. He is one of the personalities who marked Portuguese life in the twentieth century.

*Natália Bebiano is Full Professor of the Department of Mathematics at the University of Coimbra, Portugal; this article is based on a lecture commemorating the centenary of Bento Caraça's birth, given at the University of Evora on 23 November 2001.*

# William Burnside

(b. 1852)

Tony Mann (Greenwich)



This year marks the sesquicentenary of the birth in London on 2 July 1852 of William Burnside, who today is known principally for his contributions to group theory. (He is inevitably sometimes confused with his contemporary, the Irish mathematician William Snow Burnside (1839-1920), author with A. W. Panton of a *Theory of Equations*: our Burnside was of Scottish descent.) The death of his father in 1858 left the family in straitened circumstances. William was educated at Christ's Hospital, the 'Bluecoat School', where he was top pupil in the mathematical school, and in 1871 he was awarded a mathematical scholarship to St John's College, Cambridge.

In his first year at Cambridge, Burnside was a member of the St John's Boat Club which was Head of the River. For reasons that are unclear, during his second year he moved to Pembroke College, where he contributed to the Boat Club as coach and oar (usually Seven) for the rest of his time in Cambridge: it is not considered entirely coincidental that in this time the Pembroke boat rose from twenty-fifth to fourth in the May races.

Burnside was joint second wrangler in 1875, and came first in the Smith's Prize Examination. He was then awarded a fellowship at Pembroke, where he remained until the summer of 1885, when he became Professor of Mathematics at the Royal Naval College at Greenwich. He resigned his Pembroke fellowship on his marriage in 1886.

At Greenwich Burnside taught mathematics to seamen and naval architects. He was well paid – the professors' salary was

£600 per annum – and had time to pursue his own mathematical interests. He seems to have maintained his links with Cambridge, sometimes attending Henry Frederick Baker's Saturday seminar or 'tea party', and he remained highly regarded at Pembroke where he became an Honorary Fellow in 1900. On the death of Sir George Gabriel Stokes in 1903 he was offered the Mastership of Pembroke, which he declined, either for financial reasons or because he wished to avoid the concomitant administrative responsibilities. He took an active part in the London Mathematical Society, serving on Council for many years and being President 1906-08, and was elected Fellow of the Royal Society in 1893.

Burnside remained at the Royal Naval College until his retirement in 1919. He lived in south-east London and on his retirement moved to West Wickham, where his house Cotleigh in High Street is now the HSBC Bank. His wife Alexandrina Urquhart came from Poolewe in Ross-shire (north-west Scotland) and they regularly visited the family croft there, where William could indulge his love for fishing. Their five children (there were no grandchildren) are still remembered in Poolewe. There are hints that that Burnside could present a rather stern personality when people did not come up to the high standards that he set for himself and others, but he was held in affection by his naval students, who on his retirement presented him with a handsome illuminated address (now in Pembroke College Library).

Initially an applied mathematician, Burnside published his first paper on group theory in 1893. His *Theory of groups of finite order* (1897) was the first book in English on group theory: a considerably revised second edition appeared in 1911. Burnside wrote in the first edition:

*No simple group of odd order is at present known to exist. An investigation ... would undoubtedly lead ... to results of importance.*

It was almost seventy years before Feit and Thompson would show that indeed all groups of odd order are soluble. This was typical of Burnside's ability to identify fruitful problems: another example was the 'Burnside Problem' (is a finitely-generated group of finite exponent necessarily finite?) which he proposed in 1902 and which also led to significant areas of twentieth-century mathematics.

Towards the end of his life, Burnside became interested in probability theory, writing a book, *Theory of Probability* that was published posthumously in 1928.

William Burnside died on 21 August 1927 and is buried in West Wickham Parish Church, where his grave is marked by a Celtic cross. His collected papers, edited by Peter M. Neumann, A. J. S. Mann and Julia Thompson and including a number of essays about Burnside's mathematics by distinguished scholars, will shortly be published by Oxford University Press.

*Tony Mann [a.mann@gre.ac.uk] is at the University of Greenwich, UK, which is located at the Royal Naval College.*

## The 2002 Ferran Sunyer i Balaguer prize awarded to Alexander Lubotsky, Dan Segal and André Unterberger

The Institut d'Estudis Catalans has awarded the 2002 Ferran Sunyer i Balaguer Prize to Alexander Lubotsky (Jerusalem, Israel), Dan Segal (Oxford, UK), and André Unterberger (Reims, France) for their monographs entitled *Subgroup Growth* and *Automorphic Pseudo-differential Analysis and Higher-level Weyl Calculi*. This year's prize is exceptional since it has been awarded *ex-aequo* to two manuscripts.

The members of the Jury — Hyman Bass (Michigan), Antonio Córdoba (Madrid), Warren Dicks (Barcelona), Paul Malliavin (Paris) and Alan Weinstein (Berkeley) — point out that *Subgroup Growth*, by Lubotsky-Segal, is a highly original book reporting the state of the art in an important and still rapidly developing area of asymptotic group theory, while *Automorphic Pseudo-differential Analysis and Higher-level Weyl Calculi*, by Unterberger, is an excellent exposition of a sophisticated area of analysis with deep connections to analytic number theory. Both books are very well written and will be attractive to new as well as mature researchers in each field.

The prize consists of 10000 euros and the monographs will be published in Birkhäuser Verlag's series Progress in Mathematics.

The Ferran Sunyer i Balaguer Prize is granted by the Ferran Sunyer i Balaguer Foundation (<http://www.crm.es/info/ffsb.litm>) and is awarded each year to a mathematical monograph of an expository nature presenting the latest development in an active area of research in mathematics, in which the applicant has made important contributions.

The awarding ceremony took place on April 24 at the Institut d'Estudis Catalans in Barcelona.

# The 2003 Ferran Sunyer i Balaguer Prize

Ferran Sunyer i Balaguer (1912-1967) was a self-taught Catalan mathematician who, in spite of a serious physical disability, was very active in research in classical Mathematical Analysis, an area in which he acquired international recognition. Each year in honour of the memory of Ferran Sunyer i Balaguer, the Fundació Ferran Sunyer i Balaguer awards an international mathematical research prize bearing his name, open to all mathematicians. This prize was awarded for the first time in April 1993.

## CONDITIONS OF THE PRIZE

- The prize will be awarded for a mathematical monograph of an expository nature presenting the latest developments in an active area of research in Mathematics, in which the applicant has made important contributions.
- The monograph must be original, written in English, and of at least 150 pages. The monograph must not be subject to any previous copyright agreement. In exceptional cases, manuscripts in other languages may be considered.
- The prize, amounting to 10,000 euros, is provided by the Ferran Sunyer i Balaguer Foundation. The winning monograph will be published in Birkhäuser Verlag's series "Progress in Mathematics", subject to the usual regulations concerning copyright and author's rights.
- The submission of a monograph implies the acceptance of all of the above conditions.
- The name of the prize-winner will be announced in Barcelona in April, 2003.

## SCIENTIFIC COMMITTEE

The winner of the prize will be proposed by a Scientific Committee consisting of:

- H. Bass (University of Michigan)
- A. Córdoba (Universidad Autónoma de Madrid)
- W. Dicks (Universitat Autònoma de Barcelona)
- P. Malliavin (Université de Paris VI)
- J. Oesterlé (Institut de Mathématiques de Jussieu)

## SUBMISSION OF THE MONOGRAPHS

Monographs should preferably be typeset in TeX. Authors should send a hard copy of the manuscript and a disk with the DVI and PS (PostScript) files enclosing an accompanying letter to the Ferran Sunyer i Balaguer Foundation. Submissions should be sent before December 1<sup>st</sup>, 2002 to the following address:

Centre de Recerca Matemàtica  
Fundació Ferran Sunyer i Balaguer  
Apartat 50  
E-08193 Bellaterra  
e-mail: ffsb@iec.es

## WINNERS FROM PREVIOUS EDITIONS

- Alexander Lubotzky, *Discrete Groups, Expanding Graphs and Invariant Measures*.
- Klaus Schmidt, *Dynamical Systems of Algebraic Origin*.
- V. Kumar Murty and M. Ram Murty, *Non-vanishing of L-Functions and Applications*.
- A. Böttcher and Y. I. Karlovich, *Carleson Curves, Muckenhoupt Weights, and Toeplitz Operators*.
- Juan J. Morales-Ruiz, *Differential Galois Theory and Non-integrability of Hamiltonian Systems*.
- Patrick Dehornoy, *Braids and Self-Distributivity*.
- Juan-Pablo Ortega and Tudor Ratiu, *Hamiltonian Singular Reduction*.
- Martin Golubitsky and Ian Stewart, *The Symmetry Perspective*.
- Alexander Lubotzky and Dan Segal, *Subgroup Growth*.
- André Unterberger, *Automorphic Pseudodifferential Analysis and Higher-level Weyl Calculi*.

For further information on the Ferran Sunyer i Balaguer Foundation, see Web: <http://www.crm.es/info/ffsb.htm>

Barcelona, april 2002

fundació FERRAN SUNYER I BALAGUER  
institut d'estudis catalans





# CIME summer courses 2002

The CIME (International Mathematics Summer Centre) has organised the following courses for summer 2002.

## Course 1: 30 June to 6 July, at Martina Franca (Taranto)

### Real Methods in Complex and CR Geometry

Scientific direction: Dimitri Zaitsev [zaitsev@math.unipd.it] and Giuseppe Zampieri [zampieri@math.unipd.it]

4 lectures in English for each course

(a) *Angular derivatives in several complex variables*

Marco Abate, Università di Pisa, Italy [abate@dm.unipi.it]

(b) *Real methods in complex dynamics*

John Erik Fornæss, Univ. of Michigan, Ann Arbor, USA [fornaess@unimich.edu]

(c) *On the Chern-Moser theory and rigidity problem of holomorphic maps*

Xiaojun Huang, Rutgers Univ., New Brunswick, USA [huangx@math.rutgers.edu]

(d) *Theory of analytic functionals, and boundary values in the sense of hyperfunctions*

Jean Pierre Rosay, Univ. of Wisconsin, Madison, USA [jrosay@math.wisc.edu]

(e) *Extremal analytic discs and the geometry of CR manifolds*

Alexander E. Tumanov, Univ. of Illinois at Urbana-Champaign, USA, [tumanov@math.uiuc.edu]

## Course 2: 10-19 July, at Cetraro (Cosenza)

### Analytic Number Theory

Scientific direction: C. Viola (Università di Pisa) [viola@dm.unipi.it] and A. Perelli (Università di Genova)

[perelli@dima.unige.it]

The abstracts of the courses are available at the (CIME) address <http://www.math.unifi.it/cime/> where the announcement of the course is given.

(a) *Producing prime numbers via sieve methods* (4 lectures)

John Friedlander, Toronto, Canada

(b) *Exponential sums, uniform distribution and cryptographic applications* (2 lectures)

John Friedlander, Toronto, Canada

(c) *Counting rational points on algebraic varieties* (6 lectures)

Roger Heath-Brown, Oxford Univ., England

(d) *Automorphic L-functions* (6 lectures)

Henryk Iwaniec, Rutgers University, New Jersey, USA

(e) *Axiomatic Theory of L-Functions: the Selberg class* (6 lectures)

Jerzy Kaczorowski, Poznan, Poland

## Course 3: 15-21 September, at Martina Franca (Taranto)

### Theory and Applications of Imaging

Scientific direction: George Papanicolau (Univ. of Stanford, USA) [papanico@georgep.stanford.edu] and Giorgio Talenti (Univ. di Firenze, Italy) [talenti@math.unifi.it]

(a) *Array imaging in noisy environments*

George Papanicolau, Stanford Univ., USA

(b) *Tomographic imaging*

Frank Natterer, Univ. of Münster, Germany

(c) *Diffuse imaging for medical diagnoses*

Simon R. Arridge, University College, London, UK

(d) *Experimental methods and results in laser-tissue imaging*

Robert R. Alfano, Institute for Ultrafast Spectroscopy and Lasers, CUNY, New York, USA

(e) *Seismic imaging*

William W. Simes, Rice Univ., USA

### Applications

As soon as the abstracts of the courses have been sent to CIME, the information will appear on the CIME webpage.

Those who wish to attend the session should send an application to the Director of CIME at the address below, as soon as possible.

For any further information, please contact

Fondazione C.I.M.E. c/o Dipartimento di Matematica 'U. Dini'

Viale Morgagni, 67/A - 50134 Firenze, Italy

Tel: +39-55-434975 or +39-55-4237123

Fax: +39-55-434975 or +39-55-4222695

e-mail: [cime@udini.math.unifi.it](mailto:cime@udini.math.unifi.it)

Direttore del CIME: Prof. Pietro Zecca [pzecca@ingfi1.ing.unifi.it]

Segretario del CIME: Prof. Elvira Mascolo [mascolo@math.unifi.it]

Further information appears on the CIME webpage:

<http://www.math.unifi.it/cime/>

*This CIME activity is made possible thanks to the generous support received from the European Commission, Division XII, TMR Programme Summer Schools, Consiglio Nazionale delle Ricerche, Ministero Affari Esteri italiano, Ministero dell'Università e della Ricerca Scientifica e Tecnologica, UNESCO-ROSTE, Venice Office.*



# Can you spare books?

**Tsou Sheung Tsun and Herbert Fleischner**  
(EMS Committee for Developing Countries)

Some of you may be sitting on books, or some of your books may be sitting on shelves, although you may not need them any more: these books collect dust. At the same time, many universities in developing countries are in dire need of scientific literature – from undergraduate and graduate texts to journals.

The EMS Committee for Developing Countries (CDC) considers the collecting of books from you and their shipment to various universities in developing countries as one of its central activities. Moreover, although being a committee of the EMS, the CDC turns not only to European colleagues, but takes this opportunity to call upon colleagues in any developed country, to join us in our efforts. We are looking mainly for scientific literature published in English or French.

As experience has shown, the problem is not to find books for donations to such universities, nor the identification of universities in DCs that are interested in receiving such donations. The problem lies in the shipping expenses and in the logistics. With some cooperation by the various players in this (truly international) action, the CDC will be in a position to fulfil this task.

The CDC hopes to liaise with the International Centre for Theoretical Physics (ICTP) at Trieste, Italy, to organise a book donation scheme. We shall try to identify recipients for donated books and journals. We know, for example, that the University of Zimbabwe not only would gladly accept such donations (it has done so in the past in a different framework), but is also prepared to act as a centre for distribution of donated books to universities in the SADC region, which comprises member states as diverse as South Africa, Zambia, Malawi, Tanzania, Angola and Mozambique.

In order to take care of the shipping of donations to the respective places, CDC will apply to the Book Donation Scheme which the ICTP runs, to pay for the transport subject to their regulations. We, or the donors, might also try various National Commissions for UNESCO to help with shipping costs.

A minimum of 40-50 books constitutes a reasonable consignment. We hope that some of you will not only give away some of your own books, but will also involve yourselves actively in collecting books/journals from other colleagues in your respective departments. Maybe some European colleagues know of colleagues in

the USA, Canada, Australia, etc., who would be prepared to donate books within this scheme. And maybe, you can get your university to pay for the transportation costs of the books you have collected. Again, experience in a different framework has shown that some universities (or maybe private donors) may have funds available for such purposes.

So, if you have books or journals (in

mathematics and related disciplines, such as computer science) that you wish to donate to a developing country, please let us know, with a short description of the material available. Please contact either of us:

Tsou Sheung Tsun,  
e-mail: [tsou@maths.ox.ac.uk](mailto:tsou@maths.ox.ac.uk)

Herbert Fleischner,  
e-mail: [fleischner@oeaw.ac.at](mailto:fleischner@oeaw.ac.at)

**CONGRÈS DE MATHÉMATIQUES APPLIQUÉES**  
À LA MÉMOIRE DE JACQUES-LOUIS LIONS

PARIS, COLLÈGE DE FRANCE  
1 - 5 JUILLET 2002

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# *Proof*

by David Auburn

Theatre review by Luc Lemaire

In August 2001, I had the opportunity to attend in New York a performance of *Proof*, by David Auburn, and to read the play.

Both the play and performance are brilliant – and can be highly recommended to any audience, mathematical or not. In fact, the play, the director (Daniel Sullivan) and main actress (Mary-Louise Parker) got an avalanche of awards, including a Pulitzer Prize for the author. Moreover, it is a public success and the theatre was packed every evening.

The play is both serious and funny, very well organised, and talks about many problems encountered in life – notably, relations and duties in a troubled family. As various critics noted, it works like a detective story, and various twists in the play leave the audience gasping (notably, the last three words of Act One!). But three of the four characters are mathematicians, and the play is also about genius, about mathematical research and teaching, and about life in the mathematics community.

Without revealing any twist of the tale, a description of the characters will set the scene and give an idea of some real life models that the author has obviously studied.

Robert is around 50. Before he was 30, 'he made major contributions to three fields: game theory, algebraic geometry, and non-linear operator theory' – and 'the economists have been milking his techniques for Nobels ever since'. When he was 30, he developed a serious mental illness which stopped his career altogether – except possibly during some intervals of remission. Meanwhile, he has filled 103 notebooks with notes and computations, which may or may not contain the proof of an essential theorem on prime numbers (whose proof involves elliptic curves and modular forms). So the author has concentrated onto Robert the headlines of mathematics in recent years, combining the life of John Nash with Andrew Wiles's proof of the Fermat theorem, and maybe a hint of Ramanujan's notebooks. However, there is no claim anywhere of describing the life of an existing person – Robert represents a very extreme type of mathematician – and the question of the precision of a biography does not arise.

Catherine, the main character in the play, is his 25-year old daughter. She may have inherited his genius – or maybe his tendency to mental illness. She started studying mathematics, but left university to care personally for her father – as she has now done for years.

Claire, the eldest daughter, lives in another city, is a financial analyst, and represents an external view of the mathematics community.

Finally, Hal is a former student of Robert, who has now a lecturing position at university. He doesn't have the genius of Robert, and is plagued by self-doubt. He feels that his research is trivial, without big ideas, and he keeps going with the fact that he likes teaching.

The detective story aspect of the play is about that famous proof: is it in the notebooks? Could Robert really have written it during remission of his illness? Can it be recovered or published? I find it remarkable that the author could interest – or thrill – the audience and the critics with those questions, when we so often have the impression that the general public doesn't even know that mathematical research exists.

Some short scenes cleverly introduce lots of facts about the characters, mathematical life and mathematics themselves. In a single page – or a few minutes on stage – the characters mention (without giving answers) some of the clichés about research in mathematics: 'Really original work – it's all young guys ... men mostly'. So the model for Catherine is Sophie Germain, who went into hiding during the French Revolution, solved questions on prime numbers and wrote to Gauss signing as a man. We even get in two lines the definition of Germain primes – and an impression of two characters. Indeed, Hal tells Catherine (and the audience): 'Germain primes are famous. Double them and add one and you get another prime. Like two. Two is prime, doubled plus one is five: also prime'. To which Catherine immediately retorts: 'Right, or 92,305 times 2 to the 16,998 plus one' – which puts Hal back one step.

There are indeed a number of pure comedy scenes, when Claire 'does some serious drinking with the theoretical physicists', or when Catherine applies logic to the advertisement for the shampoo her sister would like her to use ('hair can't be healthy, they are dead tissues').

The author also shows understanding of what a proof is, how it can be elegant, how ideas are essential, how new angles of thought on known question produce new results – with lots of work. Certainly, mathematics is central in the play, and characters of mathematicians are not reduced to caricatures.

When a mathematician appears in a film or a book, mistakes or misconceptions are often striking. If I ask here: are those people mathematicians like those I have known for many years in many countries, the answer is a resounding yes. They look, talk and behave like real-life mathematicians (with, of course, the anomaly of the extreme character of Robert). Ben Schenkman, in the role of Hal, could go unnoticed in any mathematical department or meeting.

The questions raised about mathematical creation, or careers, and the description of the mental processes involved, are absolutely relevant – and (apart from two remarks, to be precise) I can agree with everything, and recognise the real-life mathematicians.

At the same time, it is a great play, and it is remarkable that both audience and critics can take as an obvious starting point that research is going on today in operator theory or modular forms.

The book is available (but comparing it with the performance it appears that reading a play does not necessarily do justice to it – it is meant as a play and the tempo, the silences, the quality of direction and acting are necessary ingredients). The play continues on Broadway with a new cast (the role of Catherine being taken over by Jennifer Jason-Leigh), and is currently running in London with Gwyneth Paltrow in that role.

We keep feeling that mathematical research is unknown, and try to build up various 'mathematics awareness programmes'. It seems that we now have some solid and unexpected help.

*The play is published as:*

*David Auburn, Proof, Faber and Faber, ISBN 0-571-19997-6.*

*The theatre has a web site with various comments and pictures:*

*www.proofonbroadway.com.*

## Help needed!

**Kathleen Quinn is retiring as Conferences editor at the end of 2002.**

**Volunteers are needed to take on this task.**

**If you are interested in helping, please contact Kathleen Quinn or the Editor-in-Chief.**

# Forthcoming conferences

Compiled by Kathleen Quinn

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

## July 2002

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

**Information:** website <http://acm.emath.fr/congres-jllions/>  
[For details, see EMS Newsletter 43]

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

**Information:** website <http://www.crm.es/matfin>

### 1-6: 2nd International Conference on the Teaching of Mathematics at Undergraduate Level, Chersonissos, Crete, Greece

**Information:** website <http://www.math.uoc.gr/~ictm2>  
[For details, see EMS Newsletter 42]

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

**Information:** website <http://www.imub.ub.es/wavelets>  
[For details, see EMS Newsletter 43]

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

**Information:** website <http://www.crm.es/2002bcatt>  
[For details, see EMS Newsletter 43]

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

**Information:** website <http://ecmtb.mat.unimi.it>

### 4-6: Current Geometry 2002, Naples, Italy

**Theme:** problems and trends of contemporary geometry  
**Aim:** to establish a periodic update about Italian and international advances in geometry  
**Main speakers:** E. Arbarello (Roma), B. Dubrovin (Trieste), E. Ferapontov (Moscow), L. van Geemen (Pavia), S. Gindikin (Rutgers), V. Kac (Boston), J. Kollar (Princeton), M. Mella (Ferrara), P. Piazza

(Roma), A. Sossinskii (Moscow), A. M. Vinogradov (Salerno), O. Viro (Uppsala)  
**Scientific committee:** E. Arbarello (Roma), F. Baldassarri (Padova), U. Bruzzo (Trieste), C. Ciliberto (Roma), A. Collino (Torino), M. Cornalba (Pavia), C. De Concini (Roma), B. Dubrovin (Trieste), L. van Geemen (Pavia), P. Griffiths (Princeton), V. Kac (Boston), K. O'Grady (Roma), C. Procesi (Roma), E. Sernesi (Roma), J. Stasheff (Chapel Hill), A. M. Vinogradov (Salerno)

**Organising committee:** A. De Paris (Napoli), G. Rotondaro (Napoli), G. Sparano (Salerno), A. M. Vinogradov (Salerno), R. Vitolo (Lecce)

**Sponsors:** Istituto Italiano per gli Studi Filosofici, Naples; Università degli studi di Salerno; Gruppo Nazionale per le Strutture Algebriche, Geometriche e le loro Applicazioni; Dipartimento di Matematica ed Applicazioni dell'Università degli Studi di Napoli 'Federico II'

**Location:** Palazzo Serra di Cassano, Naples

**Notes:** there is no participation fee

**Deadline:** 15 June

**Information:** e-mail [curgeo@diffiety.org](mailto:curgeo@diffiety.org), website <http://www.diffiety.org> or <http://diffiety.ac.ru>

**7-14: 6th WSEAS CISC Multiconference on Circuits; Systems; Communications; Computers; Applied Informatics; Signal Processing and Computational Geometry and Vision; Scientific Computations and Soft Computing, Rethymna Beach, Crete**  
**Information:** website <http://www.wseas.org/conferences/2002/crete>

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

**Information:** website [http://www.ictp.trieste.it/www\\_users/math/maths2002.html](http://www.ictp.trieste.it/www_users/math/maths2002.html)  
[For details, see EMS Newsletter 43]

### 10-13: VISIT-ME-2002 (Vienna International Symposium on Integrating Technology into Mathematics Education), Vienna, Austria

**Information:** website <http://www.acdca.ac.at/visit-me-2002>  
[For details, see EMS Newsletter 43]

### 15-18: Modular Curves and Abelian Varieties (EuroConference), Bellaterra, Barcelona, Spain

**Information:** website <http://www.crm.es/mcav02>

### 16-22: 7th International Spring School: Nonlinear Analysis, Function Spaces and Applications (NAFSA 7), Prague, Czech Republic

**Information:** website <http://www.math.cas.cz/~nafsa7>  
[For details, see EMS Newsletter 40]

### 19-31: V Diffiety School – A School on the Geometry of Differential Equations, S. Stefano del Sole (AV), Italy

**Aim:** to introduce undergraduate and gradu-

ate students and postdoctoral researchers in mathematics and physics to secondary calculus. Secondary calculus is the result of a natural evolution of the classical geometrical theory of partial differential equations (PDE) originated by Sophus Lie. In particular, it allows the construction of a general theory of PDE, in the same manner as algebraic geometry does with respect to algebraic equations  
**Format:** courses for beginners and advanced participants; research seminars

**Topics:** 1. Differential calculus over commutative algebras and smooth manifolds (suggested for beginners); 2. Infinite jets and diffieties (suggested for more experienced participants)

**Research seminars:** 1. 'Einstein'; 2. Singular Lagrangians and Hamiltonian formalism; 3. Differential invariants: Theory and applications; 4. Towards differential algebraic geometry

**Lecture notes:** available at the website (see below)

**Main speakers:** A. De Paris (Naples), S. Igonin (Independent University of Moscow), F. Pugliese (Salerno), A. Verbovetsky (Independent University of Moscow, Diffiety Institute), A. Vinogradov (Salerno, Diffiety Institute), M. Vinogradov (Moscow, Diffiety Institute), R. Vitolo (Lecce, Diffiety Institute)

**Organising committee:** D. Catalano Ferraioli, A. De Paris, C. Di Pietro, G. Manno, R. Piscopo, F. Pugliese, G. Rotondaro, F. Strazzullo, R. Vitolo

**Sponsors:** Diffiety Institute of the Russian Academy of Natural Sciences, Istituto Italiano per gli Studi Filosofici, Municipality of Santo Stefano del Sole (AV), Italy

**Location:** S. Stefano del Sole (AV), near Naples

**Notes:** the participation fee is 100 euros, reducible in a few special cases

**Deadline:** 15 June

**Information:** e-mail [school@diffiety.org](mailto:school@diffiety.org), website <http://diffiety.ac.ru> or <http://www.diffiety.org>

### 22-25: IEEE Symposium on Logic in Computer Science (LICS'02), Copenhagen, Denmark

**Information:** website <http://www.dcs.ed.ac.uk/home/grohe/lics/lics02/>  
[For details, see EMS Newsletter 43]

### 22-26: ICCAM 2002, International Congress on Computational and Applied Mathematics, Leuven, Belgium

**Aim:** to bring together those working on the analysis and application of computational techniques for solving real scientific problems

**Main speakers:** Chris Budd (U.K.), Adhemar Bultheel (Belgium), Volker Schulz (Germany), Ben Sommeijer (Netherlands), Masaaki Sugihara (Japan), Paul Van Dooren (Belgium)

**Deadline:** already passed for abstracts of short communications

**Proceedings:** will be published in the 'Journal of Computational and Applied Mathematics'

**Information:** website <http://www.cs.kuleuven.ac.be/conference/iccam2002/iccam.htm>

### 22-26: Universal Algebra and Lattice Theory, Szeged, Hungary

**Information:** website <http://www.math.u-szeged.hu/confer/>

## CONFERENCES

algebra/2002/  
[For details, see EMS Newsletter 43]

### August 2002

#### 3-9: Logic Colloquium 2002 (ASL European Summer Meeting), Münster, Germany [change of date]

##### Information:

website <http://www.math.uni-muenster.de/LC2002/>

[For details, see EMS Newsletter 41]

#### 4-11: International Conference on the Ideas of Albert Abraham Michelson in Mathematical Physics, Będlewo, Poland

**Motivation:** to commemorate the 150th anniversary of the birthday of A. A. Michelson on 19 December 1852 at Strzelno, near Inowrocław. The importance of Michelson's measurements of the velocity of light, ether drift, standard meter and stellar diameters had a great influence on modern-day physics and mathematical physics. Since Michelson was the first American citizen to win a Nobel prize, and since he was born into an Israelite family, the organisers will be in contact with the Polish, American, and Israeli Physical Societies

**Topics:** historical aspects of Michelson's discoveries, contemporary success and status of special relativity, contemporary experiments stimulating special relativity, special relativity versus quantum mechanics and optics, superluminal propagation in anomalous media, classical and quantum synchronisation of clocks, relations to stochastic spaces, astrophysics and cosmology

**Organising committee:** Julian Ławrynowicz (Łódź), Yuval Ne'eman (Tel Aviv), Roberto D. Peccei (Los Angeles), Jakub Rembéliński (Łódź), Ireneusz Strzałkowski (Warszawa), Józef Szudy (Toruń), Michael Turner (Chicago), Edward Witten (Princeton), Leszek Wojtczak (Łódź)

**Fees:** 140 zlotys (c. US \$35) per day, full board; the registration fee is 200 zlotys (US \$50)

**Grants:** full support for twenty participants (full board, travel excluded)

**Information:** contact Julian Ławrynowicz Institute of Mathematics, Polish Academy of Sciences, Banacha 22, 90-238 Łódź, Poland, e-mail [jlawryno@krysia.uni.lodz.pl](mailto:jlawryno@krysia.uni.lodz.pl)

#### 5-9: International Conference on Ill-Posed and Inverse Problems, Novosibirsk, Russia Information:

website [www.math.nsc.ru/conference/mml](http://www.math.nsc.ru/conference/mml)

[For details, see EMS Newsletter 42]

#### 9-11: Colloquium Logicum 2002, 2nd Biannual Meeting of the DVMLG, Münster, Germany

##### Information:

website <http://www.math.uni-muenster.de/LC2002/CL2002.html>

[For details, see EMS Newsletter 43]

#### 10-11: Colloquium Logicum 2002, Münster, Germany [satellite conference of Logic Colloquium 2002]

##### Information:

website <http://www.math.uni-muenster.de/LC2002/>

[For details, see EMS Newsletter 41]

#### 11-18, 2002 XIII Conference on Analytic Functions, Będlewo, Poland

**Motivation:** an international conference on analytic functions, with 60 to 100 foreign participants from 20 to 30 countries, and 40 to 90 Polish participants, has been organised in Poland every fourth year since 1954

**Topics:** real and complex analytic geometry, extremal problems related to one and several complex variables, approximation problems related to one and several complex variables, complex mapping and related structures, real and complex potential theory, generalised complex (in particular, Clifford) structures, quasiconformal geometry and dynamics, complex dynamical systems and fractals

**Organising Committee:** Zbigniew Jakubowski (Łódź), Jan Krzyż (Lublin), Julian Ławrynowicz (Łódź), Olli Martio (Helsinki), Dariusz Partyka (Lublin), Feliks Przytycki (Warszawa), Józef Siciak (Kraków), Jan Stankiewicz (Rzeszów), Promarz Tamrazov (Kyiv)

**Fees:** 120 zlotys (c. US \$30) per day full board; the registration fee is 160 zlotys (US \$40)

**Grants:** full support for twenty participants (full board, travel excluded)

**Information:** contact Julian Ławrynowicz Institute of Mathematics, Polish Academy of Sciences Banacha 22, 90-238 Łódź, Poland, e-mail [jlawryno@krysia.uni.lodz.pl](mailto:jlawryno@krysia.uni.lodz.pl)

#### 24-28: XV Compstat Conference of the International Association for Statistical Computing, Berlin, Germany

[the latest in a series of biannual conferences; this conference is in cooperation with the 29th Annual Meeting of the European Finance Association (21-24 August) and the Computational Finance Research Conference (24-25 August)]

**Theme:** computational statistics

**Topics:** statistical risk management, multivariate and robust analysis, Markov chain Monte Carlo methods, statistics of E-commerce, new strategies in teaching (multimedia, internet), computer based sampling/questionnaires, analysis of large databases (with emphasis on computing in memory), graphical tools for data analysis, classification and clustering, new statistical software, historical development of software

**Main speakers:** S. Brooks (USA), C. Chen (Taiwan), T. Hastie (USA), G. Kitagawa (Japan), J.S. Marron (USA), J. Symanzik (USA), M. Valderrama (Spain), Th. Yee (New Zealand), K. Yoshioka (Japan)

**Call for papers:** submission period expired

**Scientific programme committee:** J. Antoch (Czech Republic), A. Bowman (UK), M. Delecroix (France), W. Härdle (Germany), P. van der Heijden (Netherlands), W.G. Manteiga (Spain), J. Nakano (Japan), M. Schimek (Austria), A. Unwin (Germany)

**Local organising committee:** Y. Boztug, H. Büning, W. Härdle, L. Hildebrandt, U. Küchler, D. Pabst, B. Rönz, P. Schirmbacher, B. Schöler, V. Spokoyny, H. G. Strohe, J. Wolters, U. Ziegenhagen

**Sponsors:** StatSoft (Europe) GmbH, Insightful S-Plus Team, VSN International Limited, Scopeland GmbH, ProGAMMA, SUN Microsystems, John Wiley & Sons Ltd., IBM, Minitab Ltd., Springer-Verlag Heidelberg, Cambridge University Press, Design Science Inc., NAG Ltd

**Proceedings:** published by Physica-Verlag

**Location:** main building of Humboldt-

Universität zu Berlin, (Unter den Linden 6, 10099 Berlin)

**Grants:** participants from special circumstance countries and students are supported

**Deadlines:** 1 June for standard registration, 24 August for late registration

**Information:** e-mail [info@compstat2002.de](mailto:info@compstat2002.de), website [www.compstat2002.de](http://www.compstat2002.de)

#### 25-30: Wireless and Optical Communications (WOC'02), Miedzyzdroje, Poland

**Information:** website <http://www.wseas.org/conferences/2002/miedzyzdroje/gown>

#### 25-30: Nanoelectronics, Nanotechnologies (NN'02), Miedzyzdroje, Poland

**Information:** website <http://www.wseas.org/conferences/2002/miedzyzdroje/nn>

#### 25-30: WSEAS International Conference on ElectroMagnetic Compatibility (EMC'02), Miedzyzdroje, Poland

**Information:** e-mail [poland2002@wseas.org](mailto:poland2002@wseas.org), website <http://www.wseas.org/conferences/2002/miedzyzdroje/ec>

#### 27-2 September: Third International School-Symposium: Symmetry and Cosymmetry Applications in the Theory of Bifurcations and Phase Transitions, Big Sochi, Russia

**Information:** website <http://www.math.rsu.ru/mexmat/kvm/school2002>

[For details, see EMS Newsletter 43]

#### 29-31: Eleventh International Workshop on Matrices and Statistics, Lyngby, Denmark

[in celebration of the 65th birthday of George P. H. Styan]

**Location:** Technical University of Denmark (Section of Image Analysis and Computer Graphics)

**Aim:** to stimulate research and foster interaction between researchers in the interface between matrix theory and statistics. The workshop will provide a forum through which statisticians working in the fields of linear algebra and matrix theory may be better informed of the latest developments and newest techniques, and may exchange ideas with researchers from a variety of countries

**Deadline:** 3 June for submission of abstracts

**Registration fee:** 240 euros before 29 July; 280 euros after that date

**International organising committee:** R. William Farebrother (Victoria Univ. of Manchester, UK), Simo Puntanen (Univ. of Tampere, Finland), Hans Joachim Werner (Chair; Univ. of Bonn, Germany)

**Local organising committee:** Knut Conradsen (Chair), Bjarne K. Ersbøll, Per Christian Hansen, Allan Aasbjerg Nielsen (all DTU, Lyngby)

**Information:** contact Helle R. Welling, Workshop Secretary, Bldg. 321, Informatics and Mathematical Modelling, DTU, DK-2800 Lyngby; fax: +45 45 88 13 97; e-mail [matrix02@imm.dtu.dk](mailto:matrix02@imm.dtu.dk), website <http://www.imm.dtu.dk/matrix02>

#### 31-6 September: European Women in Mathematics International Workshop on Groups and Graphs, Varna, Bulgaria

**Topics:** groups and graphs and their applications in different sciences, discussions on some problems of women mathematicians

**Invited speakers:** Bettina Eick (Germany), Wendy Myrvold (Canada), Valerie Berthe (France), Sarah Rees (UK), Karin

Gatermann, (Germany), Rita Vincenti (Italy), Faina Solov'eva (Russia), Elizabeth J. Billington (Australia), Rachel Camina (UK), Daniela Nikolova (Bulgaria), Stefka Bouyuklieva (Bulgaria), Svetlana Topalova (Bulgaria)

**Call for papers:** each contributed short talk should contain original unpublished results, should not exceed four pages, and should be submitted before 10 June as a LaTeX file ([10pt]{article}, \textwidth 11.5 cm, \textheight 16.5cm, \normalsize), e-mailed to svetlana@moi.math.bas.bg. Confirmation of receipt in 3 days, information about acceptance within a month after receipt

**Programme committee:** Cheryl Praeger (president, Australia), Jennifer D. Key (USA), Valerie Berthe (France), Sarah Rees (UK), Karin Gatermann (Germany)

**Local organising committee:** Daniela Nikolova (president, Bulgaria), Svetlana Topalova (Bulgaria), Milena Dobрева (Bulgaria), Blajka Radeva (Bulgaria)

**Proceedings:** a volume of the workshop proceedings will be issued and ready at the beginning of the workshop

**Location:** Bulgaria, on the Black Sea, international home of scientists 'F. Joliot-Curie', 8 km from the town of Varna

**Deadline:** 10 June for submission of talks

**Information:** e-mail:

svetlana@moi.math.bas.bg,

website: www.moi.math.bas.bg/EWM02

## September 2002

### 1-5: 3rd WSEAS Int. MultiConference on Applied and Theoretical Mathematics, Miedzyzdroje, Poland

**Information:** e-mail math2002@wseas.org, website <http://www.wseas.org/conferences/2002/poland>

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

**Information:** e-mail aha2002@agro.duth.gr, tvougliou@edu.duth.gr, sspart@utopia.duth.gr  
[For details, see EMS Newsletter 43]

### 2-7: Poisson 2002, Conference on Poisson Geometry, Lisbon, Portugal

[The third in a series of conferences on Poisson geometry and related fields]

**Aim:** Poisson geometry has developed rapidly due to new and exciting results related to classification of Poisson brackets, deformation quantisation, topological invariants and differential equations occurring in mathematical physics. This conference aims to bring together leading experts in Poisson geometry and related fields, as well as young researchers who have made promising contributions, and so will be a forum to cover recent progress and to stimulate exchanges among active researchers

**Topics:** local properties (singularities of Poisson structures, linear approximations), Hamiltonian systems (moment maps), global geometry (Poisson-Lie groups, Poisson  $G$ -spaces, Poisson supergeometry, quasi-Poisson manifolds) and Poisson topology (modular class, characteristic classes and other invariants,  $K$ -theory, integrability of Poisson manifolds). Related fields that will also be touched upon include: symplectic and related geometries, integrable systems, deformation and geometric quantisation, Lie alge-

broids and groupoids, quantum field theory

**Invited speakers:** Anton Alekseev (Geneva), Melanie Bertelson (Brussels), Alberto Cattaneo (Zürich), Marius Crainic (Utrecht), Jean-Paul Dufour (Montpellier), Ezra Getzler (Northwestern), Viktor Ginzburg (Santa Cruz), Victor Guillemin (MIT), Johannes Huebschmann (Lille), Boris Khesin (Toronto), Yael Karshon (Jerusalem), Jiang-Hua Lu (Arizona), Yoshiaki Maeda (Keio), Eckhard Meinrenken (Toronto), Juan-Pablo Ortega (Nice), Tudor Ratiu (Lausanne), Nicolai Reshetikhin (Berkeley), Dmitry Roytenberg (Penn State), Pavol Severa (Bratislava), Alan Weinstein (Berkeley), Chris Woodward (Rutgers), Ping Xu (Penn State), Nguyen Tien Zung (Montpellier)

**Programme committee:** Anton Alekseev (Geneva), Yvette Kosmann-Schwarzbach (Ecole Polytechnique), Yoshiaki Maeda (Keio), Alan Weinstein (Berkeley)

**Organising committee:** Miguel Abreu, Ana Cannas da Silva, Rui L. Fernandes (Instituto Superior Tecnico)

**Sponsors:** Center for Mathematical Analysis, Geometry and Dynamical Systems, European Union, Portuguese Science Foundation

**Proceedings:** will not be published

**Location:** Department of Mathematics, Instituto Superior Tecnico, Lisbon

**Grants:** some funds will be available for graduate and postdoctoral students, as well as participants from countries in a difficult economic situation

**Deadlines:** 1 July for registration

**Information:** e-mail poisson@math.ist.utl.pt, website [www.math.ist.utl.pt/Poisson2002](http://www.math.ist.utl.pt/Poisson2002)

### 3-7: 8th International Conference on Stability, Control and Rigid Bodies Dynamics, Donetsk, Ukraine

**Information:**

website <http://www.iamm.ac.donetsk.ua/conf2002.html>

[For details, see EMS Newsletter 42]

### 4-6: Brno CDDE 2002 - Colloquium on Differential and Difference Equations, Brno, Czech Republic

[dedicated to Prof. Frantisek Neuman on the occasion of his 65th birthday, continuation of the Brno CDDE 2000 conference]

**Topics:** qualitative theory of differential and difference equations and their applications

**Main speakers:** P. Drabek (Czech Rep.), J. R. Graef (USA), I. Kiguradze (Georgia), J. Mawhin (Belgium), F. Neuman (Czech Rep.), M. Pituk (Hungary), F. Zanolin (Italy)

**Format:** invited plenary lectures, short communications and posters

**Abstracts:** please send an electronic version by e-mail; see the website for the required format

**Organising committee:** O. Dosly (chairman), M. Bartusek, Z. Dosla, J. Vosmansky

**Proceedings:** to be published in the series of Monographs of Folia Facultatis Scientiarum Naturalium Universitatis Masarykianae Brunensis

**Location:** Hotel Santon in the area of Brno dam lake

**Deadlines:** 31 May for registration (for later registration, accommodation in the Colloquium Hotel Santon is not guaranteed), 15 June for abstracts

**Information:** e-mail cdde@math.muni.cz, website <http://www.math.muni.cz/cdde>

### 4-6: Fourth International Workshop on Automated Deduction in Geometry, RISC-

### Linz, Hagenberg/Linz, Austria

**Information:** website <http://www.risc.uni-linz.ac.at/conferences/adg2002>

[For details, see EMS Newsletter 43]

### 4-6: 3rd International Conference on Mathematical and Computational Applications, Konya, Turkey

**Information:**

website <http://www.selcuk.edu.tr/icmca2002>

[For details, see EMS Newsletter 43]

### 4-7: International Conference on Dynamical Methods for Differential Equations, Valladolid, Spain

**Information:**

website <http://wmatem.eis.uva.es/~dmde02/>

[For details, see EMS Newsletter 41]

### 4-7: Perspectives in Mathematical Physics, Rome, Italy

[in honour of the 60th birthday of Prof. Giovanni Gallavotti]

**Information:**

website <http://www.mat.uniroma2.it/pmp2002>

[For details, see EMS Newsletter 43]

### 8-13: ALGORITMY 2002, Conference on Scientific Computing, High Tatras Mountains, Podbanske, Slovakia

**Information:**

website <http://www.math.sk/alg2002>

[For details, see EMS Newsletter 42]

### 9-12 : Conference on Harmonic Analysis, Luxembourg-Metz (Luxembourg-France)

**Information:** e-mail

harmonic\_analysis@cu.lu,

website [http://www.cu.lu/harmonic\\_analysis](http://www.cu.lu/harmonic_analysis)

[For details, see EMS Newsletter 43]

### 9-20: Siberian School on Geometry and Analysis, Novosibirsk, Russia

[dedicated to the memory of A. D.

Alexandrov (1912-99)]

**Programme:** the main part consists of several mini-courses in geometry and geometric analysis

**Programme committee:** Yu. G. Reshetnyak

(Chairman), V. A. Sharafutdinov, V. A.

Toponogov, S. K. Vodop'yanov

**Main speakers** (preliminary list): V. N.

Berestovskii (Omsk), V. N. Dubinin

(Vladivostok), S. V. Gol'din (Novosibirsk), V.

K. Ionin (Tver'), V. V. Ivanov (Novosibirsk),

S. V. Matveev (Chelyabinsk), A. D. Mednykh

(Novosibirsk), I. G. Nikolaev (Urbana-

Champaign), Yu. G. Reshetnyak

(Novosibirsk), E. D. Rodionov (Barnaul), I.

Kh. Sabitov (Moscow), V. A. Sharafutdinov

(Novosibirsk), I. A. Taimanov (Novosibirsk)

**Organising committee:** S. K. Vodop'yanov

(Chairman), A. S. Romanov (Secretary), V. A.

Alexandrov, A. A. Egorov

**Location:** Sobolev Institute of Mathematics, Novosibirsk, Russia

**Deadline:** 15 July for submission of abstracts

**Information:** e-mail angeom@math.nsc.ru,

website <http://www.math.nsc.ru/conference/>

wwwga/

### 9-27: School and Conference on Intersection Theory and Moduli, Trieste, Italy

**Theme:** algebraic geometry: intersection theory and moduli spaces

**Topics:** algebraic stacks, Gromov-Witten invariants and quantum cohomology, invariants of singular varieties, complex symplectic moduli spaces, vertex operators

## CONFERENCES

**Main speakers:** D. Abramovich (USA), K. Behrend (Canada), A. Bertram (USA), E. Frenkel (USA), D. Huybrechts (Germany), M. Lehn (Germany), J. Li (USA), F. Loeser (France), A. Vistoli (Italy)

**Format:** a two-week school followed by a one-week conference

**Programme committee:** E. Arbarello (Italy), G. Ellingsrud (Norway), L. Goettsche (Italy)

**Sponsors:** International Centre for Theoretical Physics

**Proceedings:** we plan to publish a volume of lecture notes relating to the school

**Location:** International Centre for Theoretical Physics (ICTP), Strada Costiera 11, Trieste

**Grants:** limited funds are available for participants from, and working in, developing countries; grants from the European Commission for young participants from Europe may also be available

**Deadline:** already passed

**Information:** e-mail [smr1426@ictp.trieste.it](mailto:smr1426@ictp.trieste.it), website [http://www.ictp.trieste.it/www\\_users/math/math2002.html](http://www.ictp.trieste.it/www_users/math/math2002.html)

**10-20: Advanced Course on Geometric 3-Manifolds, Bellaterra, Barcelona, Spain**  
**Information:**

website <http://www.crm.es/geom-mani>

**11-13: EACA-2002, 8th Meeting on Computer Algebra and its Applications, Peñaranda de Duero, Spain**

**Aim:** to provide a forum for researchers in computer algebra as well as for those who use its techniques. There has been an EACA meeting held in Spain every year since 1995; the 2001 meeting was attended by many researchers from all over the world. The participation of young researchers is especially encouraged

**Topics:** include, but are not restricted to, effective methods in algebra, analysis, geometry and topology; algorithmic complexity; scientific computation via symbolic-numerical methods; development of symbolic-numerical software; analysis, specification, design and implementation of symbolic computation systems; applications to science and technology

**Main speakers:** C. Andradas (Univ. Complutense, Madrid, Spain), B. Buchberger (RISC-Linz, Austria), J. Elias (Univ. Barcelona, Spain), I. Emiris (INRIA, Sophia-Antipolis, France), A. Simis (UFPE, Recife, Brazil), U. Walther (Purdue Univ., USA)

**Scientific committee:** M.-E. Alonso (Univ. Complutense), I. Bermejo (Univ. La Laguna), J.-L. Bueso (Univ. Granada), F.-J. Castro (Univ. Sevilla), J. Elias (Univ. Barcelona), Ph. Gimenez (Univ. Valladolid), L. González-Vega (Univ. Cantabria), A. Montes (U.P. Cataluña), T. Recio (Univ. Cantabria), J. Rubio (Univ. La Rioja), J.-R. Sendra (Univ. Alcalá)

**Organiser:** Ph. Gimenez (Dept. Algebra, Univ. Valladolid)

**Host institution:** University of Valladolid (Spain)

**Location:** Palacio de Avellaneda, Peñaranda de Duero (Spain)

**Deadlines:** already passed for submission; 28 June for early registration

**Information:** e-mail [eaca2002@agt.uva.es](mailto:eaca2002@agt.uva.es), website <http://www.uva.es/eaca2002>

**15-22: International Summer School on Operator Methods for Evolution Equations and Approximation Problems (OMEEAP**

26

**2002), Bari, Italy**

**Topics:** Feller semigroups and Markov processes, positive operators and approximation of functions, positive operators and approximation for evolution equations, semigroups of operators and evolution equations, cosine families of operators and evolution equations

**Aim:** the School is especially addressed to Ph.D. students and young researchers, who are already active in, or want to improve their knowledge of, the above topics.

**Format:** the main part comprises five short courses (each five hours) and some invited lectures. There will also be informal discussions and a poster session in which newer researchers can outline their research work and interests

**Invited speakers of the courses:** Jan van Casteren (Univ. of Antwerp), Heinz H. Gonska (Univ. of Duisburg), Jan Prüss (Univ. of Halle-Wittenberg), Ioan Ra'a (Techn. Univ. of Cluj-Napoca), Sen-Yen Shaw (Nat. Central Univ. of Chung-li)

**Invited lecturers:** José Antonio Adell (Univ. of Zaragoza), Detlef-Hauke Mache (Univ. of Dortmund), Giuseppe Mastroianni (Univ. of Basilicata), Abdelaziz Rhandi (Univ. of Marrakech), Vincenzo Vespri (Univ. of Firenze)

**Executive organizing committee:** F. Altomare ([altomare@dm.uniba.it](mailto:altomare@dm.uniba.it)), A. Attalienti ([attalienti@matfin.uniba.it](mailto:attalienti@matfin.uniba.it)), M. Campiti ([campiti@dm.uniba.it](mailto:campiti@dm.uniba.it)), L. D'Ambrosio ([dambros@dm.uniba.it](mailto:dambros@dm.uniba.it)), S. Diomede ([s.diomede@dse.uniba.it](mailto:s.diomede@dse.uniba.it)), G. Metafune ([Giorgio.Metafune@le.infn.it](mailto:Giorgio.Metafune@le.infn.it)), D. Pallara ([Diego.Pallara@le.infn.it](mailto:Diego.Pallara@le.infn.it))

**Grants:** the deadline for grants for young researchers has passed

**Site:** Hotel Villaggio Cala Corvino, on the Apulian coast near Monopoli, a town 35 kilometres from Bari, Italy

**Deadline for registration:** already passed

**Information:** contact one of the executive organisers, website <http://www.dm.uniba.it/documenti/formazione/SummerSchool-OMEEAP2002/index.htm>

**16-17: Annual Francophone Meeting of Classification, Toulouse, France**

**Theme:** classification topics, including neural networks, graph theory, image processing, remote sensing, multivariate modelling, pattern recognition, datamining

**Main speakers:** A. Appriou (ONERA), J.-P. Barthelemy (ENSTB), A. Ciampi (Canada), F. Critchley (England), A. Degenne (Caen), T. Denoeux (Compiègne), G. Govaert (CNRS), S. Holmes (USA), D. Ladiray (Luxembourg), J.-P. Rassin (Belgium), F. Rossi (LISE/CEREMADE), T. Snijders (Netherlands), J. Ten Berge (Netherlands), S. Thiria (LODYC), B. Victorri (ENSP)

**Location:** Université du Mirail

**Grants:** for 3 participants with support of AUPELF

**Deadlines:** 1 September for registration, 15 May for abstracts

**Information:** e-mail [lafosse@cict.fr](mailto:lafosse@cict.fr), web site <http://www.irit.fr/SFC2002/>

**16-20: LMS/EPsrc Short Course on Differential Geometry, Lie Groups and Homogeneous Spaces, Durham, United Kingdom**

**Aim:** to introduce research students to several topics in differential geometry

**Topics:** introduction to differential geometry

try; Lie groups and homogeneous spaces; geometry and integrable systems

**Main speakers:** D. Alekseevsky (UK), M. Guest (Japan), M. Micallef (UK)

**Format:** three courses each consisting of five lectures and several tutorials

**Organising Committee:** J. Berndt (UK), J. Bolton (UK)

**Sponsors:** Engineering and Physical Science Research Council (UK), London Mathematical Society

**Location:** University of Durham (UK)

**Grants:** full-board accommodation for UK-based students, four bursaries for non-UK-based students

**Deadline:** 5 July for registration

**Information:** e-mail [j.berndt@hull.ac.uk](mailto:j.berndt@hull.ac.uk), website <http://www.hull.ac.uk/LMS-DG>

**20-25: International Conference on Computational Methods in Science and Engineering (CMMSE-2002), Alicante, Spain**

**Information:** website [www.ua.es/cmmse2002/](http://www.ua.es/cmmse2002/) [For details, see EMS Newsletter 42]

**23-27: Calculus of Variations in Nonlinear Phenomena, Martina Franca (Ta), Italy**

**Theme:** non-linear analysis

**Topics:** calculus of variations, variational methods, non-linear differential equations

**Main speakers:** T. Aubin, H. Berestycki, F. Béthuel, N. Hirano, R. Kohn, C. S. Lin, F. Murat, F. Pacard, T. Riviere, E. Séré, M. Struwe, C. Stuart

**Programme committee:** A. Ambrosetti, L. Ambrosio, V. Benci, V. Coti Zelati, G. Dal Maso, D. Fortunato, A. Marino

**Organising committee:** D. Fortunato, A. Masiello, A. Salvatore

**Sponsors:** M.I.U.R., Politecnico di Bari, Università degli Studi di Bari

**Location:** Sala della Biblioteca Comunale, Palazzo Ducale in the old town of Martina Franca in southern Italy

**Deadline:** 14 September for registration

**Information:** website [www.dm.uniba.it/martina2002](http://www.dm.uniba.it/martina2002)

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

**Information:** <http://www-math.math.univ-paris13.fr/~ramifica/>

**23-4 October: The Calculemus Autumn School 2002, Pisa, Italy**

**Theme:** integration of computer algebra and deduction

**Aim:** the School will bring together a large number of experts from the field of computer algebra and deduction systems. The goal is to train young researchers, high school teachers and representatives from industry on the state-of-the-art research and current systems in this field. The school is a summit of the activities of the EU training network Calculemus and the broader Calculemus interest group

**Objectives:** to give young researchers a perspective on state-of-the-art symbolic computation and symbolic reasoning; to disseminate advanced scientific knowledge on the integration of computer algebra systems and deduction systems; to foster contacts between the research communities of computer algebra, deduction, mathematics education, and industry

**Format:** participants will be trained both theoretically and experimentally on selected topics and tools. They will have the oppor-



tunity to experiment with the main tools of the area, and researchers developing the tools will receive valuable feedback. Ph.D. students, mathematics and computer science teachers, and personnel from industry are expected to participate

**Topics:** deduction systems, computer algebra, proof planning, group theory, formal methods, model checking, systems of polynomials, partiality, integration of decision procedures, mathematical exploration, mathematics databases, mathematical learning environments, mathematical system networks, system support in mathematics education, and more

**System demos:** Inka, Vse, Coq, Theorema, Omega, Mizar, Isabelle, Activemath, Mbase, MathWeb, NuPrl, Lambda-Clam, NuSMV, Gap, Mathbook, RDL, LBA, and more

**Main speakers / lecturers** Alessandro Armando (Italy), Christoph Benzmlüller (Germany), Bruno Buchberger (Austria), Alan Bundy (Scotland), Jacques Calmet (Germany), Arjeh Cohen (Netherlands), James Davenport (England), Herman Geuvers (Netherlands), Fausto Giunchiglia (Italy), Dieter Hutter (Germany), Manfred Kerber (England), Michael Kohlhase (USA), Christoph Kreitz (USA), Ursula Martin (Scotland), Andreas Meier (Germany), Erica Melis (Germany), Tobias Nipkow (Germany), Marco Pistore (Italy), Marco Roveri (Italy), Jörg Siekmann (Germany), Volker Sorge (England), Werner Stephan (Germany), Andrzej Trybulec (Poland), Wolfgang Windsteiger (Austria), Tom Kelsey (Scotland), Olga Caprotti (Austria)

**Call for papers:** students and participants are invited to submit short papers (up to 5 pages) related to the objectives of the school

**Programme and organising committee:** Christoph Benzmlüller (Saarland University, Chair), Regine Endsuleit/Clemens Ballarin (Univ. of Karlsruhe, Chair), Carlo Traverso (Univ. of Pisa, Local Organiser), Jörg Siekmann (Saarland Univ., Calculemus Network), Jacques Calmet (Univ. of Karlsruhe, Calculemus Network), Corinna Hahn (EPO/Eurice GmbH, Calculemus Management)

**Sponsors:** Dipartimento di Matematica (Università di Pisa), Calculemus Network, German Research Centre for Artificial Intelligence (DFKI), Research Institute for Applications of Computer Algebra (RIACA), City of Pisa, Saar Toto GmbH

**Proceedings:** course handouts will be distributed at the event. Short papers and poster contributions will be published in a technical report

**Location:** conference at Dipartimento di Matematica, Università di Pisa; conference accommodation at the 14th century monastery Santa Croce in Pisa

**Grants:** the School is included in the EU Comenius Catalogue 2002 (grants for high school teachers from the EU are available). Further grants for students will probably be available

**Deadlines:** 1 July for registration, 1 August for submission of papers

**Information:** e-mail [calculemus-autumn-school@eurice.de](mailto:calculemus-autumn-school@eurice.de), website <http://www.eurice.de/calculemus/autumn-school>

**25-28: 2nd WSEAS International Conferences on: Simulation, Modelling and Optimization; Signal, Speech and Image Processing; Multimedia, Internet and**

**EMS June 2002**

**Video; Robotics, Distance Learning and Intelligent Communication Systems, Skiathos, Greece**

**Information:** website <http://www.wseas.org/conferences/2002/skiathos/>

## October 2002

**9-11: 7th Conference on Shell Structures, Theory and Applications (SSTA2002), Gdańsk-Jurata, Poland**

**Information:** website <http://www.pg.gda.pl/ssta2002>  
[For details, see EMS Newsletter 42]

## February 2003

**5-7: 4th IMACS Symposium on Mathematical Modelling, Vienna, Austria**

**Information:** website <http://simtech.tuwien.ac.at/MATHMOD>  
[For details, see EMS Newsletter 41]

**5-7: 4th MATHMOD Vienna 4th IMACS Symposium on Mathematical Modelling, Vienna, Austria**

**Aim:** scientists and engineers using or developing models or interested in the development or application of various modelling tools can present ideas, methods and results and discuss their experiences or problems with experts of various areas of specialisation

**Scope:** theoretical and applied aspects of the various types of mathematical modelling (equations of various types, automata, Petri nets, bond graphs, qualitative and fuzzy models, etc.) for systems of dynamic nature (deterministic, stochastic, continuous, discrete or hybrid with respect to time, etc.); comparison of modelling approaches, model simplification, modelling uncertainties, port-based modelling, and the impact of items such as these on problem solution, numerical techniques, validation, automation of modelling and software support for modelling, co-simulation; applications of modelling in control, design or analysis of systems in engineering and other fields of application

**Format:** special sessions, presentations of modelling and simulation software, book exhibition

**Organiser:** Division for Mathematics of Control and Simulation (E114/3), Vienna University of Technology. Chair of IPC: Inge Troch

**Location:** Vienna University of Technology  
**Deadlines:** already passed for submission of abstracts, 1 December for submission of full papers

**Information:** contact Univ.Prof. Dr. Inge Troch, Vienna University of Technology, Wiedner Hauptstrasse 8 - 10 A-1040 Wien, Austria, tel. +431-58801-11451, fax. +431-58801-11499, e-mail [inge.troch@tuwien.ac.at](mailto:inge.troch@tuwien.ac.at), website <http://simtech.tuwien.ac.at/MATHMOD>

## May 2003

**11-16: International Conference on General Control Problems and Applications (GCP-2003), Tambov, Russia**

[dedicated to the 100th anniversary of A. N. Kolmogorov]

**Theme:** optimal control

**Scope:** A. N. Kolmogorov's creative legacy, optimisation theory and its prospects, approximation methods and stability in control, variation methods for non-linear systems investigating and their applications, mathematical models of economic systems control, mathematical models of control technical, natural and humanities

**Languages:** Russian, English

**Call for papers:** authors are invited to submit abstracts. Contributions must be prepared in LaTeX

**Programme committee:** V. M. Filippov, A. B. Kurzhansky, Yu. S. Osipov, V. A. Sadovnichy, V. M. Tikhomirov (chairs); A. I. Bulgakov (deputy); A. P. Afanasiev, A. V. Arutyunov, N. A. Bobylev, A. G. Chentsov, V. B. Demidovich, V. V. Dikumar, A. V. Dmitruk, I. V. Evstigneev, V. I. Levin, G. G. Magaril-Ilyayev, S. M. Nikol'sky, Yu. V. Pokorniy, E. L. Tonkov, M. I. Zelikin; E. S. Zhukovsky (scientific secretary)

**Organisers:** Moscow M. V. Lomonosov State University, V. A. Steklov Institute of Mathematics of the Russian Academy of Sciences, Ministry of Education of Russian Federation, Ministry of Industry, Science, and Technologies of Russian Federation, Tambov Region Administration, Tambov G. R. Derzhavin State University

**Proceedings:** to be published

**Location:** the buildings of Tambov G. R. Derzhavin State University (International'naya st., 33, Tambov, Russia)

**Deadlines:** 1 March for registration, 1 November for abstracts

**Information:** e-mail [aib@tsu.tmb.ru](mailto:aib@tsu.tmb.ru), [uaa@hmb.nnn.tstu.ru](mailto:uaa@hmb.nnn.tstu.ru), website <http://www.opu2003.narod.ru>

**11-18: Conference on Topological Algebras, their Applications, and Related Topics, Bedlewo, Poland**

[in honour of Professor Wiesław Zelazko]

**Topics:** general theory of Banach and topological algebras; connections with operator theory, complex analysis, harmonic analysis, and homological methods; representations, structure and classification of topological algebras

**Main speakers:** E. Albrecht (Germany), G. R. Allan (England), H. Arizmendi-Peimbert (Mexico), C. Badea (France), P. C. Curtis (USA) H. G. Dales (England), M. Fragouloupoulou (Greece), T. W. Gamelin (USA), B. Gramsch (Germany), A. Ya. Helemskii (Russia), A. Inoue (Japan), J.-P. Kahane (France), H. Koenig (Germany), K. B. Laursen (Denmark), M. Oudadess (Morocco), A. Yu. Pirkovskii (Russia), C. J. Read (England), A. Rodrigues-Palacios (Spain)

**Programme committee:** H. G. Dales (chair, England), G. R. Allan (England), A. Ya. Helemskii (Russia), A. Rodrigues-Palacios (Spain)

**Local organising committee:** A. Soltysiak (Poland), K. Jarosz (USA)

**Sponsors:** Institute of Mathematics of the Polish Academy of Sciences, Adam Mickiewicz University, Poznan, Poland

**Proceedings:** likely to be published in the series 'Banach Center Publications'

**Location:** The Mathematical Conference Centre at Bedlewo, near Poznan, Poland

**Grants:** probably support for participants from countries in a difficult economic situation and young mathematicians

**Information:** e-mail [ta2003@amu.edu.pl](mailto:ta2003@amu.edu.pl), website <http://main.amu.edu.pl/~ta2003>

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## Zentralblatt MATH as a gateway to electronic and digitised articles in mathematics

Bernd Wegner (Editor-in-Chief,  
Zentralblatt MATH)

With the growing availability of mathematical articles in electronic form, *Zentralblatt MATH* was able to extend its services to an important new field of activities, the linking to offers of full texts. As a result, addition to the traditional comprehensive survey on the literature in mathematics provided by *Zentralblatt*, the search facilities in the electronic version are combining the final information on a document of interest with an access to the document itself.

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The link to the complete electronic version refers to the service of a publisher, a freely available offer of articles as in the ELibM of EMIS, or just to the installation of the journal on its own homepage. Links are updated when URLs of the offers change. Access to the complete version of the article depends on the regulations made by the provider. Hence, in order to get a copy of an article from a charged electronic version of a journal, a subscription to this journal will be requested from the user's side.

The link to the set of document delivery services at first gives a list of providers. For example, one of them is the State and University Library of Lower Saxony in Göttingen, which has one of the most comprehensive collections of publications in mathematics. Having chosen a document delivery service of the user's preference, the data of the corresponding publication will be exported to the provider's OPAC, and if the document will be available there, an order form will appear automatically. The requested item will be sent to the user by e-mail, fax or postal mail, depending on how it is stored in the library's holdings and in accordance with the regulations at the provider.

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EMS June 2002

# Recent books

edited by Ivan Netuka and Vladimír Souček

Books submitted for review should be sent to the following address:

Ivan Netuka, MÚUK, Sokolovská 83, 186 75 Praha 8, Czech Republic.

**S. Albeverio and P. Kurasov, *Singular Perturbations of Differential Operators*, London Mathematical Society Lecture Note Series 271, Cambridge University Press, Cambridge, 2000, 429 pp., £29.95, ISBN 0-521-77912-X** This book is devoted to a study of spectral properties of self-adjoint operators inspired by equations arising in classical and quantum physics and in chemistry. A typical model of such an operator is a second order differential operator, together with its various perturbations.

Rank one (and generalised rank one) perturbations are studied first. Finite rank singular perturbations of a self-adjoint operator are then investigated, together with the corresponding scattering theory. The Krein formula relating resolvents of two self-adjoint extensions of a given symmetric operator, is extended to the case of infinite deficiency indices. Two-body and three-body quantum-mechanical problems with various interactions are discussed in the final chapters. In the Appendix, the authors add 25 pages of historical remarks describing the main topics of the book in a historical perspective, including remarks on recent results. The book ends with an unusually comprehensive bibliography consisting of almost a thousand items in more than 70 pages.

The book offers a carefully and nicely written mathematical theory of the singular perturbations of self-adjoint operators. (vs)

**D. Alpay, *The Schur Algorithm, Reproducing Kernel Spaces and System Theory*, SMF/AMS Texts and Monographs 5, American Mathematical Society, Providence, 2001, 150 pp., US\$49, ISBN 0-8218-2155-5**

This is the English translation of a book which first appeared first in French in the series *Panoramas et Synthèses*, published by Société Mathématique de France in 1998. The review of the French edition was published in *Newsletter* 34 (December 1999, p. 36). (vs)

**B. N. Apanasov, *Conformal Geometry of Discrete Groups and Manifolds*, De Gruyter Expositions in Mathematics 32, Walter de Gruyter, Berlin, 2000, 523 pp., DM 298, ISBN 3-11-014404-2**

This book presents a systematic study of conformal geometry of  $n$ -dimensional manifolds and the related geometry of the corresponding Riemannian spaces – in particular, hyperbolic geometry. Unified methods used for the study involve the discrete holonomy groups of the corresponding geometrical structures.

Felix Klein's approach to geometry given by a couple  $(X, G)$ , where  $X$  is a manifold and  $G$  is a group of homeomorphisms of  $X$  is presented first, together with several examples,

which include conformal geometry of the sphere, hyperbolic geometry, eight three-dimensional geometries, some four-dimensional geometries and the geometry of orbifolds. In the second chapter, discrete groups of homeomorphisms are studied. Chapter 3 is devoted to hyperbolic groups and manifolds and their invariants, and to a description of arithmetic and non-arithmetic groups. Geometric finiteness as a central concept for geometric structures is presented in the fourth chapter: the planar case is discussed first and basic ideas are introduced in this setting, geometric finiteness in higher dimensions is then explored from several points of view. Chapter 5 describes the geometry and topology of Kleinian manifolds and presents special features of low dimensional cases. The concept of uniformisation is introduced and developed in the sixth chapter: starting from the classical two-dimensional case, several modern concepts of uniformisations in higher dimensions are discussed. The last chapter presents the theory of deformations of geometric structures, and rigidity of hyperbolic structures, quasi-Fuchsian structures, their bendings and cone deformations are studied in detail, ending with global properties of deformation spaces. There are many examples, notes and comments.

This book is a good source for readers interested in topics mentioned above. (jbu)

**W. Arendt, C. J. K. Batty, M. Hieber and F. Neubrander, *Vector-valued Laplace Transforms and Cauchy Problems*, Monographs in Mathematics 96, Birkhäuser, Basel, 2001, 523 pp., DM 196, ISBN 3-7643-6549-8**

In this new monograph on Cauchy problems, semigroups are treated from the point of view of Laplace transform and harmonic analysis of Banach space-valued functions. Approximately one third of the book (Chapters 1, 2, 4) is devoted to a comprehensive treatment of Laplace transform of functions with values in a Banach space. Classical results are formulated and proved in this context (the Laplace integral, representation theorems, inversion formulas, holomorphic functions and asymptotic properties). In Chapter 3, abstract Cauchy problems are solved by means of Laplace transforms, and dissipative operators, holomorphic semigroups, fractional powers of sectorial operators and the role of UMD spaces are discussed. Chapter 4 treats asymptotics of vector-valued functions and their Laplace transforms, relating different limits at infinity (Abelian and Tauberian theorems) and discussing various notions of spectra of a function on  $\mathbf{R}$  (Carleman, Beurling) and of a vector with respect to a group (local spectrum). Using these concepts, results are formulated about the asymptotic behaviour of functions and of orbits of semigroups (convergence, almost-periodicity, asymptotic almost-periodicity). This chapter summarises in a systematic way the results scattered in

many recent articles. Chapter 5 presents various results on the asymptotic behaviour of mild solutions of homogeneous and inhomogeneous Cauchy problems (relations between growth bounds and spectral bounds, together with examples illustrating each one-sided inequality, splitting and non-resonance theorems for orbits of bounded semigroups as an application of Chapter 4). Finally, three more concrete applications are given.

Each chapter ends with reference notes and the bibliography contains almost 400 items. In short appendices vector-valued holomorphic functions, closed operators, ordered Banach spaces and distributions are reviewed. The notation list (6 pages) and the index (7 pages) make the book more comfortable to use. This book may serve as an up-to-date research monograph or a textbook for advanced graduate students. It is clearly written with an emphasis on simple proofs of (even well-known) theorems. (efa)

**T. Aubin, *A Course in Differential Geometry*, Graduate Studies in Mathematics 27, American Mathematical Society, Providence, 2001, 184 pp., US\$35, ISBN 0-8218-2709-X**

The book contains an introduction to differential geometry on manifolds with an emphasis on Riemannian geometry. A knowledge of basic facts from topology, multi-linear algebra and the theory of functions of several real variables is supposed, and a summary of necessary facts from these fields appears in the introductory chapter.

The book begins with the definition of a differentiable manifold and a description of some of its properties. Submanifolds are then studied, including the Whitney embedding theorem, the Sard theorem and a discussion of critical values of differentiable maps. In Chapter 2, the tangent space of a manifold, differential forms and their calculus, orientation on manifolds and manifolds with boundary are defined and Stokes' theorem is proved. Integration of vector fields and Pfaffian systems and their applications are described in the third chapter. Chapter 4 defines linear connections and parallel transport on manifolds with a given connection.

The main topic of this book is Riemannian manifolds. In addition to standard material, one can find here a discussion of invariant operators on forms, the Hodge theorem, the spectrum of a Riemannian manifold, and the Yamabe problem. More than half of the book is devoted to exercises, problems at different levels and solutions of exercises. The author's aim was to facilitate the teaching of differential geometry. The presentation is very successful, and I can strongly recommend the book to anybody willing to learn differential geometry, as well as to teachers of the subject. (jbu)

**S. Axler, P. Bourdon and W. Ramey, *Harmonic Function Theory*, 2nd ed., Graduate Texts in Mathematics 137, Springer, New York, 2001, 259 pp., DM 119, ISBN 0-387-95218-7**

A brief review of the first edition of this book appeared in *Newsletter* 10 (December 1993). There are several major changes in this second edition: a new and simplified treatment of spherical harmonics, solvability of the

## RECENT BOOKS

Dirichlet problem on the half-space with no growth conditions on boundary data, and a new discussion of generalised versions of Liouville's and Bôcher's theorems. Many exercises have been added and several photographs of mathematicians related to harmonic functions are included. The book is a nice introduction to the fundamental notions of potential theory. (in)

**O. Biquard, *Métriques d'Einstein asymptotiquement symétriques*, Astérisque 265, Société Mathématique de France, Paris, 2000, 109 pp., Ffrs 250, ISBN 2-85629-083-3**

This book is devoted to asymptotically symmetric Einstein metrics: this property means that its curvature at infinity approaches asymptotically the curvature of a rank 1 symmetric space of non-compact type (hyperbolic spaces). In cases that correspond to Einstein deformations of complex, quaternionic or octonionic symmetric spaces, some Carnot-Carathéodory metrics appear on the boundary at infinity. In the last two cases, the author obtains new structures at infinity called *contact structures* (quaternionic or octonionic).

After a short summary of the history of the problem, the author summarises the results of the book. The theory of Einstein deformations of hyperbolic metric is described and an overview of analysis on symmetric spaces and constructions of Einstein metrics is given. Contact structures of quaternionic type are studied in Chapter 2, together with related induced structures, such as partial connections and twistors. The final chapter is devoted to constructions of quaternionic Kähler metrics and twistor spaces.

The book is nicely written and can be recommended to anybody interested in the subject. (jbu)

**J.-C. Birget, S. Margolis, J. Meakin and M. Sapir (eds.), *Algorithmic Problems in Groups and Semigroups*, Trends in Mathematics, Birkhäuser, Boston, 2000, 307 pp., DM 148, ISBN 0-8176-4130-0 and 3-7643-4130-0**

This volume contains sixteen papers based on talks at an international conference at the University of Nebraska-Lincoln in May 1998 that brought together researchers in algorithmic problems in group theory, semigroup theory and computer science.

Among the papers are two survey articles on the algorithmic theory of free groups, one by Baumslag, Myasnikov and Remeslenikov, and the other by Bencsath, Fine, Gaglione, Myasnikov, Roehl, Rosenberger and Spellman. Another survey paper by Kublanovskii is on the decidability of Rhodes of a finite semigroup. Connections between the algebraic theory of finite monoids and the theory of communication complexity are surveyed in the paper by Raymond, Theson and Therien.

The volume also contains research articles on various aspects and interconnections between the topics of the conference. It can be used both as an introduction to the subject of algorithmic problems in groups and semigroups, and as a reflection of the current state of the subject. (jtu)

**B. Bollobás, *Random Graphs* (2nd ed.), Cambridge Studies in Advanced Mathematics 73, Cambridge University Press, Cambridge, 2001,**

**498 pp., £29.95, ISBN 0-521-80920-7 and 0-521-79722-5**

This book, written by one of the leaders in the field, has become the bible of random graphs. This second edition contains two new chapters, numerous new results and over 150 additional references. Just as one can compare a random graph with a living organism that evolves with time, so one could also compare this book with the life-story of this organism.

The long adventure starts in Chapter 2 by introducing the most frequently encountered probability models of random graphs and their basic properties. In Chapter 3, one learns about the distribution of degree sequences and how to deal quickly with the graph isomorphism problem in these models. Chapter 4 gives the probability that a random graph contains a given fixed graph as a subgraph. The next two chapters are devoted to the components of a random graph with special emphasis on the largest one – the so-called *giant component*. Chapters 7-11 consider connectivity, matching, Hamiltonicity, asymmetry and the diameter of random graphs. A special chapter is dedicated to clique number, independence number and chromatic number. In the Ramsey theory chapter, dealing with extremal problems, the probabilistic approach overpowers deterministic methods. The book concludes with random cubes, random matrices, random mappings, and applications of random graphs in sorting algorithms.

This book is primarily for mathematicians interested in graph theory and combinatorics with probability and computing, but it could also be of interest to computer scientists. It is self-contained and lists numerous exercises in each chapter. As such, it is an excellent textbook for advanced courses or for self-study. (rskr)

**T. Breuer, *Characters and Automorphism Groups of Compact Riemann Surfaces*, London Mathematical Society Lecture Note Series 280, Cambridge University Press, Cambridge, 2000, 199 pp., GBP 24.95, ISBN 0-521-79809-4**

These notes describe some recent results on automorphism groups of compact Riemann surfaces. The author is interested in the classifications of (i) groups of automorphisms of compact surfaces  $X$  of a fixed genus  $g \geq 2$ , up to equivalence given by the natural action on  $H^1(X)$ ; (ii) all characters of a given finite group  $G$  arising from the natural action of groups of automorphisms of compact Riemann surfaces  $X$  on  $H^1(X)$ .

The first two chapters present basic notions and facts from the theory of Riemann surfaces, Fuchsian groups and characters, and introduces the module  $H^1(X)$ . Chapters 3 and 4 treat the structure of groups of automorphisms of compact Riemann surfaces and the description of sets of their generators and their properties. The problem of determining all characters and groups of automorphisms for small genus  $g$ , with  $2 \leq g \leq 48$  is solved in Chapter 5. The last two chapters give classifications of characters for a fixed group, first for a real character, then for the case where non-real irrationalities appear in the character table of  $G$ . There are three appendices, dealing with abelian invariants, irreducible charac-

ters and Maillet's determinant.

This book can be recommended to all readers interested in theory of compact Riemann surfaces and their automorphism groups. (jbu)

**E. Bujalance, A. F. Costa and E. Martínez (eds.), *Topics on Riemann Surfaces and Fuchsian Groups*, London Mathematical Society Lecture Note Series 287, Cambridge University Press, Cambridge, 2001, 177 pp., £24.95, ISBN 0-521-00350-4**

This book contains extended versions of lectures given at the conference 'Topics on Riemann Surfaces and Fuchsian Groups', held in Madrid in 1998.

There are two main themes. The first is unification of two concepts underlying two different definitions of Riemann surfaces – one geometrical, where Riemann surfaces are defined as one-dimensional complex manifolds, and the other analytic, based on analytic continuations and analytic functions in function theory. The second theme is the study of Riemann surfaces as a topological quotient of certain covering spaces with respect to the action of a group: apart from the plane  $\mathbb{C}$ , the twice-punctured sphere and the tori, Riemann surfaces can be studied as quotients of the group of the hyperbolic plane by a discrete group called a Fuchsian group.

There are nine contributions: the geometry of Riemann surfaces, by A. F. Beardon; introduction to arithmetic of Fuchsian groups, by C. Maclachlan; Riemann surfaces, Belya functions and hypermaps, by D. Singerman; compact Riemann surfaces and algebraic function fields, by P. Turbek; symmetries of Riemann surfaces from a combinatorial point of view, by G. Gromadzki; compact Klein surfaces and real algebraic curves, by F. J. Cirre and J. M. Gamboa; moduli spaces of real algebraic curves, by M. Seppälä; periodic matrices and the Schottky problem, by R. Silhol and Hurwitz spaces by S. M. Natanzon. Beardon's paper is a nice overview of problems in the geometry of Riemann surfaces, and can be used as a source for a series of lectures on this topic. Real algebraic curves are well discussed in the papers by Cirre and Gamboa, and by Seppälä. (jbu)

**R. Cori and D. Lascar, *Mathematical Logic. A Course with Exercises. Part I*, Oxford University Press, Oxford, 2000, 338 pp., £25, ISBN 0-19-850049-1 and 0-19-850048-3**

The first part of this course of mathematical logic is based on the notion of truth, rather than on the notion of derivation from axioms. This conception leads rather quickly to the problematics of computer processing, especially to the resolution method described in the final chapter.

The topic is divided into four chapters – propositional calculus, boolean algebras, predicate calculus, and completeness theorems. Unlike most courses on mathematical logic, the second chapter deals with boolean algebras: this is also suitable for students of computer science to whom the course is addressed. For students interested in 'more classical' mathematical logic (such as model theory, modal or many-valued logic), we recommend *Mathematical Logic* by Ebbinghaus, Flum and Thomas.

This book contains many stimulating exercises, with solutions. In Corollary 4.19, an explicit formulation of the assumption of the closeness of the formula  $F$  would help the reader: the assumption appears in the theorem used in the proof. The notation used in the book sometimes differs from the standard one (as used, for example, in the *Handbook of Mathematical Logic*). (kč)

**R. Downey and D. Hirschfeldt (eds.),** *Aspects of Complexity*, de Gruyter Series in Logic and Its Applications 4, Walter de Gruyter, Berlin, 2001, 169 pp., DM 169, ISBN 3-11-016810-3

This book is based on lectures by the contributors during the course 'Computability, Complexity and Computational Algebra' given in January 2000 in Kaikoura, New Zealand. It comprises notes for seven lectures on different subjects, including basic complexity, computation with real numbers, parametrised complexity, Kolmogorov complexity, matrix groups computation, counting complexity and aspects of continuum: most of these are recently developed areas of computational complexity.

The contributions are intended neither as surveys nor as introductions to the topics discussed, but are (sometimes informal) overviews of concepts and key results. The material and level of presentation are accessible to those familiar with only the basics of computer science. Readers will not learn the whole subject from any chapter of this book, but will find what the particular area of modern computational complexity is about; interested readers can find further details in monographs or surveys referred to in each chapter. The book should be valuable for mathematicians who want to learn the basic concepts of those areas of computational complexity covered by the book. (dkr)

**M. du Sautoy, D. Segal and A. Shalev (eds.),** *New Horizons in pro- $p$  Groups*, Progress in Mathematics 184, Birkhäuser, Boston, 2000, 423 pp., DM 178, ISBN 0-8176-4171-8 and 3-7643-4171-8

A *pro- $p$  group* is the inverse limit of a system of finite  $p$ -groups – groups of prime-power order where the prime  $p$  is fixed. The systematic study of *pro- $p$  groups* in general is a recent development. This volume presents a coherent account of recent achievements and points the way forward by bringing together articles by leading researchers in the field that develop various aspects of the theory in twelve chapters.

The impetus for current research on *pro- $p$  groups* comes, broadly speaking, from four directions. The first is number theory: the classical context is Galois cohomology, and the modern one is the theory of  $p$ -adic Galois representations. The second source is the problem of classifying finite  $p$ -groups. The third is the theory of infinite groups, and finally there is the subject of 'profinite group theory', of which the theory of *pro- $p$  groups* is only a well-developed part. A large number of open problems are presented throughout the text and in the Appendix: this makes the volume a rich source of promising directions for further research. (jtu)

**R. C. Fabec, *Fundamentals of Infinite***

***Dimensional Representation Theory***, Monographs and Surveys in Pure and Applied Mathematics 114, Chapman & Hall/CRC, Boca Raton, 2000, 428 pp., £53.99, ISBN 1-58488-212-3

This book is an accessible and self-contained account of the central results of analytic group representation theory and operator algebras. Starting from Borel spaces, the exposition continues with fundamentals of  $C^*$ -algebras and the classical theory of von Neumann algebras. Since unitary representations of groups correspond to  $*$ -representations of their group algebras, the exposition naturally continues with group actions and the induced actions and representations. The final two chapters deal with operator algebras: the Hilbert algebras (including the Tomita-Takesaki theory of the modular ones) and the Fourier-Stieltjes algebra.

This book will certainly be of interest to specialists from a wide range of fields in mathematics and physics – from algebra, via functional analysis and measure theory, to quantum mechanics. (jtrl)

**S. D. Friedman, *Fine Structure and Class Forcing***, de Gruyter Series in Logic and its Applications 3, Walter de Gruyter, Berlin, 2000, 221 pp., DM 178, ISBN 3-11-016777-8

In this book the class of constructible sets  $L$  and generic extensions of  $L$  are investigated, with an emphasis on the method of class forcing (and iterated class forcing), which appears to be a powerful means for solving mathematical problems. The class  $L$  was introduced by Gödel to prove the consistency of the continuum hypothesis and the method of forcing was introduced by Cohen to prove the independence of this hypothesis. Since then, both methods have been significantly improved.

The book starts with an investigation of  $L$  and with a proof of some combinatorial principles (Diamond, Square and various versions of Morasses) that are used later for constructions of various special partial orderings (sets or classes of properties) used in the forcing method: some classical forcings are included, and many other techniques are used (such as indiscernibles) – for example, it is proved that such set-theoretical notions as large cardinals are closely related to special properties of the reals. From many of the hard problems solved in the book, let us mention the consistency of  $\Pi^1_2$  definable real  $\mathbf{R}$  (as a singleton) being constructible larger than 0 and strictly constructible less than 0-sharp. From the last chapter, we mention some applications proving that some classical results of measurability, categoricity, and perfectness of sets of projective hierarchy are best possible. The reader is supposed to be familiar with a standard course of set theory. References to the literature appear only in the proofs in the last chapter. (kč)

**C. G. Gibson, *Elementary Geometry of Differentiable Curves: An Undergraduate Introduction***, Cambridge University Press, Cambridge, 2001, 216 pp., £16.95, ISBN 0-521-80453-1 and 0-521-01107-8

This is an elementary introduction to the geometry of curves in the Euclidean plane. It contains standard material on the differential geometry of plane curves, and also of certain classical special curves (conics, alge-

braic curves as cissoids, trochoids, epi- and hypocycloids, etc.). The curvature of curves is introduced via moving frames, the inflexion points are discussed and their invariance with respect to the isometries of the plane is proved. Special problems, such as the contact of curves with lines and circles, evolutes, cusps and vertices, envelopes, orthonomics and caustics are studied and illustrated by examples. At the end of the book, planar kinematics and its problems are described.

There are many examples and exercises. This is a nice textbook that can be recommended to students of mathematics as well as to students of physics or engineering. (jbu)

**J. Glaz, J. Naus and S. Wallenstein, *Scan Statistics***, Springer Series in Statistics, Springer, New York, 2001, 370 pp., DM 192.49, ISBN 0-387-98819-X

The meaning of a scan statistic is clarified by the following example. From 1991 to 1995 there were 19 cases of a particular type of cancer reported in a city. A 1-year period (April 1993 to April 1994) contains eight cases. Is such a cluster statistically significant? In general,  $N$  points are distributed over  $(0, T)$ . Let  $S_w$  be the largest number of events in a window of length  $w$ . The maximum cluster  $S_w$  is the *scan statistic*.

This book is divided into two parts. The first part describes the use of scan statistics in applications: the main topics are retrospective and prospective scanning of events over time, success scans in a sequence of trials, higher-dimensional scans, and scan statistics in DNA sequences. The second part describes scan distribution theory and its developments. The individual chapters are devoted to exact results, approximations, and bounds for scan statistics. The case when the size of the sliding window is unknown or there is a need to detect clusters of events superimposed on trends, is also discussed. One of the interesting topics is clustering two types of letter pattern in a two-dimensional array, with an application to the text of the Bible: the problem is to look at words appearing as equally spaced letters in a text. The words, whose letters' positions in the text form an arithmetic progression, are called *equidistant letter sequences* (ELS). It is interesting to test whether such ELSs contain hidden information.

The book contains a valuable bibliography that includes over 600 references. It can be recommended to researchers working in applications, as well as to specialists developing methods for the scanning of events. The material is also suitable for graduate-level courses. (ja)

**R. E. Greene and S. G. Krantz, *Function Theory of One Complex Variable* (2nd ed.)**, Graduate Studies in Mathematics 40, American Mathematical Society, Providence, 2002, 502 pp., US\$69, ISBN 0-8218-2905-X

This book was written for a first-year graduate course in complex analysis, and the first edition has been revised and improved. The authors base their approach on ideas taken from multi-variable calculus already familiar to students, but they try to reduce the necessary topological material and concentrate on a straightforward approach to the analytical topics: the topological tools are concentrated

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in one (revised) Chapter 11.

The book contains some advanced and less traditional topics and includes, for example, theorems on rational approximation, Hardy spaces and the Bergman kernel. One chapter is devoted to special functions and the final one is on the prime number theorem; its proof has also been rewritten. The exposition is clear and written in an accessible way for most students, who will also appreciate the exercises (555 of them!), both routine and 'theoretical' (with hints), following each of the 16 chapters. Short comments on the history and origins of notions and theorems are contained in the text.

This book can be recommended as a text for a basic course (the first third of the text), as well as for an advanced course at graduate level. (jive)

**C. E. Gutiérrez, *The Monge-Ampère Equation*, Progress in Nonlinear Differential Equations and their Applications 44, Birkhäuser, Boston, 2001, 126 pp., DM 156, ISBN 0-8176-4177-7 and 3-7643-4177-7**

The Monge-Ampère equation  $\det D^2u = f$  is of great importance for its geometrical interpretation and applications, and in recent years, many remarkable advances have been achieved. This book develops the modern theory of the Monge-Ampère equation, including regularity results of L.A. Caffarelli. With any convex function  $u$ , we can associate a measure  $Mu$  by the formula  $Mu(E) = |\partial u(E)|$ ; here,  $\partial u$  is the normal mapping, or subdifferential of  $u$ , and  $|\dots|$  is Lebesgue measure. For  $u$  smooth, the measure  $Mu$  has density  $\det D^2u$ , and it is thus natural to call a function  $u$  with  $Mu = f$  a generalised solution of the Monge-Ampère equation: this is compared with the notion of viscosity solution. The Dirichlet problem for  $Mu = f$  is also solved, and various questions in regularity theory are studied. All  $C^1$ -solutions of  $\det D^2u = 1$  satisfy a Hölder estimate for the second derivative, which implies that entire solutions are quadratic polynomials.  $C^{1,\alpha}$  and  $W^{2,p}$  estimates are established for the solutions where  $0 < \lambda < Mu < \Lambda < \infty$ .

This book is not restricted to presentation of the author's results: the material is selected according to its importance. The exposition is self contained, equipped with complete proofs and carefully arranged. The Monge-Ampère equation has many applications in differential geometry, the calculus of variations and optimisation, including the Monge-Kantorovich mass transfer problem. The methods, using some techniques of harmonic analysis, are beautiful and promising extensions of other problems. This book is one of the best sources for this purpose. (jama)

**M. Hashimoto, *Auslander-Buchweitz Approximations of Equivariant Modules*, London Mathematical Society Lecture Note Series 282, Cambridge University Press, Cambridge, 2000, 281 pp., £27.95, ISBN 0-521-79696-2**  
In this monograph, the theory of Auslander-Buchweitz approximations is developed for the category of  $A$ -finite  $G$ -equivariant  $A$ -modules, where  $G$  is a split reductive group over a commutative noetherian ring  $R$ , and  $A$  is a commutative noetherian  $G$ -algebra. This theory generalises and unifies the theory of

Cohen-Macaulay approximations due to Auslander-Buchweitz, as well as Ringel's theory of approximations for representations of algebraic groups.

Unifying commutative noetherian rings with finite-dimensional algebras, the book requires a large introductory Chapter I that spans almost half of the text. The fundamentals of the highest weight theory are also presented in a self-contained way, in Chapter III. Along with the general theory, several interesting applications are provided: in Section II.2, the regularity (Cohen-Macaulay, Gorenstein, and local complete intersection) criteria for noetherian  $G$ -algebras are proved. Section IV.2 deals with applications to the structure of equivariant resolutions of determinantal rings, and other applications concern invariant theory.

This monograph brings the reader to the bounds of knowledge in the subject. It will be of interest to researchers and graduate students, both in commutative ring theory and representation theory. (jtrl)

**S. Helgason, *Differential Geometry, Lie Groups, and Symmetric Spaces*, Graduate Studies in Mathematics 34, American Mathematical Society, Providence, 2001, 641 pp., US\$69, ISBN 0-8218-2848-7**

The first edition of Helgason's classical book appeared in 1962, and revised and substantially extended version was published in 1978 by Academic Press. The book under review is the third printing, published by the American Mathematical Society. A few inaccuracies have been corrected and some new explanatory notes have been collected in a dozen of pages at the end of the book. This book has been famous for many years and used by several generations of readers. It is important that the book has again become available for a general audience. (vs)

**C. C. Heyde and E. Seneta (eds.), *Statisticians of the Centuries*, Springer, New York, 2001, 500 pp., DM 96.19, ISBN 0-387-95238-7 and 0-387-95329-9**

This book arose through the initiative of the International Statistical Institute. It contains about 100 short biographies of selected statisticians born prior to the 20th century, including biographies of persons who are probabilists rather than statisticians. The view of the authors is expressed on p.441: 'Probability' is surely the life blood of 'statistics' and any dividing line is impossible to position. Many interesting facts are presented about scientists whose names are usually connected only with formulas and theorems. Let me introduce a few examples. De Morgan, when asked his age, declared: 'I was  $x$  years old in the year  $x^2$ .' (You can check that he was born in 1806: find other statisticians who were not born in that year and still can declare the same!) He also refused to be proposed as a Fellow of the Royal Society: 'Whether I could have been a Fellow, I cannot know; as the gentleman said who was asked if he could play the violin, I never tried.' Further one reads that Boole married Mary Everest, niece of Colonel Everest after whom Mount Everest was named; that the Bonferroni inequality had already been derived by Boole; that Karl Pearson in one of his lectures scattered 10000 pennies over room floor and asked his

students to count the number of heads or tails: it is not well known that K. Pearson was offered an OBE (Officer of the Order of the British Empire) and a knighthood, but he refused both honours. It may be surprising to many readers that Borel was mayor of Saint-Affrique and Minister for the Navy.

The book is interesting reading and information from it can surely refresh lectures on probability and mathematical statistics. (ja)

**K. Jänich, *Vector Analysis*, Undergraduate Texts in Mathematics, Springer, New York, 2001, 281 pp., 108 fig., DM 69, ISBN 0-387-98649-9**

When and how to introduce students to surface integration and ideas related to Stokes' theorem is a question that is difficult to answer. The calculus books treat only the simplest ideas related to the Gauss and Stokes theorems, while a systematic treatment of these questions in analysis courses for undergraduates is usually missing. This book offers a very nice description of the basic conceptual tools needed to explain these topics to mathematics students (the concept of a manifold, Cartan calculus of differential forms, a general form of Stokes' theorem), and includes some more advanced (and very important) topics, such as the de Rham complex, Hodge duality and Ricci calculus on Riemannian manifolds.

The book can be used for a course on these topics, and only the rudiments of calculus, linear algebra and a bit of topology are needed as prerequisites. A nice feature is that it contains many figures (making easier an intuitive understanding of the treated topics), exercises with hints, and tests with answers. This book is a translation of the second German edition, so that it is now accessible for a much broader audience. It is certainly one of the best books in the field and can be strongly recommended for a general mathematical audience. (vs)

**K. Kaarli and A. F. Pixley, *Polynomial Completeness in Algebraic Systems*, Chapman & Hall/CRC, Boca Raton, 2001, 358 pp., £56.99, ISBN 1-58488-203-4**

This book is on general algebraic systems – in particular, on affine completeness and polynomial completeness. After introducing necessary concepts on algebras, lattices and varieties in the first chapter, the authors proceed to lattices of equivalence relations, including material on compatible function lifting. Chapter 3 introduces primal algebra and systematically develops its natural generalisations, including affine completeness: there are results on the important concepts of congruence permutability, congruence distributivity and near unanimity. The main results appear in Chapter 4 on affine complete varieties. The final chapter describes the affine complete members in several special varieties, including the varieties of lattices, modules, semi-lattices, etc.

The book is clearly written and is accessible to anyone with a basic knowledge of the methods and concepts of general algebraic systems. (jtu)

**M. Kerber and M. Kohlhase, *Symbolic Computation and Automated Reasoning*, The Calcululus-2000 Symposium, A. K. Peters, Natick, 2001, 270 pp., US\$60, ISBN 1-56881-**



145-4

The proceedings of CALCULEMUS 2000 consists of fourteen full-length papers, short description of two invited presentations, one system description and twelve posters. The selected papers were presented at the 8th CALCULEMUS Symposium, held on 6-7 August 2000 in St. Andrews, Scotland. The Symposium was intended for researchers interested in both symbolic computation and mechanised reasoning.

The full-length papers cover a wide range of topics in these fields and describe various systems; they are self-contained and can be divided into three groups. The first group is about integration or standardisation of particular systems (communication protocols for mathematical services based on KQML and OMRS; interfacing computer algebra and deduction systems via Logic Broker Architecture based on Corba and Openmath;  $\dot{U}$ -ants, combining interactive and automated theorem proving; and a progress report of the Theorema project). The papers from the next group centre around a particular problem, they describe a new theory (integrated processing of self-contained mathematical text), new methods for solving the problem (definite integration of parametric rational functions using DILTU method; learning methods in proof planning; meta-variables for natural deduction in Theorema) or experiments and case studies (finding symmetries hidden in combinatorial problems using Godzilla; formal and efficient proof of prime (2999) in COQ; exploring properties of residue classes of  $\mathbb{Z}_n$ ). The last group describes extensions of particular systems (theory of continuous lattices in Mizar; power series and polynomials in Mizar; logic and dependent types in Aldor). Many of the posters, as well as the description of CAS system Singular for polynomial computation, include URL for a more detailed description.

The volume covers selected topics and describes new trends in the fields of deduction systems, computer algebra systems and their integration. It is a valuable contribution for researchers and postgraduate students in these fields. (jhr)

**O. Kounchev, *Multivariate Polysplines, Applications to Numerical and Wavelet Analysis*, Academic Press, San Diego, 2001, 498 pp., US\$84.95, ISBN 0-12-422490-3**

This book introduces and develops a new type of multi-variate splines known as polysplines. The author studies cardinal polysplines and polyharmonic wavelets in a complete analogy with the one-dimensional polynomial cardinal splines and cardinal spline wavelets. Polysplines are piecewise polyharmonic splines and provide a powerful means of interpolating data: they also provide new perspectives on wavelet theory, with applications to signal and image processing. All these results may be considered as a step in the direction of the qualitative theory of partial differential equations.

This book is in four parts. In Part I the author provides a logical basis for the notion of polysplines and explains in detail the meaning of the data, smoothness and object concepts of the polyharmonic paradigm, and their implementation in spline analysis. Polysplines on strips and annuli in  $\mathbb{R}^2$  with

applications are studied, including the polysplines on strips and on annuli in  $\mathbb{R}^n$ : this part is logically self contained and would meet the interests of a reader interested in smoothing methods and computer-aided geometric design, but not in wavelet analysis. Part II concentrates on the polysplines analogue of Schoenberg's one-dimensional cardinal splines. The author starts with the theory of cardinal  $L$ -splines according to Micchelli, and then develops the theory of cardinal interpolation polysplines on annuli: the major result is a generalisation of the polynomial case considered by Chui. Part III presents wavelet analysis using polysplines and provides a detailed study of one example of spherical polyharmonic wavelet analysis. The author briefly recalls Chui's results on cardinal spline wavelet analysis and proves generalisations of all Chui's basic results: the main conclusion is that the attempt to make a reasonable multi-resolution analysis (MRA) by means of a refining sequence of spaces of cardinal polysplines (on annuli or strips) leads to a considerable reconsideration of the whole store of basic notions of MRA. Part IV has a quite different flavour: unlike the previous parts, it is not concrete analysis. It considers the polysplines for general interfaces. Even more generally, the author introduces a very general class of polysplines, which are piecewise solutions of a large class of higher-order elliptic equations. A generalisation of the Holladay extremal property and the existence of interpolation polysplines for the so-called 'even-order polysplines' are proved.

This is a nicely written book of great value for stimulating graduate students. It is aimed principally at specialists in approximation and spline theory, wavelet analysis and signal and image processing, and at people using computer-aided geometric design systems or smoothing and spline methods in geophysics, geodesy, geology or magnetism. It can be strongly recommended as a comprehensive resource for self-study. (knaj)

**E. L. Lehmann, *Elements of Large-Sample Theory*, Springer Texts in Statistics, Springer, New York, 1999, 631 pp., 10 fig., DM 192,49, ISBN 0-387-98595-6**

This book consists of 7 chapters and an appendix. Chapter 1 contains some mathematical background, while Chapter 2 is devoted to convergence in probability and in law. The material of these chapters (132 pages) has an introductory character and many students of mathematical statistics will know it from calculus or from courses in probability theory. Chapter 3 deals with performance of statistical tests, with topics like power and sample size, relative efficiency and robustness, while Chapter 4 describes estimation problems: confidence intervals, accuracy of point estimators, comparing estimators, and sampling from a finite population; Chapter 5 extends these results to the multi-variate case. In Chapter 6 we find non-parametric estimation ( $U$ -statistics, statistical functionals, density estimation, bootstrapping), while Chapter 7 presents efficient estimators and test, mainly maximum likelihood, Fisher information, and asymptotic normality.

This is a very nice introduction to large-

sample theory for statisticians. Although the more difficult results are stated without proof, the conditions for their validity are given and the results are illustrated by interesting examples. For applied statisticians it is important to know relative efficiencies of frequently used tests (p. 176), robustness results concerning the  $t$ -test (p. 191), the performance of two statistical tests applied to the data simultaneously (p. 376), and that there exists a case when one can make a very informative observation although its Fisher information is 0 (p. 462). The book also contains a rich collection of problems and a useful list of references, and can be warmly recommended as a complementary text to lectures on mathematical statistics, as well as a textbook for more advanced courses. It was originally used for a postgraduate statistics course at Charles University, Prague, during 2001/02. (ja)

**A. Liu (ed.), *Hungarian Problem Book III, The Anneli Lax New Mathematical Library 42, The Mathematical Association of America, Washington, 2001, 142 pp., £20.95, ISBN 0-88385-644-1***

This is a translation from Hungarian by Andy Liu. The Eötvös-Kirsch mathematical competition for high-school students has been organised since 1894. The problems given in this contest from the periods 1894-1905 and 1906-1928 were published in two booklets of the 'New Mathematical Library' (Vols. 11, 12). This book contains the problems from the period 1929-43.

The problems are divided into the following chapters: Combinatorics, Number Theory, Algebra, Geometry I (congruence, similarity) and Geometry II (circles, vectors). Each chapter contains problems (with one or more solutions) together with basic definitions and various problem-solving techniques. The foreword is written by József Pelikán, well known as a member of the Committee of the International Mathematical Olympiads (IMO). One of the prizewinners of the Eötvös Competition was Miklos Császár (in 1942), chairman of the IMO in 1982 in Budapest.

The book will be very useful for students who participated, or will participate, in mathematical competitions, as well as for teachers and anybody interested in solving mathematical problems. (lbo)

**L. Manivel, *Symmetric Functions, Schubert Polynomials and Degeneracy Loci*, SMF/AMS Texts and Monographs 6, American Mathematical Society, Providence, 2001, 167 pp., US\$44, ISBN 0-8216-2154-7**

The French edition of this book appeared in 1998 in the series 'Cours Spécialisés', issued by the Société Mathématique de France; its review appeared in EMS Newsletter 32 (June 1999, p.34). The English translation was issued in cooperation with the American Mathematical Society. (vs)

**J. C. McConnell and J. C. Robson, *Noncommutative Noetherian Rings*, Graduate Studies in Mathematics 30, American Mathematical Society, Providence, 2001, 636 pp., US\$72, ISBN 0-8218-2169-5**

This is a revised and updated edition of a monograph first published under the same title in 1987. Non-commutative noetherian

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rings have gained importance in the meantime, with the appearance of quantum groups and related non-commutative structures. Starting (and ending) with the key motivating examples, the exposition proceeds to the classical Goldie theory and the structure of the prime spectrum of the ring. Part II deals with dimension theory: the Krull, global, and Gelfand-Kirillov dimensions are treated in detail. Part III deals with extensions, starting with generic flatness and the Nullstellensatz, and proceeding to stability and the Grothendieck group  $K_0$ .

The first edition of this book was the basic reference in non-commutative ring theory, stimulating research in the area since the late 1980s. Only a few changes were needed for the present edition, yet another sign of the quality of the monograph. (jtrl)

**K. Nishiyama, H. Ochiai, K. Taniguchi, H. Yamashita and S. Kato, *Nilpotent Orbits, Associated Cycles and Whittaker Models for Highest Weight Representations*, Astérisque 273, Société Mathématique de France, Paris, 2001, 163 pp., FRF 200, ISBN 2-85629-101-5**

This volume contains three papers, with an introduction and concluding remarks (including some problems). In the three articles, the authors investigate irreducible unitary highest-weight representations of reductive Lie groups of Hermitian type, not necessarily contained in the holomorphic discrete series. In particular, associated cycles, the Bernstein degree and generalised Whittaker models for these representations are described. The Howe correspondence for dual pairs, one of which is compact, is also explained, and the realisations of highest-weight representations in kernels of invariant differential operators of gradient type are presented. In the last paper, by S. Kato and H. Ochiai, the degrees of orbits of multiplicity-free actions of connected reductive algebraic group are computed. The subclass of orbits, consisting of holomorphic tangent bundles of Hermitian symmetric spaces, is studied as a nice example. A complete list of degrees of actions in hermitian and non-hermitian cases is presented in the appendix of the last paper.

This book is an excellent source of information for study and research in this field. (jbu)

**A. L. Onischuk and E. B. Vinberg (eds.), *Lie Groups and Lie Algebras II*, Encyclopaedia of Mathematical Sciences 21, Springer, Berlin, 2000, 223 pp., DM 159, ISBN 3-540-50585-7** This volume of the *Encyclopaedia of Mathematical Sciences* treats two topics: discrete subgroups of Lie groups, and cohomologies of Lie groups and Lie algebras.

The first part (written by E. B. Vinberg, V. V. Gorbatsevich and O. V. Shvartsman) contains a systematic treatment of all basic results in theory of discrete subgroups of Lie groups. More complicated proofs of presented results are usually omitted, and related questions (discrete subgroups of motions in spaces of constant curvature) can also be found in Volume 19 of the *Encyclopaedia*. The authors discuss in turn discrete subgroups of locally compact topological groups, lattices in solvable Lie groups, lattices in semi-simple Lie groups and lattices

in Lie groups of general type.

The second part (written by B. L. Feigin and D. B. Fuchs) is devoted to various cohomologies of Lie groups and Lie algebras. It presents corresponding definitions (classical, van Est and Segal cohomologies of Lie groups; cohomology of Lie algebras), and some of their general properties and their relations, as well as tools and methods for their calculations. The results of such computations are presented in the last chapter for many important special cases (finite-dimensional Lie groups and Lie algebras, Lie algebras of vector fields and diffeomorphisms, Lie groups and algebras of currents, Lie algebra of infinite matrices). One can also find here useful interpretations of cohomology and homology in low dimensions, and this part includes a very useful summary of basic concepts and results in the field.

This book will be very useful as a reference book and a source of information for students and researchers from both mathematics and theoretical physics. (vs)

**M. A. Picardello, *Harmonic Analysis and Integral Geometry*, Research Notes in Mathematics 422, Chapman & Hall/CRC, Boca Raton, 2001, 171 pp., £49.99, ISBN 1-58488-183-6**

This volume contains the proceedings of the first Summer University of Safi, Morocco, and consists of sixteen contributions related to real harmonic analysis and integral geometry.

The proceedings include papers by T. Nomura (invariant Berezin transforms), where explicit spectral decomposition of this important transform is described in several cases, and A. Abouelaz (integral geometry in the sphere  $S^d$ ), where the geometric approach based on the dual Radon transform for the sphere  $S^d$  is presented, including several explicit formulas and results. Other contributions are concentrated on specific problems: F. Gonzales (John's equation and the plane-to-line transform on  $\mathbb{R}^3$ ), T. Kakehi (Radon transforms on compact Grassmann manifolds and invariant differential operators of determinantal type), S. Gindikin (integral geometry on hyperbolic spaces), M. A. Picardello (the geodesic Radon transform on trees), E. C. Tarabusi, J. M. Cohen and F. Colonna (the distribution-valued horocyclic Radon transform on trees), L. Atanasi (integral geometry on affine buildings), A. d'Agnolo and C. Marastoni (a topological obstruction for the real Radon transform), H. Dib and M. Mesk (on Laguerre polynomials of two variables), S. Ibenmouloud and M. Sbair (Poisson transform on  $H^3$ ), H. Sami (transfer formula in the real hyperbolic space  $B^n$ ), A. Essadiq ( $q$ -analogue of Watanabe uniform transform associated to the  $q$ -continuous Gegenbauer polynomials) and M. E. Beggar (realization of a holomorphic discrete series of the Lie group  $SU(1, 2)$  as star-representation). (jbu)

**M. Schechter, *Principles of Functional Analysis* (2nd ed.), Graduate Studies in Mathematics 36, American Mathematical Society, Providence, 2001, 425 pp., US\$59, ISBN 0-8218-2895-9**

This excellent book provides an elegant introduction to functional analysis, including related parts of theory of integral equations.

The reader will find a basic mathematical introduction to the theory of normed vector spaces and linear operators between them.

The book has fifteen chapters, each ending with carefully selected problems to be solved. The first three chapters present the basic principles of linear functional analysis: the Riesz representation theorem, the Hahn-Banach theorem, the uniform boundedness principle and the open mapping theorem. Chapters 4 and 5 present the Riesz theory of compact operators and the general theory of Fredholm and semi-Fredholm operators. The introduction to spectral theory is contained in Chapter 6. Unbounded operators, unbounded Fredholm and semi-Fredholm operator are studied in Chapter 7. Chapter 8 deals with reflexive Banach space, and Chapters 11-13 cover Hilbert space. An introduction to Banach algebras is given in Chapter 9, where the Fredholm and semi-Fredholm perturbations are also presented. Chapters 9 and 14 discuss special topics from the theory of semigroups, measures of operators and perturbation functions. The last chapter contains important applications. The book concludes with two appendices: the first gives definitions of important notions and symbols used throughout the book, while the second contains a list of major theorems and indicates the pages where they can be found.

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

**C. J. Scriba and P. Schreiber, *5000 Jahre Geometrie. Geschichte Kulturen Menschen*, Springer, Berlin, 2001, 596 pp., DM 69, ISBN 3-540-67924-3**

This book is an excellent and comprehensive work on the history of geometry from prehistoric times to the present time, written by C. J. Scriba, professor of history of science at Hamburg, and P. Schreiber, professor of geometry at Greifswald.

The topics treated here contain the origins of geometry and its history in Greece, the Orient, the European middle ages, the renaissance and the last four centuries. In the last chapter is a discussion of the relationships between geometry and science, technics or informatics: the last-but-one deals with descriptive, projective, synthetic and non-Euclidean geometry and the origins of topology. We also find applications of geometry in geodesy, cartography, astronomy and in art. Special attention is paid to geometry in Islam countries, in India, Japan and China.

Each chapter begins with an overview of the historical events and technical discoveries of the corresponding period, including very useful surveys on the progress in geometry. In this way the book represents the valuable contributions of geometry to the cultural development of mankind. There are also some original short texts (in German) from Plato, Archimedes and others. Among the more than 200 pictures are reproductions of works by Dali and Escher and photographs of interesting surfaces. Each chapter also contains a number of problems, such as the proof of the Heron formula, the construction of a quadrilateral

inscribed in a circle, or calculating the Gauss curvature of the pseudosphere. At the end of the book is a comprehensive list of more than 350 references.

This book can be warmly recommended, not only to historians of mathematics, but also to professional mathematicians, teachers and students. (lbc)

**S. Skiena, *Calculated Bets: Computers, Gambling, and Mathematical Modeling to Win*, Cambridge University Press, 2001, 232 pp., £12.95, ISBN 0-521-80426-4**

This interesting book is about a gambling system that works. It tells how the author used computer simulations and mathematical modelling techniques to predict the outcome of jai alai (pelota) matches and bet on them successfully. His method can work for anyone; at the end of the book the author describes the best way to bet on jai alai. With humour and enthusiasm, Skiena discusses other gambling systems, such as lotto, roulette, blackjack and the stock market: indeed, he shows how his jai alai system functions like a miniature stock-trading system.

The book will be surely of interest not only for the fun of jai alai, but also for all those who would like to learn about the program trading systems, the future of internet gambling, how mathematical models are used in political polling, what is the difference between the correlation and causality, and so on. If you are interested in gambling and mathematics, the odds are that this is a book for you! (jant)

**M. Taniguchi and Y. Kakizawa, *Asymptotic Theory of Statistical Inference for Time series*, Series in Statistics, Springer, New York, 2000, 661 pp., DM 203,19, ISBN 0-387-95039-7**

The first three chapters of this book serve as an introduction to the asymptotic theory of statistical inference. This part is useful as a review of modern probabilistic tools applicable not only to stochastic processes but to the whole of mathematical statistics, for example, we find here Le Cam's lemmas, results concerning local asymptotic normality, and the asymptotic theory of estimation and testing for stochastic processes. There is an important section on criteria for the stationarity of non-linear processes, where several recent useful results are collected and discussed. Since many estimators and tests have the same limiting behaviour, it is necessary to analyse their higher-order asymptotic optimality. In Chapter 4, the concept of higher-order asymptotic efficiency of estimators is introduced, and a differential geometrical framework of curved exponential families is extended to a class of general stochastic processes: it is shown that the maximum likelihood estimator is third-order asymptotically optimal. The general approach is also applied to Fisher's  $z$ -transformation, and higher-order asymptotics of diffusion processes are investigated. The remaining chapters deal with asymptotic theory for long-memory processes, statistical analysis of functionals of spectra, discriminant analysis for stationary time series, and large deviation theory and saddle-point approximation for stochastic processes.

This book contains a rich variety of modern results scattered in papers and books. It

is suitable as a reference book or as an advanced textbook for PhD courses on inference for stochastic processes. (ja)

**H. C. Thode, Jr., *Testing for normality*, Statistics, Textbooks and Monographs 164, Marcel Dekker, New York, 2002, 479 pp., US\$150, ISBN 0-8247-9613-6**

The assumption that a sample comes from a normal distribution is very frequent in mathematical statistics. Fortunately, in many cases a central limit theorem helps a fast convergence to normality of a test statistic, so that small or moderate departures from the assumption about distribution of the population do not invalidate the results of the statistical analysis. In other cases, the assumption of normality is crucial – no wonder that the tests for normality have attracted statisticians for many years! One of the first was Karl Pearson, whose name is usually connected with the famous  $\chi^2$  goodness of fit test. It is less well known that he also advocated tests based on moments because they belong to the most powerful methods for detecting departures from normality.

This book is a good reference text on test for univariate and multivariate normality. The first part concerns testing for univariate normality. The author describes plots, probability plots, regression tests, tests using moments, goodness-of-fit tests and other tests for complete samples, tests for outliers, power comparisons, and testing for normality with censored data. The second part of the book is devoted to tests for multivariate normality. Additional topics include testing for normal mixtures, robust estimation of location and scale, and computational issues. Three appendices contain data sets, parameter and critical values, and a computer subroutine for optimisation. Nowadays, it is easy to use a computer and to calculate some statistics for testing normality. However, it is comfortable to have this book and to look in it for whether the test is sufficiently powerful, whether the sample is large enough, or whether it is better to use another test.

The book is clearly written with many interesting numerical examples and historical remarks. The large bibliography will be useful for readers who wish to obtain more details about the methods described in the text. (ja)

**V. Turaev, *Introduction to Combinatorial Torsions*, Lectures in Mathematics, Birkhäuser, Basel, 2001, 123 pp., DM 38, ISBN 3-7643-6403-3**

This book is an extended version of the notes from the author's lectures at ETH, Zürich, in Spring 1999. It is an introduction to combinatorial torsions of cellular spaces and manifolds, with special emphasis on torsions of 3-dimensional manifolds.

The first two chapters cover the algebraic foundations of the theory of torsions and various topological constructions of torsions due to K. Reidemeister, J. H. C. Whitehead, J. Milnor and the author. Connections between the torsions and the Alexander polynomial of links and 3-manifolds are also discussed. The third (and last) chapter of the book deals with so-called refined torsions and the related additional structures on manifolds, specifically homological orientations and Euler structures. As an applica-

tion, a construction of the multivariable Conway polynomial of links in homology 3-spheres is presented. At the end of the book the recent results of G. Meng, G. H. Taubes and the author on connections between the refined torsions and the Sileberg-Witten invariant of 3-manifolds is briefly described.

The exposition is aimed at students, professional mathematicians and physicists interested in combinatorial aspects of topology and/or in low-dimensional topology. The necessary background for the reader includes a basic knowledge of topology and homological algebra. (jtu)

**A. van den Essen, *Polynomial Automorphisms and the Jacobian Conjecture*, Progress in Mathematics 190, Birkhäuser, Basel, 2000, 329 pp., DM 118, ISBN 3-7643-6350-9**

This book is divided into three main parts, Methods, Applications and Appendices. The first part consists of seven chapters. The first one (Preliminaries) introduces the basic tools used throughout the book. The next chapter (Derivations and polynomial automorphisms) is devoted to the interplay between polynomial automorphisms and locally nilpotent derivations. In Chapter 3 (Invertibility criteria and inversion formulae) various criteria for polynomial automorphisms are presented. Chapter 4 (Injective morphisms) investigates some conditions under which injective endomorphisms are surjective, while the next chapter (The tame automorphism group of a polynomial ring) deals with polynomial rings with coefficients in a commutative  $\mathbf{Q}$ -algebra. In Chapter 6 (Stabilization methods) the stabilization principle is described and is applied to a reduction of the Jacobian conjecture. In the last chapter of the first part (Polynomial maps with nilpotent Jacobian), a large class of such mappings is investigated.

The second part consists of three chapters, Application of polynomial mappings to dynamical systems, Group actions and The Jacobian conjecture.

The last part consists of six appendices, the first five forming a sufficient background for reading the text, while the last one presents special examples and counter-examples to the whole text. (lbi)

**H. Walser, *The Golden Section*, Spectrum Series, The Mathematical Association of America, Washington, 2001, 142 pp., £17.95, ISBN 0-88385-534-8**

From antique times, the golden section has occurred frequently in geometry, architecture and art. We say that a line segment is divided in golden ratio if the larger subsegment is related to the smaller one as the whole segment is related to the larger subsegment. The golden section plays an important role not only in classical geometry, but also in fractals, in the study of Fibonacci sequences and in the theory of regular and quasi-regular solids. All of these connections are described in the book under review. It contains a large collection of pictures which help to understand the content, and many of problems, whose solutions are given at the end.

The book, a translation from the German original (B. C. Teubner, Leipzig, 1993) can be recommended to students of high schools and to their teachers. (lbo)