European Mathematical Society

NEWSLETTER No. 23

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NOTICE FOR MATHEMATICAL SOCIETIES

Please note labels are prepared during the second half of the month before the next issue. Would you please send your updated lists before this time.

Many thanks. Ms T Mäkelainen

EUROPEAN MATHEMATICAL SOCIETY

Meeting of the Executive Committee
Cambridge (United Kingdom) October 11–13, 1996

Main Decisions

SCIENTIFIC ACTIVITIES

Third European Congress of Mathematics – ECM3 in 2000 Barcelona (Spain)

A meeting with the ECM3 organisers is to take place in Vienna. The purpose is to agree on the distribution of responsibilities.
The Congress organisers informed the EC that the support of the Spanish government has been confirmed and Sir Michael Atiyah has agreed to serve as chairperson of the Scientific Committee.

Junior Congress

The Second Junior Congress of Miskolc was a success and should be repeated. EMS is trying to hold in 1998 a Junior Congress and one for 2000 should be planned in Spain. The participation of East-European young mathematicians must be ensured.

Diderot Mathematical Forums

DMF2, Mathematics and Environment

The theme of the second forum will be Mathematics and Environment, focusing on problems related to water. A scientific committee has been appointed.

Towards a European Bibliographical Database

It is agreed that EMS wishes to become a major partner in the European database: the request should be made as soon as the Current Awareness Programme (CAP) is running.
Implementation of the European database has to get going. The structure should be defined and cooperation with the London Mathematical Society may be started after consulting the French partners.
Lobbying should be undertaken in Brussels for the European Database to be considered as a large scale facility in the Fifth Framework Programme of the EU. The Database Committee will produce a document describing the European database. National societies should be approached with this document incorporating the role of the Zentralblatt, and urged to push for action in Brussels.

Journal of the European Mathematical Society (JEMS)

The list of the main and associate editors is finalised in Vienna. The editors should work out the policy of the journal, including their position on survey articles. The rules for running the journal are to be defined by the Editor-in-Chief and main editors and presented to the EMS Executive Committee for approval.

INFORMATION SERVICES

Server (EMIS)

Since the Budapest Congress there has been increased interest in the server.
There are negotiations underway to have new journals in the server. It has been agreed that Annals of Mathematics will be available on the server 5 years after publication. Unfortunately there are no files available older than 1995, so that it will begin in 4 years. Discussions on other journals are pending. It might be possible to secure funds from the EU for converting older journals into electronic form.
The Executive Committee decided that a "Job Forum" should be created.

Multilingual Newsletter

Discussions have been continued with *Deutsche Mathematiker-Vereinigung* and *Société Mathématique de France*. A pilot issue with the best of the German *Mitteilungen* and the French *Gazette* of the past ten years is being planned. It was suggested that the material should be at most 2-3 years old and that a mock issue should be prepared for the final decision on the project.
The idea of also collecting information from other national societies should be borne in mind: the material to be considered could include obituaries. National societies will be asked to take care of the distribution and share the printing costs.

Flyer

National societies should remind their membership of the possibility of joining EMS. For this purpose a flyer in black and white has been prepared by D.A.R. Wallace, setting out the accomplishments of EMS and its plans for the future.

The Secretariat will mail it, with a covering letter to the corporate members/ national societies. The flyer can be obtained, also in electronic form, from the Secretariat.

COMMITTEE ON EDUCATION

The new chairperson, Vinicio Villani (Italy), presented a discussion paper. Some goals were set for the Committee and the projects proposed were approved.
- A comparative study of teaching and/or methodologies in several European countries could be undertaken, with videotapes, translations, comments, in the form of multimedia product, perhaps financed through the Leonardo or Socrates programmes.
- Mathematics for all: where, when, why, how?
- Bridging the gap between school and university mathematics. Contacts between teachers and other mathematicians should be improved.
- Working group for mathematical exhibitions and science museums.
- Capability tests at the European level could be useful. The group producing the multinational testing system must get in touch with the Education Committee.
- Information on different activities at the European level could be compiled, information of Junior Congresses could be collected and sent to Ministries of Education in the different countries.

RELATIONS WITH EUROPEAN INSTITUTIONS

The Fifth Framework Programme of the EU

The end of the Fourth Programme is approaching and the Fifth is at the planning stage. The philosophy developed in documents available so far does not leave much room for pure research, having a strong emphasis on industrial applications.
A position paper by the EMS will be available on the server EMIS.

Euresco Conferences

There are four series of such conferences running in mathematics. A new structure is considered with a different funding requested from ESF itself.
The ESF has asked EMS for an opinion on the Euresco conferences. Mathematicians feel it to be a problem to hold them in expensive centres such as the ESF programme requires. They prefer to use cheaper venues, some in Eastern Europe. If the conferences are run by ESF itself, approval would take less time, a fact to be appreciated. The mathematical meetings have been a success, though the rule imposing that a vice-chair should become chair for the following conference did not make sense because mathematicians prefer to operate within a broader theme.

European Collaborative for Science, Industry and Technology Exhibitions (ECSITE)

As part of the European Week for Scientific and Technological Culture, two days of seminars, conferences, demonstrations and experiments in the field of mathematics were held in Barcelona on 23–24 November 1996 by ECSITE and EMS, with the support of *Electricité de France*. More than a hundred people attended in the Museum of Science; the title was "Mathematics in daily life"
There are plans to have exhibitions on "Mathematics in Nature" in 1999 in Paris and in Barcelona in 2000.

RELATIONS WITH MATHEMATICAL INSTITUTIONS

International Mathematical Union

IMU is creating a Committee on electronic publishing with A. Odlyzko, L. Lovasz, M. Groetschel appointed. Peter Michor was nominated to this Committee as representative of EMS.

Stefan Banach International Mathematical Center

The mandates of E. Bayer, F. Hirzebruch and A. Lahtinen on the Scientific Council of the Banach Center come to an end on December 31st, 1997. F. Hirzebruch is willing to continue serving on the Council; E. Bayer and A. Lahtinen expressed their wish to be replaced. F. Hirzebruch, Marta Sanz Sole and D.A.R. Wallace are proposed for the period 1998–2001.

LIFE OF THE SOCIETY

Elections to the Executive Committee

There was a discussion on the preparations for the elections to the EC. It was decided that before the Council meeting we need to have a commitment that a candidate is willing to serve if elected. Also it is strongly recommended that a

statement of intention or policy be made. If the nomination comes from the floor, commitment and policy statement should be available in writing or made verbally to the chair of the Nominating Committee, if there is one, or to the President.

Membership

◇ *Application form*

It should be possible to download the application form for EMS individual membership from EMIS.

◇ *Zentralblatt and membership*

Zentralblatt has offered to collect EMS individual membership fees of its reviewers from their Zentralblatt accounts. The Executive committee decided that the Zentralblatt reviewers who have difficulties in paying their EMS membership fee in a convertible currency can pay through their Zentralblatt account.

European Science Foundation

The Programme of European Research Conferences is run by the European Science Foundation with funding from the Euroconferences Activity of the European Union. The programme is open to all researchers, both from industry and academia, and covers all fields, from natural and technical sciences to social sciences and humanities. Grants are available to encourage the attendance of young researchers, in particular those from less favoured regions in Europe. Details on the individual conferences, as well as an on-line application form and general information are available on the World Wide Web at

http://www.esf.org/euresco

EMS Lectures 1997

The EMS Lecturer of 1997 is Professor Nigel Cutland (University of Hull). He will give his EMS Lectures at the University of Helsinki on May 27 – June 2, 1997, with the title

Loeb Measures in Practice: Recent Advances

He will outline the Loeb measure construction of nonstandard analysis, and discuss recent applications in stochastic fluid mechanics, finance theory and stochastic calculus of variations (Malliavin calculus and related topics).
As part of this programme he gives, on his way to Helsinki, some lectures at the University of Gothenburg on May 23 and May 26, 1997.

For more information please contact

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"ENGLISH MATHEMATICIANS GO BACK TO SCHOOL"

Tony Gardiner, University of Birmingham, England

Within the last few years, university mathematicians in England have woken up to the apparent marked decline in "preparedness" among the best 18 year olds embarking on degree courses in numerate disciplines. Indications of this impending change could be discerned in the curriculum changes of the mid-late 1980s. The scripts of secondary school participants in national olympiads since 1990 contained more substantial evidence of a marked change in basic technique, and of a shift from precise calculation to "experiment plus guesswork".

The observed decline had its origins in the way university mathematicians responded to the expansion of educational opportunity in the 1960s, 70s and 80s. Until the 1960s universities exerted greater control over school leaving examinations than was perhaps healthy. In parallel with increased "staying on" rates at school, universities faced their own challenges. Hence, instead of relaxing their grip and learning to work with teachers in new ways, universities chose to stand back and leave things to teachers and professional educationists.

As the mathematical experience of those entering universities evolved during the 1980s, universities responded by revising their courses. However, as long as the supply of reasonably competent 18 year olds continued to flow into the universities, no-one worried too much. Around 1990 things began to change more dramatically, and by the middle of 1994 alarm bells were sounding.

In the light of the unprecedented level of concern, in January 1995 the Council of the London Mathematical Society established a working group, under the Chairmanship of Professor Geoffrey Howson, to identify the problems more clearly, and to suggest steps that might be taken to improve matters. The group worked closely with other mathematical societies, with scientists and with engineers; and it consulted as widely as it could (subject only to the importance of trying to achieve a consensus before things got worse).

The resulting report – "Tackling the mathematics problem" – was published (jointly with the Institute of Mathematics and its Applications and the Royal Statistical Society) in October 1995. Its findings can be briefly summarised by the following quote (p.8): "Mathematics, science and engineering departments appear unanimous in their perception of a *qualitative* change in the mathematical preparedness of incoming students.

* Students enrolling on courses making heavy mathematical demands are hampered by a serious lack of *essential technical facility* - in particular, a lack of fluency and reliability in numerical and algebraic manipulation and simplification.

* Compared with students in the early 1980s, there is a marked decline in students' analytical powers when faced with simple two-step or multi-step problems.

* Most students entering higher education no longer understand that mathematics is a precise discipline in which exact, reliable calculation, logical exposition and proof play essential roles; yet it is these features which make mathematics important."

The report's aim was to lay the foundations for as wide a consensus as possible. The authors went out of their way to stress "at the very outset that [...] the main responsibility for the weaknesses we identify cannot be laid at the door of classroom teachers."

Those government agencies who were held responsible for the situation described so vividly in the report promptly set out to undermine its credentials. However, so great was the support in the media, from businessmen, and from ordinary teachers that, within six weeks policies began to be reversed. But though the agenda had changed, the style of decision-making, which had contributed to the original mess, remained the same - with overhasty initiatives, implemented hurriedly, on the basis of poor, and inscrutable, advice.

The last twelve months have seen a complete reversal of many earlier policies. Yet the authorites have still not learned that good intentions are not enough and that hasty change in education always makes things worse. They have also not yet accepted the need to involve mathematicians in the process of assessing how mathematics should be taught at school level. Until they do, things are unlikely to improve.

Mathematisches Forschungsinstitut Oberwolfach

Lorenzenhof
D - 77709 Oberwolfach-Walke

Meetings 1998

Participants of the meetings are invited personally by the director of the institute. The participation is subject to such an invitation. Interested researchers, in particular young mathematicians, can contact the administration of the institute. Since the number of participants is restricted not all enquiries can be considered.

Information is also available on our web site http://www.mfo.de.

04.01. – 10.01.1998
Stochastic Geometry and Spatial Statistics
Organisers:
Adrian J. Baddeley, Nedlands
Dietrich Stoyan, Freiberg
Wolfgang Weil, Karlsruhe

11.01. – 17.01.1998
Global and Geometric Theory of Delay Differential Equations
Organisers:
John Mallet-Paret, Providence
Roger D. Nussbaum, New Brunswick
Hans-Otto Walther, Giessen

18.01. – 24.01.1998
Mathematische Logik
Organisers:
Yiannis N. Moschovakis, Los Angeles
Helmut Schwichtenberg, München
Anne S. Troelstra, Amsterdam

25.01. – 31.01.1998
Geometric Questions in Partial Differential Equations
Organisers:
Henri Berestycki, Paris
Bernhard Kawohl, Köln
Giorgio Talenti, Firenze

01.02. – 07.02.1998
C*-Algebren
Organisers:
Dietmar H. Bisch, Santa Barbara
Eberhard Kirchberg, Berlin
Georges S. Skandalis, Paris

08.02. – 14.02.1998
Endliche Modelltheorie
Organisers:
Heinz-Dieter Ebbinghaus, Freiburg
Jörg Flum, Freiburg
Yuri Gurevich, Ann Arbor

08.03. – 14.03.1998
Elementare und analytische Zahlentheorie
Organisers:
Jörg Brüdern, Stuttgart
Hugh L. Montgomery, Ann Arbor
Hans Peter Schlickewei, Ulm
Eduard Wirsing, Ulm

15.03. – 21.03.1998
Designs and Codes
Organisers:
Dieter Jungnickel, Augsburg
Jacobus H. van Lint, Eindhoven

22.03. – 28.03.1998
Applications and Computation of Orthogonal Polynomials
Organisers:
Walter Gautschi, West Lafayette
Gene H. Golub, Stanford
Gerhard Opfer, Hamburg

29.03. – 04.04.1998
Arbeitsgemeinschaft mit aktuellem Thema (wird in Heft 1/1998 der DMV-Mitteilungen bekanntgegeben)
Organisers: N.N.

05.04. – 11.04.1998
Algebraische Gruppen
Organisers:
Peter Slodowy, Hamburg
Tony A. Springer, Utrecht
Jacques Tits, Paris

12.04. – 18.04.1998
Numerical Methods for Singular Perturbations
Organisers:
Pieter W. Hemker, Amsterdam
Hans-Görg Roos, Dresden
Martin Stynes, Cork

19.04. – 25.04.1998
Functional Analytic and Complex Analytic Methods in the Theory of Linear Partial Differential Equations
Organisers:
Reinhold Meise, Düsseldorf
B. Alan Taylor, Ann Arbor
Dietmar Vogt, Wuppertal

26.04. – 02.05.1998
Domain Decomposition and Multifield Theories
Organisers:
Franco Brezzi, Pavia

Ronald H.W. Hoppe, Augsburg
Yuri A. Kuznetsov, Moscow

17.05. – 23.05.1998
Regulators
Organisers:
Spencer Bloch, Chicago
Manfred Kolster, Hamilton
Peter Schneider, Münster
Victor P. Snaith, Hamilton

31.05. – 06.06.1998
DMV-Seminar
Organisers: N.N.

07.06. – 13.06.1998
Freiformkurven und Freiformflächen
Organisers:
Robert E. Barnhill, Tempe
Carl de Boor, Madison
Josef Hoschek, Darmstadt

28.06. – 04.07.1998
Quantum and Classical Integrable Systems
Organisers:
Pierre van Moerbeke, Louvain-la-Neuve
Werner Nahm, Bonn

12.07. – 18.07.1998
Arithmetic of Fields
Organisers:
Wulf-Dieter Geyer, Erlangen
Moshe Jarden, Tel Aviv

19.07. – 25.07.1998
Verallgemeinerte Kac-Moody-Algebren
Organisers:
R. Borcherds, Cambridge
Peter Slodowy, Hamburg

26.07. – 01.08.1998
Spectral Theory and Stochastic Analysis
Organisers:
Michiel van den Berg, Diepenbeek
Michael Demuth, Clausthal-Zellerfeld
Jan van Casteren, Wilrijk

02.08. – 08.08.1998
Mathematical Methods in Tomography
Organisers:
F. Alberto Grünbaum, Berkeley
Alfred K. Louis, Saarbrücken
Frank Natterer, Münster

09.08. – 15.08.1998
Nichtkommutative Geometrie
Organisers:
Alain Connes, College de France, Paris
Joachim Cuntz, Heidelberg
Marc Rieffel, Berkeley

16.08. – 22.08.1998
Nonlinear and Stochastic Systems
Organisers:
Ludwig Arnold, Bremen
N. Sri Namachchivaya, Urbana
Werner Schiehlen, Stuttgart
Walter Wedig, Karlsruhe

23.08. – 29.08.1998
Mechanics of Materials
Organisers:
George Herrmann, Stanford
Reinhold Kienzler, Bremen
Horst Lippmann, München
Ewald Werner, Leoben

30.08. – 05.09.1998
Komplexe Analysis
Organisers:
Jean-Pierre Demailly, St.Martin d'Heres
Klaus Hulek, Hannover
Thomas Peternell, Bayreuth

06.09. – 12.09.1998
Topologie
Organisers:
Robion C. Kirby, Berkeley
Wolfgang Lück, Münster
Elmer G. Rees, Edinburgh

13.09. – 19.09.1998
Homotopietheorie
Organisers:
Mike Hopkins, Cambridge
Karlheinz Knapp, Wuppertal
Erich Ossa, Wuppertal

20.09. – 26.09.1998
Inverse Wave Scattering Problems and Applications
Organisers:
Ralph E. Kleinman, Newark
Rainer Kress, Göttingen

27.09. – 03.10.1998
Geometrie
Organisers:
Victor Bangert, Freiburg
Yurii D. Burago, St. Petersburg
Ulrich Pinkall, Berlin

04.10. – 10.10.1998
Arbeitsgemeinschaft mit aktuellem Thema (wird in Heft 3/1998 der DMV-Mitteilungen bekanntgegeben)
Organisers: N.N.

11.10. – 17.10.1998
DMV-Seminar
Organisers: N.N.

11.10. – 17.10.1998

DMV-Seminar
Organisers: N.N.

18.10. – 24.10.1998
History of Mathematics: Mathematics in the Americas and the Far East, 1800-1940
Organisers:
Ivor Grattan-Guinness, Bengeo, Herts
David E. Rowe, Mainz
Erhard Scholz, Wuppertal

25.10. – 31.10.1998
Modelltheorie
Organisers:
Alexander Prestel, Konstanz
Martin Ziegler, Freiburg
N.N.

01.11. – 07.11.1998
Experimental Design: Theory and Applications
Organisers:
Norman R. Draper, Madison
Norbert Gaffke, Magdeburg
Friedrich Pukelsheim, Augsburg

15.11. – 21.11.1998
Fortbildungslehrgang für Studienräte
Organisers: N.N.

22.11. – 28.11.1998
DMV-Seminar
Organisers: N.N.

22.11. – 28.11.1998
DMV-Seminar
Organisers: N.N.

29.11. – 05.12.1998
Applied Probability
Organisers:
Arie Hordijk, Leiden
Volker Schmidt, Ulm

06.12. – 12.12.1998
Modulformen
Organisers:
Siegfried Böcherer, Mannheim
Tomoyoshi Ibukiyama, Osaka
Winfried Kohnen, Heidelberg

13.12. – 19.12.1998
Gruppen und Geometrien
Organisers:
Michael Aschbacher, Pasadena
William M. Kantor, Eugene
Franz-Georg Timmesfeld, Giessen

EUROPEAN NEWS: Country by Country

AUSTRIA

35th International Symposium on Functional Equations

Graz-Mariatrost, Austria

7 – 14 September, 1997

Scientific Committee: W. Benz (Hamburg), R. Ger (Katowice), J. Rätz (Bern), L. reich (Graz)
Local Organisers: D. Gronau, J. Schwaiger, L. Reich (University of Graz)

Participation is by invitation only. Those wishing to be invited should contact one of the local organisers (Institut für Mathematik, Universität Graz, Heinrichstrasse 36, A-8010 Graz. E-mail: isfe@kfunigraz.az.at)

BELGIUM

25–29 August 1997: Analysis and Logic

Organisers: Teams of Analysis and of Mathematical Logic of the University of Mons-Hainaut and team of Analysis of the University of Paris 6.
Location: University of Mons-Hainaut (Belgium).
Subject: Geometry of Banach Spaces, Non-Standard Analysis, Ramsey Theory, Descriptive Set Theory and their interactions.
Programme: The programme will include three mini-courses and ten plenary lectures.
Mini-Courses: C.W. Henson (Urbana): Nonstandard Analysis and Ultraproducts in Banach Spaces and Functional Analysis, A. Kechris (Caltech): On the Interactions between Descriptive Set Theory and Analysis, T. Odell (Austin): State of the Art in Banach Spaces.
Organising Committee: R. Deville (Bordeaux), C. Finet (Mons), J.P. Gossez (Bruxelles), C.W. Henson (Urbana), C. Impens (Gent), J. Jayne (London), A. Louveau (Paris 6), C. Michaux (Mons), A. Pétry (Liège), G. Pisier (Paris 6, Texas A & M), J. Schmets (Liège), J. Van Casteren (Antwerpen).
Scientific Committee: M. Boffa (Mons), G. Godefroy (Paris 6, Columbia Missouri), T. Gowers (Cambridge), B.S. Kashin (Moscow), A. Macintyre (Oxford), A. Pelczynski (Warsaw), F. Point (Mons), A.A. Razborov (Moscow), S. Troyanski (Sofia), L. Tzafriri (Jérusalem).
Registration Fee: Bef 5.000 ($160)
Accommodation: arranged in the university residence (single and double rooms with bathroom) for around Bef 6.000 ($190) including breakfast and lunch.
Contributed Papers: Please contact the organisers.
Informations: Catherine Finet and Christian Michaux, UMH, Institut de Mathématique et d'Informatique, 15 Avenue Maistriau, B-7000 Mons (Belgique), e-mail : analog@sun1.umh.ac.be, Tél. 32-65-373507, 32-65-354706, Fax 32-65-373318/3054, Website : http://sun1.umh.ac.be/~boffa/logicumh.htm

CZECH REPUBLIC

Sixth International Spring School

Nonlinear Analysis, Function Spaces and Applications
Prague, May 31 – June 6, 1998

First Announcement

The sixth spring school, which continues the series of preceding five schools, organized by the Mathematical Institute in 1978, 1982, 1986, 1990, and 1994, will take place in Prague from Sunday, May 31 (the day of arrival) to Saturday, June 6, 1998.
The school will concentrate on survey lectures in topics collected in the title. The invited speakers

V. I. Burenkov (Cardiff, UK)
F. Cobos (Madrid, Spain)

V. G. Maz'ya (Linköping, Sweden)
L. Pick (Prague, Czech Republic)
C. Sbordone (Naples, Italy)
H. Triebel (Jena, Germany)
I. E. Verbitsky (Columbia, MO, USA)
W. P. Ziemer (Bloomington, IN, USA)

will deliver a series of four lectures each. In addition to the main lectures there will be a limited possibility of short communications and a poster session.
For registration and for further information please contact A. Kufner (Chairman of the Organizing Committee) or L. Pick (Secretary), Mathematical Institute, Academy of Sciences, Žitná 25, 115 67 Praha 1, Czech Republic; e-mail address: pick@mbox.cesnet.cz

FINLAND

EUROCONFERENCE ON CONFORMAL GEOMETRY AND COMPLEX DYNAMICS

SAARISELKÄ, FINLAND, JUNE 9 – 13, 1997

The conference will take place at a congress and vacation resort in northern Lapland, well north of the polar circle: latitude 68.6°. The event is a continuation of the activity of the earlier EC Human Capital and Mobility network Conformal Geometry and Geometric Function Theory.
The programme will consist of about 25 invited lectures 40 min each. A second announcement including prices for accommodation and travel arrangements will be delivered by the end of February, 1997. There will be a limited amount of resources for young participants from EC countries.

Organisers:

Kari Astala	Ilkka Holopainen	Seppo Rickman
astala@math.jyu.fi	ih@geom.helsinki.fi	rickman@cc.helsinki.fi

For more information, contact either the organisers or the **secretary**

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FRANCE

XXXVIIth Probability Summer School

Saint-Flour (Cantal), 7th – 23rd July, 1997

Invited Speakers:
J. Bertoin, Professeur à l'Université Paris VI, "Processus de Lévy"
F. Martinelli, Professeur à l@Université dell'Aquila (Italie), "Glauber Dynamics for Lattice Spin Models of Statistical Mechanics"
Y. Peres, Professeur, Hebrew University, Jerusalem, "Probability on Trees"

For further information, contact
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GEORGIA

Tbilisi International Centre of Mathematics and Informatics (TICMI)

Advanced Course on Pseudodifferential Operators and Their Applications 1

Date: 25 June-5 July 1997
Location: TICMI (Tbilisi)
Roland Duduchava (University of Tbilisi, Georgia)

PSEUDODIFFERENTIAL EQUATIONS ON MANIFOLDS WITH SMOOTH BOUNDARY: SOLVABILITY, ASYMPTOTICS OF SOLUTIONS, APPLICATIONS

Summary:
Pseudodifferential operators (PsDOs) on manifolds (definition, properties). Boundedness of PsDOs in anisotropic Sobolev spaces with weight. Factorisation of matrix elliptic symbols and Fredholm properties of PsDOs. Asymptotics of solutions to elliptic systems of pseudodifferential equations. Application to some problems in elasticity.

B.-Wolfgang Schulze (University of Potsdam, Germany)

THE PSEUDO-DIFFERENTIAL CALCULUS FOR SINGULAR AND DEGENERATE OPERATORS

Summary:
The lectures present the basic methods of PsDOs for solving elliptic and parabolic problems on configurations with singularities (conical, edge, corners, cuspidal etc.). Essential tools are the Mellin transform, meromorphic operator-valued symbols and weighted wedge Sobolev spaces with asymptotics. The calculus is aimed at constructing parametrices or inverses and to illustrate the connection to concrete models in applied sciences.

Coordinator: George Jaiani

ADVANCED COURSE ON THEORY OF ELASTICITY 2

Date: 16-25 September 1997
Location: TICMI Tbilisi
Veronique Lods, Gerard Tronel (Universite P. et M. Curie, France)

THREE- AND TWO-DIMENSIONAL ELASTICITY

Summary:
During the past decades, substantial progress has been made in the mathematical analysis of three-dimensional elasticity and in the understanding of the two-dimensional linear and nonlinear theories of plates and shells by means of the technique of asymptotic analysis. The lectures will thoroughly review these recent developments.

Tamas Vashakmadze (University of Tbilisi, Georgia)

ON THE CONSTRUCTION OF A MATHEMATICAL THEORY OF ANISOTROPIC NONHOMOGENEOUS ELASTIC PLATES AND SHELLS

Summary:
Construction of finite models (e.g. such as von Karman, Reissner, Kirchhoff etc) without simplifying hypotheses. Investigation of problems of error estimation, convergence and effective solvability of two-dimensional models corresponding to the reduction methods (e.g. Theories of Vekua, Babushka). Some similar generalisations for piezoelastic and electric elastic plates and shells. New numerical processes for solving of some two-dimensional problems in above sense.

Coordinator: George Jaiani

These courses are suitable for advanced graduate students or recent Ph.D.'s. The participants will also have an opportunity to give 20-minute talks on their own work at a mini-symposium which will take place during the Advanced Course. Lectures and abstracts of the talks will be published and distributed among the lecturers and participants after the Advanced Course. The registration fee for participants is 400 USD which includes all local expenses during the Advanced Course. A restricted number of participants will be awarded grants.

Further information:
TICMI, Vekua Institute of Applied Mathematics of Tbilisi State University, University Str. 2, Tbilisi 380043, Georgia
e.mail:jaiani@apmath.acnet.ge or gmu@imath.acnet.ge
Fax:00995 32 304697 or Tel:00995 32 303040

GREECE

Euroconferences in Mathematics on Crete

The Department of Mathematics of the University of Crete announces the 1997 conferences of the series Euroconferences in Mathematics on Crete, sponsored by the Training and Mobility of Researchers Programme of the Commission of the European Union.

Dirichlet Forms and Their Applications in Geometry and Stochastics

22 - 28 June, 1997

Organisers: J.Jost (Leipzig, Germany), U.Mosco (Rome, Italy), K.T.Sturm (Erlangen, Germany)
Main speakers: J.Jost (Leipzig, Germany), W.Kendall (Warwick, United Kingdom), U.Mosco (Rome, Italy), M.Röckner (Bielefeld, Germany), K.T.Sturm (Erlangen, Germany)

Non-linear Dispersive Waves: Theory and Applications

29 June - 5 July, 1997

Organisers: V.A.Dougalis (Athens, Greece), A.S.Fokas (London, United Kingdom)
Main speakers: J.L.Bona (Austin, U.S.A.), D.Crighton (Cambridge, United Kingdom), A.Its (Purdue, U.S.A.), J.-C.Saut (Paris-Sud, France), V.E.Zakharov (Moscow, Russia)

The conferences will take place at the Anogia Academic Village, a conference centre located at the traditional Cretan village of Anogia on the slopes of Mount Ida. Anogia is at an elevation of 750 m, about 45 minutes by car from Heraklion, the largest city of Crete, and about half an hour from the nearest point on the coast. The living expenses (accommodation plus meals) per day for a person are estimated at about 33 ECU for a double room or 43 ECU for a single room. The registration fee is 250 ECU. The Training and Mobility of Researchers Programme financially supports young researchers from the countries of the European Economic Area to enable them to attend the conferences. There will also be some limited funds from other sources available to support participants not belonging to the above group. Support can cover (all or certain) travel, living and registration expenses. For information please contact the local co-ordinator of the conference series indicated below.

The series will continue in summer 1998 with the following three conferences:
Groups of finite Morley rank (A.Borovik, Manchester, United Kingdom),
Galois representations in arithmetic geometry (M.Taylor, Manchester, United Kingdom),
Front propagation: Theory and Applications (P.L.Lions, Paris-Dauphine, France).

The topics of future conferences will be decided by the international scientific committee which consists of: H.Abels (Bielefeld, Germany), H.Bauer (Erlangen, Germany), C.Dafermos (Brown University, USA), O.Kegel (Freiburg, Germany), S.Papadopoulou (Crete, Greece) V.Thomée (Göteborg, Sweden), A. Wilkie (Oxford, United Kingdom). The next meeting of the committee will be in Autumn 1997. Suggestions for topics for these conferences should be sent to the local co-ordinator of the series.

For additional information please contact the local co-ordinator:

Susanna Papadopoulou
Department of Mathematics
University of Crete
Heraklion, Crete, GREECE
Fax-Nr.: 81-234516
e-mail: souzana@math.uch.gr

or, for the conferences of 1997:

V.A. Dougalis
Mathematics Department
University of Athens
University Campus
Athens 15710, GREECE
e-mail: doug@eudoxos.dm.uoa.gr

K.T. Sturm
Mathematisches Institut
Universität Erlangen-Nürnberg
Bismarckstrasse 1 1/2
91054 Erlangen, GERMANY
e-mail: sturm@mi.uni-erlangen.de

ITALY

Scuola Matematica Interuniversitaria

Summer Course In Mathematics - Perugia 1997

In Summer 1997 graduate courses in mathematics will be organized under the sponsorship of the Italian National Research Council and MURST, at the University of Perugia, Perugia (Italy); the courses will take place between July 27 and August 30, 1997.

The courses are directed towards young graduates wishing to study mathematics at a graduate level.

The list of courses offered is attached. Each participant is required to choose two courses for a total of 10 hours a week of lectures in addition to problem sessions. Daily attendance is compulsory for participants. Although written tests will be given by the lecturers, no certification of proficiency will be issued.

Ten fellowships, of 520.000 Italian lire each, will be available to foreign participants to help cover their living expenses during the course. All the participants will be lodged, at no cost, in the Casa dello Studente. Text books, lecture notes and photocopies will be provided by the School.

NO TRAVEL EXPENSES WILL BE REIMBURSED

Applications should be sent by mail to the following address :

Professor Graziano GENTILI
Scuola Matematica Interuniversitaria
Summer Course in Mathematics
Via S. Marta 13/A
50139 - Firenze, Italy

and should reach this address before April 30, 1997. A selection Committee will meet shortly afterwards and all foreign applicants will be notified of the result before June 20, 1997. Applications should contain the titles of three courses the applicant would like to attend (in order of preference), a brief curriculum vitae and a DETAILED CURRICULUM STUDIORUM (including a certificate with the list of university courses taken and corresponding grades). Applicants are requested to state if their participation is conditioned by the allotment of a fellowship. They should indicate very clearly the exact address to which all correspondence concerning the Summer Course should be mailed.

Information - Programmes and further information can be found on the WEB page of SMI at the address:

http://www.iaga.fi.cnr.it/SMI/index.html

or can be obtained by e-mail at:

smi@iaga.fi.cnr.it

Programmes and further information can also be required by fax at +39-55-475915 or by mail at the address of the Scuola Matematica Interuniversitaria (see above).

The Chairman of S.M.I.
(Prof. Graziano Gentili)

List of Courses – Perugia 1997

-ALGEBRA	Prof. L. Kovacs, Austral.Nat.Univ. (lectures in English)
-COMPLEX ANALYSIS	Prof. N. Kerzman, UNC Chapel Hill (lectures in English)
-FUNCTIONAL ANALYSIS	Prof. C. Citrini Politecnico Milano (lectures in Italian)
-NUMERICAL ANALYSIS	Prof. D. Kershaw. Univ. Lancaster (lectures in English)
-DIFFERENTIAL EQUATIONS OF MATHEMATICAL PHYSICS	Prof. B. Kellogg, Univ. Maryland (lectures in English)

-ALGEBRAIC GEOMETRY	Prof. W. Barth, Univ. Erlangen (lectures in English)
-DIFFERENTIAL GEOMETRY	Lecturer to be defined
-INTRODUCTION TO PROGRAMMING AND COMPUTER SCIENCE	Prof. A. Segre, Univ. Iowa (lectures in English)
-PROBABILITY	Prof. P. Protter, Purdue Univ. (lectures in English)
-MATHEMATICAL STATISTICS	Lecturer to be defined
-GAMES THEORY	Prof. S. Zamir, Hebrew Univ. (lectures in English)
-ALGEBRAIC TOPOLOGY	Prof. K. Gruenberg, Univ. London (lectures in English)

Scuola Matematica Interuniversitaria

Summer Courses In Mathematics - Cortona 1997

During Summer 1997 several graduate courses in mathematics will be held, under the sponsorship of the National Research Council and MURST, in Cortona at the Scuola Normale Superiore. The courses will take place during the periods July 6-July 19, 1997; July 20-August 9, 1997 and August 10-August 30, 1997.

The courses are directed towards young graduates who would like to engage in research in one of the following fields:

July 6 - July 19
-NONLINEAR ANALYSIS Prof. A. Ambrosetti (Scuola Normale Superiore Pisa) - Prof. I. Ekeland (Univ. Paris IX)
- MATHEMATICAL FINANCE Prof. Prof. P. Boyle (Waterloo Univ.) - Prof. W. Runggaldier (Univ. Padova)

July 20 - August 9
-NUMERICAL ANALYSIS Prof. D. Funaro (Univ. Pavia) - Prof. P.J. van der Houwen (CWI Amsterdam)

August 10 - August 30
- ALGEBRAIC GEOMETRY Prof.A. Vistoli (Univ. Bologna) - Prof. C.H. Walter (Univ. Nice)

The possibility of organizing courses in COMBINATORICS (July 6-19) and PROBABILITY (July 20-August 9) is still under investigation.

Each participant is required to choose one topic for a total of 12 hours a week of lectures.

In addition, the participants themselves will be asked to participate in the problem sessions and in the seminars that will be be organized in the afternoons.

Six fellowships, of the duration of two or three weeks (each consisting of 85.0●● Italian lire per weeks) will be available to foreign participants to help cover their living expenses. The participants will be lodged at no cost in the Palazzone; furthermore breakfast and lunch (the latter only from Monday through Saturday) will be offered by the organization. The School will also provide texts books, lecture notes and photocopies.

NO TRAVEL EXPENSES WILL BE REIMBURSED

Applications should be sent by mail to the following address:

Professor Graziano GENTILI
Scuola Matematica Interuniversitaria
Summer Course in Mathematics
Via S. Marta 13/A
50139 - Firenze, Italy

Applications for the courses of the first period should reach this address before April 15, 1996; for the for second and third period before May 15, 1997.

A selection committee will meet shortly afterwards and all foreign applicants will be notified of the result before June 1, 1997.

Applications should contain a BRIEF CURRICULUM VITAE and a DETAILED CURRICULUM STUDIORUM and should indicate which course the candidate would like to follow. Applicants are requested to state if their participations is conditioned by the allotment of a fellowship.The exact address to which all correspondence concerning the Summer courses has to be mailed should be clearly stated.

Information - Programmes and further information can be found on the WEB page of SMI at the address:

http://www.iaga.fi.cnr.it/SMI/index.html

or can be obtained by e-mail at:

smi@iaga.fi.cnr.it

Programmes and further information can also be required by fax at n. +39-55-475915 or by mail at the address of the Scuola Matematica Interuniversitaria (see above).

The Chairman of S.M.I.
(Prof. Graziano Gentili)

Program of C.I.R.M. (Trento) for the year 1997

The Centro Internazionale per la Ricerca Matematica (C.I.R.M.) of Trento will organize during the year 1997 the following Conferences:

1. "Methods in Ring Theory", from May 20 to May 23 1997, at the Grand Hotel Bellavista in Levico Terme (Trento).
Scientific Organizers: V. Drensky (Sofia), A. Giambruno (Palermo) and S.K. Sehgal (Alberta).

The two main areas covered by the conference will be rings with polynomial identities and group rings.
Confirmed main lecturers: Y. Bahturin (Moscow), A.A. Bovdi (Debrecen), E. Formanek (University Park), E. Jespers (St John's), A.R. Kemer (Ulyanovsk), Z. Marciniak (Warsaw), D.S. Passman (Madison), C. Procesi (Roma I), Y.P. Razmyslov (Moscow), A.E. Zalesskii (Norwich).

Deadline for applications: March 31, 1997.

2. "Third Italian Conference on Mathematical Finance", from May 26 to May 30 1997, at the IRST in Povo (Trento).
Scientific Organizers: R. Avesani (Brescia), W. Runggaldier (Padova) and L. Tubaro (Trento).
Provisional list of speakers: G. Barone-Adesi (Edmonton), T. Bjoerk (Stockholm), F. Delbaen (Zürich), P. Embrechts (Zürich), M. Frittelli (Milano), H. Geman (Paris Dauphine and ESSEC), A. Grorud (Marseille), J. Jacod (Paris VI), F. Jamshidian (London), M. Jeanblanc-Picqué (Evry), E. Jouini (Malakoff), Y. Kabanov (Besançon), D. Lamberton (Noisy-Le-Grand), C. Martini (Sophia-Antipolis), F. Moriconi (Perugia), M. Musiela (Kensington), F. Ortu (Trieste), E. Platen (Canberra), S. Pliska (Chicago), M. Pontier (Orleans), M. Pratelli (Pisa), W. Schachermayer (Wien), D. Sondermann (Bonn), M. Taksar (Stony Brook), D. Talay (Sophia-Antipolis), T. Vorst (Rotterdam).
Informations, programs and application forms can be obtained from the file:
http://alpha.science.unitn.it/~tubaro/cirm_ec.html

Deadline for applications: March 31, 1997.

3. "Viability and Control - II", from June 3 to June 7 1997, at the Grand Hotel Bellavista in Levico Terme (TN).
Scientific Organizers: J.-P. Aubin (Paris Dauphine), P. Cannarsa (Roma II), H. Frankowska (Paris Dauphine) and M. Iannelli (Trento).
Provisional list of speakers: S. Anita (Iasi), V. Barbu (Iasi), M. Bardi (Padova), E.N. Barron (Chicago), P. Bernhard (Sophia-Antipolis), I. Capuzzo Dolcetta (Roma I), P. Cardaliaguet (Paris IX), A. Cellina (Trieste), G. Da Prato (Pisa), J. Demongeot (Saint Martin d'Heres), O. Dordan (Bordeaux 2), L. Doyen (Paris-Dauphine), D. Flockerzi (Würzburg), D. Gabay (Paris-Dauphine), F. Gozzi (Pisa), K.P. Hadeler (Tübingen), H.W. Knobloch (Würzburg), W. Kryszewski (Toruń), A. Kurzhanski (Moscow), M. Langlais (Bordeaux 2), C. Lobry (Nice), H. Maurer (Münster), B.

Mordukhovich (Detroit), J. Müller (Tübingen), B. Piccoli (Trieste), M. Quincampoix (Brest), F. Rampazzo (Padova), P. Saint-Pierre (Paris Dauphine), A. Schiaffino (Roma II), N. Seube (Brest), C. Sinestrari (Roma II), S. Stojanovic (Cincinnati), V. Veliov (Wien), R.B. Vinter (London), J. Zabczyk (Warsaw), S. Zagatti (Trieste), T. Zolezzi (Genova).

Deadline for applications: April 30, 1997.

4. "Complex Analysis and Geometry - XIII", from June 10 to June 13 1997, at the Grand Hotel Bellavista in Levico Terme (Trento).
Scientific Organizers: V. Ancona (Firenze) and A. Silva (Roma I).

Deadline for applications: April 30 1997.

5. "Mathematics in the Academies", in autumn 1997.
Scientific Organizers: E. Giusti (Firenze) and L. Pepe (Ferrara).

For further information and applications please contact:

Mr. A. Micheletti - Secretary of CIRM
Centro Internazionale per la Ricerca Matematica
Istituto Trentino di Cultura
38050 Povo (Trento)
Tel. +39-461-881628 - Telefax +39-461-810629 - e-mail: michelet@science.unitn.it.

Meeting of Italian Research Groups on Mathematics Education

Each year since 1980, the Italian Research Groups on Mathematics Education have met to compare their researches and results. Usually each meeting was concerned with the work of one school level at a time. Two years ago, it was decided to organise a meeting every two years which would cover the work of both primary and middle school levels. This year, from 10th to 12th April, the second meeting of this kind will take place in Salsomaggiore Terme (Parma). The theme is *"From the space of the child to the space of geometry"* and the sub-themes are the following:

1 The problem of the space:
- real space - geometrical space
- figural space - conceptual space
- drawing and geometry

2 Euclidean geometry:
- analytical representation
- geometrical transformations
- the problem of measure

3 Natural language, languages of geometry and didactical software

Moreover, "vertical" (primary and middle school) working groups have been established to discuss some common problems - for example: "real space - geometrical space: how to manage the two aspects?".

For information, contact Lucia Grugnetti - Dipartimento di Matematica - via D'Azeglio 85 - I 43100 Parma - fax 39 521 902350 - e mail Grugnetti@PRMAT.Math.UNIPR.IT

SPAIN

Research Conference On

Number Theory and Arithmetical Geometry: Arithmetical Applications of Modular Forms

San Feliu de Guixols, Spain, 24 - 29 October, 1997

Chairman: G. Frey (Essen)
Vice-Chairman: J.B. Bost (Bures)
Scientific committee: P. Bayer (Barcelona), J. Coates (Cambridge, England), L. Merel (Paris), D.B. Zagier (Bonn)

Preliminary Programme
An important part of arithmetic geometry is the study of arithmetical properties of representations of the Galois group of **Q** which arise by its action on geometric objects like torsion points of algebraic groups and the relations

of these representations with diophantine problems. During the last 20 years it became obvious that modular forms play a very prominent role in this theory (cf. results of Gross-Zagier, Kolyvagin, Merel and most recently of Wiles about the Taniyama conjecture). These results open the way to come nearer to the famous conjecture of Birch and Swinnerton-Dyer for elliptic curves over **Q** which predicts that all important data of such a curve is contained in the analytic behaviour of its L-series. Moreover the result of Wiles possibly can be used to get an overview of all two-dimensional representations of a certain important type of the Galois group of **Q** (Serre's conjecture).
Key words: Serre's conjecture, deformation theory of Galois representations, application to diophantine problems, homology of modular curves, modular theory over function fields, applications to coding theory and cryptography.

Invited speakers
V. Abrashkin (Moscow), E. Bayer-Fluckiger (Besançon), G. Böckle (Essen), N. Boston (Urbana), J. Cremona (Exeter), H. Darmon (Montreal), F. Diamond (Cambridge, USA), E. de Shalit (Jerusalem), E. Kani (Kingston), G. van der Geer (Amsterdam), M. Hindry (Paris), A. Kraus (Paris), I. Kiming (Copenhague), R. Murty (Kingston), P. Parent (Rennes), R. Pink (Mannheim), J. Quer (Barcelona), H.-G. Rück (Essen), R. Schoof (Amsterdam), R. Sujatha (Bombay), S. Vladuts (Moscow)

Problem Corner

Paul Jainta, Werkvolkstr. 10, D-91126 Schwabach, Germany

For reasons beyond our control, the problems in this article have not been edited in the usual way.

A Ouantum leap for co-operation in Mathematics

The benefit of mathematical journals in fostering student interest

Interest in Mathematics appears to be increasing. Commendable efforts in making mathematics better known have now brought forth a wide diversity of mathematical journals. But the favour of the public can be as ephemeral as snow in March: old-established mathematical journals disappear from the scene just as new titles emerge.

The editorials of these publications tend to follow a pattern: 'Welcome to a new and exciting adventure!' Yet despite these slightly pretentious words one cannot avoid admitting that many of these new magazines, such as QUANTUM, MATHEMATICS and INFORMATICS QUARTERLY or SAMASYÂ, can be fun to read. They do not, however, concentrate solely on mathematical games and trivia - their intentions are more serious and the subtext is that 'reading requires work'. In these times where isolation of our youth is increasing and interpersonal relations are withering, these magazines also highlight the benefits of working with others. In fact, many of these journals provide an adequate, but hardly used, means of nurturing mathematically gifted students. In recent times much effort has been devoted to the improvement of mathematics teaching at all levels; it is only natural to look for fresh means of discovering and developing dormant abilities in mathematics.

Three publications which could help in widening the mathematical horizon of keen young people (and of those kept young through problem solving!) have recently appeared. The first, Mathematics & Informatics Quarterly (M&IQ), is an international journal: published in Singapore, financed from the USA and supported by The Institute of Mathematics of the Bulgarian Academy of Sciences and The Union of Bulgarian Mathematicians. M&IQ is brought out in one volume of four issues per year and contains articles, notes, problems and solutions in school mathematics. The editors are particularly interested in reaching science-oriented student-readers, for whom most of the pieces are written, but they are equally intent on having the support of teachers. The publishers hope that many parents of school-age children will learn about this quarterly and urge their youngsters to become regular readers.

M&IQ is an English language publication. The choice of language dictated by the fact that, in scientific circles, English is fast becoming dominant. Consequently, it is to the students' advantage to master this language as early as possible, at least in a scientific context. This is especially true in mathematics and in the study of computer programming and algorithmic reasoning.

In addition to articles, Mathematics and Informatics Quarterly features a variety of problems which should challenge even the most advanced students and help prepare beginners for more ambitious goals in the years ahead. In particular, its readers will have an opportunity to take part in the International Mathematics Talent Search (IMTS), whose USA equivalent attracts nearly 300 students each year. (I will give a detailed description of IMTS in this Corner in the future.) It is hoped that the journal will help build an international network of 'problemists' - both students and professionals - and provide them with the opportunity of experiencing the excitement of international competitions without having to leave the comfort of their homes. Finally, the editors hope their readers will assist in making the publication truly successful by sending in their comments, suggestions for future improvements, and ideas for promoting it world-wide.

The second new publication is the Indian Samasyâ. (The word samasyâ refers to a tradition in Sanskrit literature wherein part of a couplet or a quartet is given to be completed in the same metre.) It is a triennial journal devoted to problem-solving in mathematics aimed at students in their final two years of school or junior college and perhaps also students in the first or second year of an undergraduate degree programme. Samasyâ builds on the great interest in Olympiads in mathematics in India: awareness about the Indian National Mathematics Olympiad is growing as it is for the Regional Mathematics Olympiads. It is hoped that readers will find the magazine to provide a ready forum for discussions, comments, queries, criticisms and possible generalisations of mathematical problem solving.

It is possible to criticise Olympiads in mathematics: concentrating problem-solving in mathematics into the limited time-span of an examination detracts from the beauty and dignity of the subject. This criticism is not without foundation yet anyone familiar with the problem sections of the American Mathematical Monthly and Mathematics Magazine will have seen at first hand how a problem section imparts tremendous life to a mathematics journal. So the editors have high hopes that something similar will happen in the pages of Samasyâ.

The last of our trio of publications is glossy and demands attention: Welcome to Quantum! This journal is based on the famous Kvant, the Russian-language magazine for secondary school students and is published by Springer- Verlag. A sizeable expert board has been given control over Quantum, which makes strong claims for its pre- eminence in its market niche. The project of publishing Quantum was spearheaded by Bill G. Aldridge, Executive D irector, and Edward D. Lozansky, co-ordinator, of the Mathematics and Science Institutes of the National Science Teachers Association. Three top scholars act as its chief editors: Academician Yuri Ossipyan, a physicist who is vice president of the Academy of Sciences of the USSR, and editor-in-chief of the sister publication Kvant; Dr Sheldon Lee Glashow, a professor of physics at Harvard University who has taught at summer science and mathematics institutes for gifted high school students for many years and who was awarded the Nobel Prize for Physics in 1979 and, finally, Fields Medallist Dr William P. Thurston, a professor of mathematics at Princeton University, who is personally committed to motivating academically gifted students.

Working with the American Association of Physics Teachers and the National Council of Teachers of Mathematics, and in co-operation with the Russian Academy of Sciences, the editors intend to produce a magazine of the highest quality. 'They expect Quantum to provide interesting and stimulating material for inquisitive, bright young people of all countries. The staff of the American counterpart of Kvant enjoy working closely with the members of the advisory boards, who are scientists, mathematicians, and teachers of the highest calibre. They will provide support in selecting translations from Kvant, soliciting original material and reviewing it for technical accuracy. They hope that the magazine will inspire in the reader the sense that the pursuit of scientific truth is a grand and never-ending adventure. Both the American and Russian editorial staff hope that co-operation between Ouantum and Kvant will result in the simultaneous publication in English and Russian of issues with almost the same content so that Russian and American high school students will be working on the same subjects at the same time, competing peacefully and co-operating in the spirit of the present rapprochement between these two great countries. Quantum is just the first of a number of co-operative projects undertaken by US and Russian science and education organisations. Young readers are invited to take part in some of the student exchanges planned, and it is hoped their teachers will participate in teacher-interchanges.

Reading Kvant or Quantum isn't always easy, but a reader who really likes science will surely find it exciting. The magazine contains recreational material, lively illustrations, humour and amusing anecdotes from the history of science. But its core, and main source of interest, consists of articles in physics and mathematics that require no little thought to be understood. Certainly a lot of brainwork and some paperwork are required to solve the problems in the Problem Corner, intended for those who like Olympiads and other problem-solving competitions. But few experiences can match the intense 'I've got it!' feeling that comes when one has solved an intricate problem or grasped a profound idea!

These new journals are not particularly novel, only the packaging has changed. The progenitor of all present- time popular mathematical magazines is undoubtedly the Hungarian Matematikat és Fizikai Lapok, the journal of the Mathematical and Physical Society (of Hungary), which was first published in 1894. In an eulogy to that grand old periodical, no less a person than Gabor Szegö used these, rather progressive, words: The intensive preoccupation with interesting problems of simple and elementary character and the effort of finding clear and complete answers gave ... a new experience, the taste of creative intellectual adventure. Thus the young readers were bound finally and unalterably to the jealous mistress that mathematics is. The main road was charted for life". Perhaps we could also recall the adage of the great German mathematician Leopold Kronecker who compared his profession with lotus eaters: „Wer einmal von dieser Kost etwas zu sich genommen hat, kann nie mehr davon lassen". (He who has once tasted of this fruit can never more forswear it.)

It is a matter of great pleasure to pick out two questions from each of the publications described above as the problems set for this issue.

Q.63 Someone has a rectangular block of wood of size $a \times b \times c$, where a, b and c are integers, and $a < b < c$. He paints the surface of the block, cuts it into unit cubes, and notices that exactly half the cubes are completely unpainted.
Find the number of different blocks with this property. (*M&IQ*)

Q.64 The Quality Food Supermarket sells its own brand of frozen pizza. It has been discovered that when it places special advertising in the local newspaper, pizza profits rise to \$ 300 on the following day, declining \$ 5 per day thereafter, until profits become \$ 200 per day.
How often should newspaper advertising be done to maximise profit if the cost of advertising is \$ 40 each time it is done? Assume that initially the store realises \$ 300 profit. (*M&IQ*)

Q.65 Determine all integers x such that $x^2 + 19x + 97 = 0$ is a square number. (*Samasyâ*, updated)

Q.66 In a regular n-sided polygon $A_1A_2...A_n$, the side lengths are related as follows:

$$\frac{1}{A_1A_2} = \frac{1}{A_1A_3} = \frac{1}{A_1A_4}.$$

Determine the value of n. (*Samasyâ*)

Q.67 The side lengths x, y, z of a triangle are integers, and one of its altitudes is equal to the sum of the other two. Prove that $x^2 + y^2 + z^2$ is the square of an integer. (*Quantum*)

Q.68 A function f satisfies the equation $f(x+1) + f(x-1) = \sqrt{2}f(x)$ for all real x. Prove that this function is periodic. (*Quantum*)

We now turn to readers' solutions to problems given in the Corner of Newsletter No.21. **Dr J.N. Lillington**, *Winfrith Technology Centre, Dorchester*, is first under starters orders. By the way, you are reminded that no question is ever permanently closed. The editor is always pleased to consider for publication new solutions or new insights on past problems.

Q.54 A positive integer is called *nice* if the equation $x^2 + 11y^2 = n$ has a solution in integers x and y.

(i) Prove that if n is nice, then so is $15n$.
(ii) Prove that if $3m$ is nice (where m is a positive integer), then so is $5m$.

Solution (i) if n is nice then a solution in integers exists to

$$x^2 + 11y^2 = n. \tag{1}$$

Also we have

$$2^2 + 11.1^2 = 15. \tag{2}$$

This together yields $15n = (2^2 + 11.1^2)(x^2 + 11y^2) = (2x + 11y)^2 + 11(x - 2y)^2 \Rightarrow 15n$ is nice, too.

(ii) We note also $15n = (2x - 11y)^2 + 11(x + 2y)^2$.
If $3m$ is nice, then by (1) there exists a solution to

$$45m = (2x + 11y)^2 + 11(x - 2y)^2 \tag{3}$$

$$\text{and} \quad 45m = (2x - 11y)^2 + 11(x + 2y)^2. \tag{4}$$

If $x \equiv 0 \bmod 3$, then $y \equiv 0 \bmod 3$ since $3m$ is nice and

$$5m = \frac{2x \pm 11y}{3}^2 + 11\frac{x \pm 2y}{3}^2 \quad \text{q.e.d.}$$

If $x \equiv 1 \bmod 3$ and $y \equiv 1 \bmod 3$ or $x \equiv 2 \bmod 3$ and $y \equiv 2 \bmod 3$ then

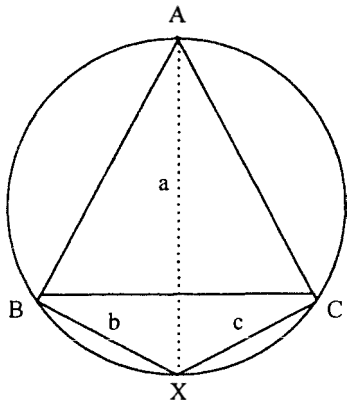
$$5m = \frac{2x - 11y}{3}^2 + 11\frac{x + 2y}{3}^2 \quad \text{q.e.d.}$$

If $x \equiv 1 \bmod 3$ and $y \equiv 2 \bmod 3$ or $x \equiv 2 \bmod 3$ and $y \equiv 1 \bmod 3$ then we finally have

$$5m = \frac{2x + 11y}{3}^2 + 11\frac{x - 2y}{3}^2 \quad \text{q.e.d.}$$

Thus in all cases $5m$ is nice, proving the result.
Also solved by Nico Lorentz, Howald/Luxembourg.

Q.54 ABC is an equilateral triangle inscribed in a circle. The distances from a point X on the circle to A, B and C respectively are a, b and c where $a \geq b$ and $a \geq c$. Prove that $a = b + c$.



First Solution (Maurice Brémond, Avignon)

On a: $a \geq b$ et $a \geq c \Rightarrow X \in$ petit arc BC, d'où $\angle AXB = \angle AXC = \frac{\pi}{3}$.

Ensuite:

a) $b = c \iff X = \frac{2B+2C-A}{3} \equiv$ milieu, du petit arc BC, alors

$$\cos\tfrac{\pi}{3} = \tfrac{1}{2} = \tfrac{b}{a} = \tfrac{c}{a} \Rightarrow \tfrac{b}{a} + \tfrac{c}{a} = \tfrac{b+c}{a} = 1 = \tfrac{a}{a} \Rightarrow a = b + c.$$

b) $b \neq c \iff X \neq \frac{2B+2C-A}{3}$ (notation de GRASSMANN); alors, d'après le théorème *d'Al Kaschi* („cosine rule" en Anglais) on obtient:

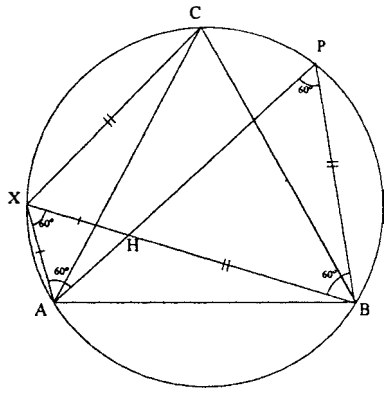
$$AB^2 = a^2 + b^2 - 2ab\cos\tfrac{\pi}{3} = a^2 + b^2 - ab \text{ et } AC^2 = a^2 + c^2 - ac.$$

Avec $AB^2 = AC^2$ on a $a^2 + b^2 - ab = a^2 + c^2 - ac \iff ab - ac = b^2 - c^2$
$\iff ab - ac = b^2 - c^2 \iff a(b-c) = (b+c)(b-c) \iff a = b + c$

Second solution (Claudio Bernardi, Dipartimento di Matematica, Univaersità La Sapienza, Roma)

He gives a „proof without words" and provides evidence of the statement through a diagram that helps the observer see why it may be true. Of course, proofs without words are not really proofs; some consider such visual arguments to be of little value. But to counter this viewpoint I want to quote Paul Halmos, who stated, speaking of Solomon Lefschetz (editor of the Annals): „He saw mathematics not as logic but as pictures". And we are in good company. Proofs without words have become regular features in the journals published by the Mathematical Association of America – notably Mathematics Magazine and the College Mathematics Journal.

Note that the illustrated proof refers to the non-trivial case (i.e. point X isn't coincident with a vertex).
In accordance with the accompanying figure we have:
arc $AX =$ arc CP and
$XA + XC = XH + PB = XH + HB = XB.$



Also solved by **Nico Lorentz** *and* **Dr J.N. Lillington.**

Q 55. Suppose that a, b, c, d, e and f are six different integers. Find the least possible value of
$(a-b)^2 + (b-c)^2 + (c-d)^2 + (d-e)^2 + (e-f)^2 + (f-a)^2$.

First Solution

This is the first time students are involved in the Corner. The following solution was provided by **Alessandro Guiliani** *and* **Francesco Salvadore**, *both attending a high school at Rome. My thanks go to* **Marco Isopi** *and* **Stefano Marchiafava** *(Dipartimento di Matematica Istituto 'Guido Castelnuovo', Università degli Studi di Roma 'La Sapienza') for forwarding it to me. The latter are conducting an ongoing problem seminar open to all mathematically gifted students from Rome or its vicinity. One problem each month is sent to interested young problemists and they're solicited to submit nice solutions. Out of 22 students 15 have taken advantage of this opportunity. An enterprise worthy of imitation, isn't it? If there is any other endeavour of that kind, please let me know!*

Let $S = (a-b)^2 + (b-c)^2 + (c-d)^2 + (d-e)^2 + (e-f)^2 + (f-a)^2$
and $S_1 = |a-b| + |b-c| + |c-d| + |d-e| + |e-f| + |f-a|$.

We make use of the arithmetic-mean-geometric-mean inequality and get

$$\sqrt{\frac{S}{6}} \geq \frac{S_1}{6} \text{ or } S \geq \frac{S_1^2}{6}.$$

Now we arrange the integers in a line, and if we imagine to travel from the smallest integer to every other including the largest and then return to the first, we see that S_1 must be at least 10. This gives $S \geq 16.666...$

Since S must be an even integer, its value is at least 18.

In fact, for $a = 0$, $b = 2$, $c = 4$, $d = 5$, $e = 3$, $f = 1$, one gets $S = 18$.

We remark that all other solutions are obtained from the given one by adding the same integer to a, b, c, d, e and f respectively or by circular permutation and reflection (i.e. consideration of the same integers in reverse order).

Second Solution (Nico Lorentz)

Notons S (*as above*). A l'aide de l'identité

$$\sum_{i=1}^{6} x_i^2 = \left(\sum_{i=1}^{6} x_i\right)^2 - 2.\left(\sum_{i=1}^{5}\sum_{\substack{j=2 \\ j>1}}^{6} x_i x_j\right) \text{ on obtient:}$$

$$S = -2 - [(a-b)(b-a) + (b-c)(c-a) + (c-d)(d-a) + (d-e)(e-a) + (e-f)(f-a)]$$

$$\geq 2 - [|a-b|.|b-a| + |b-c|.|c-a| + |c-d|.|d-a| + |d-e|.|e-a| + |e-f|.|f-a|]$$

Comme a, b, c, d, e, f sont six entiers distincts, chacune des valeurs absolues intervenant ci-dessus est supérieure ou égale à 1. D'où en particular $S \geq 2 - [|b-a| + |c-a| + |d-a| + |e-a| + |f-a|]$.

La somme figurant dans les crochets est égale à la somme des distances des entiers b, c, d, e, f à l'entier a. Elle est supérieure ou égale à $1 + 1 + 2 + 2 + 3 = 9$ vu que les six entiers a, b, c, d, e, f sont distincts. D'où $S \geq 18$.

Mais $S = 18$ est obtenu par example pour $a = 3$, $b = 1$, $c = 2$, $d = 4$, $e = 6$, $f = 5$. Ainsi 18 est la valeur minimale pour S.

Also solved by **Maurice Brémond** *and* **Dr J.N. Lillington**.

Q.56 Three schools, Auchterturra Academy, Bridge of Greetin Grammar School and Craskie Castle High School had a recent athletics meeting, at which each school had just one competitor in each event. The competitors scored points depending on their places, with first > second > third > 0.

At the end of the meeting Craskie won with 22 pts, whilst Auchterturra and Bridge of Greetin each scored 9 pts.

If Auchterturra won the high jump, who won the 1500 metres?

Solution (Nico Lorentz)

Notons a, b, c les points distribués à chaque épreuve, $(a, b, c) \in N^3, t = a + b + c, n$le nombre d'épreuves.

Des données il découle que

(1) $1 \leq c \leq b - 1 \leq a - 2$

(2) $n \geq 2$

(3) $n.t = 9 + 9 + 22 = 40$

(4) $9 \geq a + (n-1)c$

(5) $22 \leq (n-1)a + b$

Vu (1) on a $t \leq 1 + 2 + 3 = 6$, et avec (2) et (3) on obtient alors $(n, t) \in \{(2, 20), (4, 10), (5, 8)\}$.

Comme $c \geq 1$, on a $t - 1 \geq a + b$ et d'àpres (4) on a $10 - n \geq a$.

Ainsi (5) fourmit $22 \leq (n-2)a + a + b \leq (n-2)(10-n) + t - 1$, soit en particulier $43 + n^2 - 12n \leq t$. Mais cette inégalité est seulement vérifiée par le couple $(n, t) = (5, 8)$.

Pour $n = 5$, (4) donne $a \leq 9 - 4c \leq 5$ et donne $22 \leq 4a + b \leq 5a$. D'où $n = 5$ et $b + c = t - a = 8 - 5 = 3$, soit par (1), $b = 2$ et $c = 1$.

Le détail des scores réalisés (sans tenir compte de l'ordre de déroulement des épreuves!) est ainsi donné par:

$9 = 1 + 1 + 1 + 1 + 5$ (*Auchterturra took third place in all events except the high jump*),

$9 = 2 + 2 + 2 + 2 + 1$ (*Bridge of Greetin came second in every event except the high jump, where they were third*),

$22 = 5 + 5 + 5 + 5 + 2$ (*Craskie won every event except the high jump, and in particular won the 1500 metres*).

That completes the Corner for this issue. The Olympiad Season is fast approaching. Please collect your contests and send them to me. Also spend some time solving problems and send me your nice solutions as well as Olympiad Contest material.

Finally, propose problems for which readers will send in solutions. Proposals should, whenever possible, be accompanied by a solution, references, and other insights which are likely to be of help for the editor. They can be anything from elementary to advanced, from easy to difficult. Original problems are particularly sought. So, please submit any interesting problems you came across, especially those from (problem) books and contests that are not easily accessible. But other interesting problems may also be acceptable provided they are not too well known and references are given as to the provenance. I hereby invite my readers to share them with their colleagues and students.

I welcome your input!

BRIEF REVIEWS

Edited by Ivan Netuka and Vladimír Souček. Books submitted for review should be sent to the following address: Ivan Netuka, MÚUK, Sokolovská 83, 186 00 Praha 8, Czech Republic.

J.Bertoin: Lévy Processes, Cambridge Tracts in Mathematics, vol.121, Cambridge University Press, Cambridge, 1996, x+265 pp., GBP 35.00, ISBN 0-521-56243-0

Lévy processes are stochastic processes with independent and stationary increments; that is, roughly speaking, with random walks in continuous time, and, in this book, in Euclidean spaces. Thus Lévy processes are an adequate model for numerous processes in the real world and are applied in queues, insurance, dams and finance. Their interest for mathematicians lies also in their elegant mathematical theory, utilising methods of both probability theory and analysis (e.g. potential theory and regular variation). The elegance of the theory is convincingly documented by the present book. The exposition starts with a short review of material needed in the sequel on infinitely divisible laws, Poisson processes, martingales, Brownian motion and regular variation. Chapter I studies Lévy processes in the framework of Markov processes, Chapter II in relation to potential theory. Chapter III is devoted to subordinators, i.e. to increasing Lévy processes, especially to properties of their sample paths. Local time and excursions of Markov processes are the contents of Chapter IV; Chapter V specialises this topic to Lévy processes. Fluctuation theory is treated in Chapter VI, with special emphasis on arcsin laws for Lévy processes. Chapter VII is devoted to Lévy processes with no positive jumps, Chapter VIII to stable processes. At the end of each chapter there are (theoretical) exercises and a section called Comments, that gives a brief account of the history of the respective material and references to related results. The list of references comprises more than 300 items. This nice book will be appreciated by both probabilists and analysts. (vd)

W.Rudin: The Way I Remember It, History of Mathematics, vol.12, American Mathematical Society, Providence, 1997, ix+191 pp., GBP 22.00, ISBN 0-821-80633-5

This book consists of two parts. The first one, accessible to a non-mathematician, presents W. Rudin's memories about family history, his boyhood in Vienna in the twenties and thirties and life for his family during World War II. In almost 100 pages, W. Rudin records personal recollections and describes what the world was like during his ancestors' time and his own life. The post-war period (Duke University, positions at M.I.T., in Rochester and in Madison) is described rather briefly (in about 20 pages). (The author says that "there is no point in describing in detail what we did for the next 33 years" (University of Wisconsin), so that the fruitful and surely interesting part of Rudin's life is recorded on a few lines only. I personally would like to read much more about that period.) The second part of the book is devoted to mathematics: samples of Rudin's work on power series, trigonometric series, harmonic analysis, topology, function algebras and functions of several complex variables. The description is in the Rudin style: clear, elegant, brief and attractive - understandable also to non-analysts. There is a nice chapter called "Misteaks" (on mistakes in mathematics) and I found particularly interesting (among other things) his personal comments on the continuum hypothesis (p.159). I regret that a list of Rudin's papers and books and a name index were not included. It is a real pleasure to read this book and to admire the charming personal style we have come to know from Rudin's textbooks, monographs and articles. The book is strongly recommended not only to analysts, but also to all mathematicians as well as historians. (in)

J.-E.Björk: Analytic $\mathcal{D}$-Modules and Applications, Mathematics and Its Applications, vol.247, Kluwer Academic Publishers, Dordrecht, 1993, xiii+581 pp., GBP 162.00, ISBN 0-792-32114-6

Analytic $\mathcal{D}$-module theory treats holomorphic differential systems on complex manifolds, presented by bounded complexes of sheaves of modules over the sheaf of rings $\mathcal{D}_X$ of holomorphic differential operators on a given complex manifold X. The first chapter "The sheaf $\mathcal{D}_X$ and its modules" is devoted to the construction and basic properties of differential operators. The next one "Operations on $\mathcal{D}$-modules" studies bounded complexes of $\mathcal{D}_X$-modules and how to perform various operations. The properties of holonomic $\mathcal{D}$-modules are investigated in chapters "Holonomic $\mathcal{D}$-modules", "Deligne modules" and "Regular holonomic $\mathcal{D}$-modules". Chapter 6 deals with b-functions and the last two work with distributions and regular holonomic systems and microdifferential operators. One third of the book is devoted to the applications to several branches of mathematics like derived categories, sheaf theory, filtered rings, homological algebra, complex analysis, analytic geometry and symplectic analysis. (lb)

M.Adams, V.Gullemin: Measure Theory and Probability, Birkhäuser, Boston, 1996, xiv+205 pp., DM 48.00, ISBN 0-817-63884-9, ISBN 3-764-33884-9

The authors claim (in the preface to the first edition) that the only way to teach measure theory to undergraduates is from the perspective of probability theory even though these two theories historically met each other only in the early 1930s thanks to the efforts of A.N. Kolmogorov to find a good axiomatic foundation for the classical calculus of probability.

Though hesitating a little about probability theory being "the only way" to provide a measure theory course with applications, we welcome the authors' idea and the book itself as a neatly written standard undergraduate textbook on measure and integration with some excursions made to the mathematics of probability theory. It would be incorrect to assume that the book provides a good comprehensive introduction to probability theory; it provides "only" correct proofs to some of its cornerstone theorems. The reader is therefore warned that the second part of the title of the book may be somewhat misleading. Probability theory is a colourful and complex mathematical science that cannot be introduced simply as a motivation, or even as an example, within some other mathematical discipline. To do so would deny the subject its own sources of motivation and its wealth of applications. The main subjects treated in the book are measure theory (randomness, measure); integration (measurable functions, Lebesgue and Riemann integration, Fubini theorem, random variables and their expectations, independence, the law of large numbers); Fourier analysis ($\mathcal{L}^1, \mathcal{L}^2$-spaces, Hilbert space, Fourier integral, the central limit theorem). The Appendices treat metric spaces, $\mathcal{L}^p$-spaces and non-measurable sets. (jste)

R.Carter, G.Segal, I.Macdonald: Lectures on Lie Groups and Lie Algebras, London Mathematical Society Student Texts 32, Cambridge University Press, Cambridge, 1995, viii+190 pp., GBP 13.95, ISBN 0-521-49579-2, ISBN 0-521-49922-4

Symmetries play a key role in many parts of mathematics. Lie groups and algebraic groups form a cross-road of group theory, algebraic and differential geometry, number theory, global analysis and theoretical physics. A written version of lectures given by R.Carter, G.Segal and I.Macdonald at an LMS-SERC Instructional Conference on this topic (Lancaster, 1993) is hence a welcome addition to the literature. The book retains the flavour of oral lectures and leads readers through main highlights in a quick and understandable way. The first part (by R.W.Carter) describes the Killing-Cartan classification of simple Lie algebras, uses Verma modules for a construction of their finite dimensional representations and ends with a description of the classification of finite simple Lie groups. The part written by G. Segal concentrates mainly on representation theory. You can find here key results illustrated by most important examples - representations of compact groups for the unitary case (including the Weyl correspondence with representations of permutation groups and Borel-Weil theorem), different series of infinite dimensional representations of $SL(2, R)$ and representations of the Heisenberg group. The last part (by I.Macdonald) contains an introduction to linear algebraic groups (here the highlight is the classification theorem for connected reductive groups over an algebraically closed field). It is a charming small booklet useful for anybody wanting to pick up quickly well chosen essential points in the field. (vs)

H.Upmeier: Toeplitz Operators and Index Theory in Several Complex Variables, Operator Theory. Advances and Applications, vol.81, Birkhäuser, Basel, 1996, 490 pp., DM 198.00, ISBN 3-764-35282-5, ISBN 0-817-65282-5

This is probably the first book to give a systematic treatment of Toeplitz operators on domains in several complex variables, the C^*-algebras they generate, and their index theory. The first chapter recalls the necessary background material from several complex variables, PDEs, and algebra (pseudoconvexity, holomorphic faces and the Shilov boundary, $\overline{\partial}$-Neumann problem, Jordan triple systems). In the second chapter the author introduces the Hardy and the (weighted) Bergman spaces over domains in C^n and establishes their basic properties. Chapter 3 studies the multiplier C^*-algebras and their representations. Chapter 4 constitutes the core of the book and is devoted to a systematic study of the C^*-algebras generated by Toeplitz operators; a discussion of the necessary material on Hopf and groupoid C^*-algebras is also included. Using these results, the final Chapter 5 treats the index theory of multivariable Toeplitz operators: after reviewing the basics of K-theory, the author introduces a refined generalisation of the usual Fredholm index (taking values in vector bundles) and the exposition culminates by deriving index formulas for these Fredholm indices. In each chapter, the discussion is carried out separately for the Hardy and the Bergman cases, and special attention is paid to domains with smooth boundary or with a sufficiently rich automorphism group, for which our understanding is at present most complete (e.g. the strictly pseudoconvex, symmetric, Reinhardt, and tubular domains). The exposition is very lucid and well written. The prerequisites for studying the book are a basic knowledge of Hilbert space operator theory and elementary theory of C^*-algebras; all necessary additional material is carefully reviewed prior to its usage in order to make the book self-contained. The book can be well recommended to any analyst interested in this field. (me)

C.B.Thomas (Ed.): Contact and Sympletic Geometry, Publications of the Newton Institute, Cambridge University Press, Cambridge, 1996, xviii+310 pp., GBP 37.50, ISBN 0-521-57086-7

This is a collection of 13 expository articles on 3-dimensional contact and 4-dimensional symplectic geometry. They originated from the activities of the Isaac Newton Institute in Cambridge in the second half of 1994 and their aim is to make the reader familiar with recent advances in the field. The whole collection seems to be extraordinarily successful in accomplishing this aim! The papers are very clearly written: one can see their motivation and relations

with other branches of geometry and topology, and the papers often contain results that have not been published before. It can be expected that this collection will arouse a lot of interest, even among specialists in other fields of mathematics. The book begins with an introduction written by C. B. Thomas, and is then divided into two parts: Part A. Geometric Methods and Part B. Symplectic Invariants. (Part B is concerned primarily with Floer (co)homology.) The contents are as follows. Part A.: F. Lalonde, D. McDuff: J-curves and the classification of rational and ruled symplectic 4-manifolds; Y. Karshon: Periodic Hamiltonian flows on four dimensional manifolds; C. B. Thomas (based on lectures of Y. Eliashberg and E. Giroux): 3-dimensional contact geometry; H. Geiges, J. Gonzalo: Topology and analysis of contact circles; H. Hofer, K. Wysocki, E. Zehnder: Properties of pseudoholomorphic curves in symplectisation IV: Asymptotics with degeneracies; K. Cieliebak: Pseudoholomorphic curves and Bernoulli shifts; V. L. Ginzburg: On closed trajectories of a charge in a magnetic field. An application of symplectic geometry. Part B.: M. Schwarz: Introduction to symplectic Floer homology; S. Piunikhin, D. Salamon, M. Schwarz: Symplectic Floer-Donaldson theory and quantum cohomology; Y. G. Oh: Relative Floer and quantum cohomology and the symplectic topology of Lagrangian submanifolds; L. H. Vân, K. Ono: Cup-length estimate for symplectic fixed points; Yu. V. Chekanov: Hofer's symplectic energy and Lagrangian intersections; C. B. Thomas (from lectures of S. Donaldson): On the existence of symplectic submanifolds. (jiva)

R.Meester, R.Roy: Continuum Percolation, Cambridge Tracts in Mathematics, vol.119, Cambridge University Press, Cambridge, 1996, x+238 pp., GBP 35.00, ISBN 0-521-47504-X

The book presents the first systematic account of continuum percolation. It contains stochastic models of the phase description in space, especially the Boolean and related models. For some results there exist counterparts in discrete percolation theory, for others such analogues do not exist or are false. Other random-connection models are also included, as is fractal percolation in continua. In applications, unbounded components, holes, volume fraction etc. are all studied. The explanation is reasonably self-contained, although some knowledge of probability and measure theory is desirable. Simple ergodic theory is used and geometrical ideas are especially well explained. The book is recommended to students and scientists in probability and stochastic geometry. (vb)

A.Böttcher, I.Gohberg (Eds.): Singular Integral Operators and Related Topics. Joint German-Israeli Workshop, Tel Aviv, March 1-10, 1995, Operator Theory: Advances and Applications, vol.90, Birkhäuser, Basel, 1996, viii+315 pp., DM 148.00, ISBN 3-764-35466-6, ISBN 0-817-65466-6

This book presents the proceedings of the Joint German-Israeli Workshop in Tel Aviv (March 1995). It consists of twelve papers which concentrate on the following topics: Toeplitz operators with discontinuous symbols (A.Böttcher, S.M.Grudsky), singular integrals with operator-valued piecewise quasicontinuous coefficients (T.Ehrhardt, S.Roch, B.Silbermann), Banach algebras generated by N idempotents (A. Böttcher, I. Gohberg, Yu.I. Karlovich, N.Krupnik, S.Roch, B.Silbermann, I.Spitkovsky), singular integral and Toeplitz operators on general Carleson-Jordan curves (A.Böttcher, Yu.I.Karlovich), quadrature method for SI equations (M.Capobianco, P.Junghanns, U.Luther, G.Mastroianni), semi-Fredholm properties of SIO (Yu.I.Karlovich, I.Spitkovsky), the inverse scattering problem (D.Alpay, I.Gohberg), and zeroes of orthogonal functions related to the Nehari problem (R.L.Ellis, I.Gohberg). There are also three shorter papers on asymptotic invertibility of Toeplitz operators (B.Silbermann), canonical factorisation of matrix functions (I.Krupnik, N.Krupnik, V.Matsaev), and calculation of norms of polynomials of two projections (Y.Spigel). The papers are well written and of good quality. The book will be appreciated by mathematicians working in operator theory, function theory and control theory, and will possibly also appeal to an audience in the engineering sciences. (me)

M.Biroli (Ed.): Potential Theory and Degenerate Partial Differential Operators, Kluwer Academic Publishers, Dordrecht, 1995, 184 pp., GBP 59.99, ISBN 0-792-33596-1

The volume contains proceedings of the conference "Potential Theory and Degenerate Partial Differential Equations" held in Parma, Italy, February 1994. It consist of 11 lectures by [1] M. Biroli and U. Mosco, [2] F. Chiarenza, [3] T. Coulhon, [4] D. Feyel and A. de La Pradelle, [5] B. Franchi, G. Lu and R.L. Wheeden, [6] M. Fukushima and M. Tomisaki, [7] G. Mokobodzki, [8] S. Mustapha and N. Varoupoulos, [9] L. Salloff-Coste, [10] S. Campanato and [11] P. Drábek and F. Nicolosi. The contributions are concerned with the following topics: (a) Poincaré and Sobolev inequalities with weights and generalisation to Hörmander vector fields [5], manifolds [3],[9] and abstract spaces (homogenous, Dirichlet) [1], [7]; (b) Hörmander fields, geometry and differential operators, [5], [8], [9]. (c) Generalisations of Moser's method and Harnack inequalities for elliptic and parabolic equations [5], [9]; discussion of function spaces for coefficients [2]; (d) Probabilistic methods: Ornstein-Uhlenbeck sheet as solution of a linear stochastic PDE system of Langevin type and the Cameron Martin space associated with the generalised Wiener measure on a locally convex Lusin space [4], construction of a strong Feller diffusion process on irregular domains associated with a scalar product on H^1 with bounded measurable coefficients [6]; (e) Existence methods: abstract setting [10] and concrete problems with p-Laplace growth whose

further degeneracy depends on x and u [11]. The contributions are written mostly as articles, including proofs and other details. Some papers present a survey of the field. The book gives a representative view on recent trends in the theory of degenerate PDEs. Thus, it is recommended to specialists and postgraduate students interested in the subject. (jama)

D.Lee, M.H.Schultz: Numerical Ocean Acoustic Propagation in Three Dimensions, World Scientific, Singapore, 1996, xi+207 pp., GBP 39.00, ISBN 9-810-22303-X

The book provides some steps toward the solution of the complete ocean acoustic propagation problem. The purpose of the book is to introduce a basic, three-dimensional ocean acoustic propagation model that will satisfy most fundamental environmental requirements and that will be practical for realistic applications. Numerical solution is carried out by the finite difference method via functional and operator splitting techniques with rational function approximations. Complete detailed listing of proven computer codes used by a number of universities and research organisations are included. Advanced knowledge of numerical methods and ocean acoustics is not required. The book is oriented toward graduate students and research scientists. (mf)

A.I.Kostrikin, I.R.Shafarevich (Eds.): Algebra VI. Combinatorial and Asymptotic Methods of Algebra. Non-Associative Structures, Encyclopaedia of Mathematical Sciences, vol.57, Springer-Verlag, Berlin, 1995, 287 pp., 5 fig., DM 148.00, ISBN 3-540-54699-5, ISBN 0-387-54699-5

The 57-th volume of the Encyclopaedia consists of two disjoint parts. The first one ("Combinatorial and asymptotic methods in algebra") covers some topics from combinatorial algebra - mainly various classes of linear algebras given by generators and relations and their asymptotic behaviour. The technique in the exposition is based on Gröbner bases and the generating functions method. A good and extensive list of references is added. The second part ("Non-associative structures") presents a well written survey on basic classes of non-associative linear algebras close to the associative ones, mainly alternative, Jordan and Malcev algebras. A few fragments of other non-associative structures are also included. (tk)

F.A.Sherk, P.McMullen, A.C.Thompson, A.I. Weiss: Kaleidoscopes. Selected Writings of H.S.M. Coxeter, Canadian Mathematical Society Series of Monographs and Advanced Texts, J.Wiley & Sons, Inc., New York, 1995, xxx+439 pp., GBP 67.00, ISBN 0-471-01003-0

The book contains 26 selected papers by H.S.M.Coxeter, the distinguished 20th century geometer and algebraist. The papers selected for the book are centred around so called Coxeter-Dynkin diagrams, which are graphical representations of groups generated by reflections. A typical feature of Coxeter's papers is the inspired application of geometrical ideas and concepts to problems in group theory. Besides papers discussing various questions of discrete groups, many papers are devoted to a study of regular and semiregular polytopes. The book also contains an interesting biography of H.S.M.Coxeter, a complete list of his publications as well as a tune composed by him at the age of 16. Papers reprinted in the book cover a period of sixty years but the deep geometrical insight behind make them eternally interesting and fresh. A remarkable collection indeed. (vs)

A.I.Kostrikin, I.R.Shafarevich (Eds.): Algebra IX. Finite Groups of Lie Type. Finite-Dimensional Division Algebras, Encyclopaedia of Mathematical Sciences vol.77, Springer-Verlag, Berlin, 1996, vii+239 pp., DM 148.00, ISBN 3-540-57038-1

In this book important results of recent research in two areas within algebra are presented to a wide circle of mathematicians. Recall from the classification of finite simple groups that each such group is one of the following: (1) a cyclic group of prime order, (2) an alternating group of order $1/2n!$ for $n \geq 5$, (3) a group of Lie type over a finite field or (4) one of 26 sporadic simple groups. In part I, "On the Representation Theory of Finite Groups of Lie Type over an Algebraically Closed Field of Characteristic 0" the author, R.W.Carter, focuses on the groups in (3), which occur as fixed point sets of some Frobenius map on a connected reductive algebraic group over an algebraically closed field of prime characteristic. After recalling their main properties the author explains the character theory developed by Deligne and Lustig. In an appendix (6 pp.) similarities between this theory and other branches of representation theory are pointed out. The authors V.P.Platonov and V.I.Yanchievskii of the second part on finite dimensional division algebras (translated from the Russian by P.M.Cohn) provide an introduction to simple algebras inChapter 1 and present construction methods for, and basic structure theory of, division algebras over arbitrary fields in Chapter 2. Moreover, a deeper analysis in Ch.3 of division rings over certain classes of fields (e.g. valuated fields, algebraic number fields, rational function fields) leads to investigations of the multiplicative structure of division algebras and to reduced K-theory (Ch.4, where recent results also from the authors are included). Each chapter has a comment section containing historical notes. (ms)

Yu.L.Ershov, E.I.Khukro, V.M.Levchuk, N.D. Podufalov (Eds.): Algebra. Proceedings of the IIIrd International Conference on Algebra held in Krasnoyarsk, August 23-28, 1993, Walter de Gruyter, Berlin, 1996, xiii+306 pp., DM 268.00, ISBN 3-110-14413-1

A collection of 30 selected talks delivered at the IIIrd International Conference on Algebra (Krasnoyarsk, Russia, August 23-28, 1993). The topics covered are finite groups, infinite groups, rings, linear algebras,

algebraic systems and model theory. Altogether, the collected papers represent important research streams in their fields of interest but the main emphasis is laid on groups and their applications and some of the published papers are well written expository articles. (tk)

A.Bellaïche, J.-J.Risler (Eds.): Sub-Riemannian Geometry, Progress in Mathematics, vol.144, Birkhäuser, Basel, 1996, viii+393 pp., DM 108.00, ISBN 3-764-35476-3, ISBN 0-817-65476-3

This volume is devoted to Nonholonomic Riemannian Geometry in which a Riemannian metric is given only on a tangent distribution (possibly of nonconstant rank) of a manifold. There are important applications of this theory to Control Theory, Classical Mechanics, Gauge Theories, Diffusions on manifolds, analysis of hypoelliptic operators and Cauchy-Riemann Geometry. The main chapter of the book (234 pages) is written by M.Gromov under the title "Cauchy-Carathéodory space seen from within". The other contributions are by A.Bellaïche, R.Montgomery, H.J.Sussmann and J.M.Coron. The idea to publish this volume came from a satellite conference of ECM 1992 held in Paris under the name "Journées Nonholonomes - Géométrie sous-riemannienne, théorie du contrôle, robotique". (ok)

J.Madore: An Introduction to Noncommutative Differential Geometry and its Physical Applications, London Mathematical Society Lecture Note Series 206, Cambridge University Press, Cambridge, 1995, 200 pp., GBP 22.95, ISBN 0-521-46791-8

A broad and deeply-rooted generalisation of the algebraic formulation of standard differential geometry has been recently and intensively investigated within the framework of A.Connes' noncommutative geometry. In recent years, its impact on particle physics has grown rapidly. This survey, based on a 1994 LMS lecture series by J.Madore, contains an introduction to this topic. The reader will find a lot of preparatory material (a short review of basic facts from differential geometry, K-theory of vector bundles, cyclic homology). Examples of noncommutative geometries start with a detailed discussion of matrix geometry and includes the Manin plane and a fuzzy sphere. At the end of the book, applications of noncommutative geometry in particle physics are discussed. Notes at the end of each chapter with comments and references are very useful; the style of presentation and notation employed are those used in physics. The number of books devoted to this very active and interesting field is still small. This book is a valuable addition to the literature, and is especially suitable for mathematical and theoretical physicists. (vs)

J.-P.Aubin: Neural Networks and Qualitative Physics, Cambridge University Press, Cambridge, 1996, xvii+283 pp., GBP 29.95, ISBN 0-521-44532-9

Although rapid advances in neural networks and qualitative physics are evident, a lot of mathematical questions raised in these areas in recent years still remain open. This text should encourage a wide range of mathematicians to study these problems. The mathematical techniques presented thoroughly and rigorously in this book use several important results on the control of linear and nonlinear systems and on set-valued analysis. This enables the author to present many types of neural networks in a unified way as well as to devise mathematical metaphors for cognitive processes. Moreover, the qualitative evolution of solutions to the differential equations can be studied by means of so-called qualitative cells, in which the monotonicity behaviour of the solutions does not change. The book consists of three parts. In the first part, various neural network paradigms (e.g. associative memories or multilayer neural networks trained with the back-propagation learning algorithm) are investigated from the point of view of control theory. The next part of the book deals with cognitive systems that go beyond neural networks (as they are usually defined) in the sense that they involve the problem of adaptation to viability constraints. Cognitive systems can recognise the state of the environment and act on the environment to adapt to given viability constraints. Instead of encoding knowledge in synaptic matrices, as neural networks do, the knowledge is stored in the so-called conceptual controls that can evolve to adapt to viability constraints. The concluding part of the book is devoted to qualitative physics (or rather to "qualitative analysis"). The author gives here a general framework for linking quantitative problems with qualitative ones. Further, the text also treats qualitative simulations of differential equations and the QSIM algorithms for tracking the monotonicity properties of solutions to differential equations. As an example, the qualitative behaviour of a class of differential systems, the replicator systems, which play an important role in biology and biochemistry, is studied. An interesting application of the algorithms presented in this book is to the control of autonomous underwater vehicles tracking the trajectory of an exosystem; this is the subject of an Appendix. The text is suitable for postgraduate students and research workers interested in neural networks and cognitive systems, and especially to those involved in viable solutions to control systems and in mathematical questions raised by qualitative physics. (imr)

C.-P.Bruter: Comprendre les mathématiques, Editions Odile Jacob, Paris, 1996, 297 pp., 140.00, ISBN 2-738-10435-5

This book is addressed to three types of readers: to the university public (mainly students), to members of administrations of education and to the cultivated public. The first part (four chapters) is philosophical and discusses the nature and the position of mathematics among other sciences, its origins and future, and the didactics of mathematics in the tradition of H.Poincaré. The second part explains ten fundamental notions of geometry in an intuitive manner: the theorem of Thales, vector spaces, volumes, linear maps, metrics, geometry

of 2-dimensional surfaces, the implicit function theorem, construction of topological surfaces, the Euler-Poincaré characteristic, and an introduction to exterior calculus of differential forms. The objects defined are illustrated by visual examples with an emphasis on geometrical presentation. Each of these ten chapters is accompanied by a selection from the relevant literature with a special attention to the historical development. There is also a collection of solved examples. The book could be used for example as a supplementary reading to classical geometry textbooks. (efa)

R.Kannan, C.K.Krueger: Advanced Analysis on the Real Line, Universitext, Springer-Verlag, New York, 1996, ix+259 pp., DM 68.00, ISBN 0-387-94642-X

The main topics treated in the book are monotone functions, density and approximate continuity, the Dini and approximate derivatives, bounded variation, absolute continuity, Cantor sets and singular functions (with a treatment of the one-dimensional Hausdorff measure), spaces of BV and AC functions and metric separability. Each chapter contains a set of exercises. A brief summary of basic results on Lebesgue measure and integral on the real line $\mathbf{R}$ is given without proofs. Besides classical results, the book contains many special results. The authors, who are not active researchers in the field, present a selection of results contained in a number of research articles. Thus some proofs are given in detail with references and others are presented in sketch only (e.g. the proof of the Denjoy-Young-Saks theorem which contains a small error due to a wrong translation). Some results are almost immediate consequences of other theorems presented (e.g. Theorem 2.7.8 is a corollary of Theorem 2.7.5.). The proofs of some important results are omitted (cf. Lemma 1.2.5., 7.2.9.). All topics are treated on $\mathbf{R}$ only; the generalisations to $\mathbf{R}^n$ will be presented (as the authors announce) in a sequel to this book. This restriction is not natural in all cases; e.g. d-regular sets of Definition 2.7.9 are simply closed intervals in R. The terminology is sometimes archaic (e.g. metrically dense, metric separability); both approximate continuity and asymptotic continuity are defined and used. In any case, the authors have gathered and organised a large volume of material which can be used e.g. for student seminars on the theory of real functions. (lz)

J.James: The Music of the Spheres. Music, Science, and the Natural Order of the Universe, Springer-Verlag, Berlin, 1995, xv+262 pp., DM 19.00, ISBN 0-387-94474-5

This book was originally published in 1993 (Grove Press, New York). It presents *the parallel histories of music and science - from celestial harmony to cosmic dissonance*. The author is New York music critic for the London Times, and a regular contributor to the Sunday New York Times and many magazines on music and science. In this interesting book, the area of overlap between music and science in relations to various views of the universe from the beginning of Western civilisation to modern times are considered. A great deal of attention is devoted to the personalities and the work of Pythagoras, Plato, Kepler and Newton, to the period of Renaissance, to the rise of Romanticism and to the hermetic tradition. The last chapter provides a glimpse into the future. Pythagoreans, the music of the spheres, the divine harmony, the world soul, the key of the universe, the magic flute - these are some topics covered by this wonderful book. *The music of the spheres* is a very nice and attractively written book. The book will have general appeal and can be recommended to mathematicians, physicists, astronomers, philosophers and to musicians interested in science. (jbe)

A.N.Kolgomorov, A.P.Yushkevich (Eds.): Mathematics of the 19th Century. Geometry. Analytic Function Theory, Birkhäuser, Boston, 1996, 302 pp., DM 118.00, ISBN 0-817-65048-2, ISBN 3-764-35048-2

The book under review is the second volume of the extensive work *Mathematics of the 19th Century*, which was edited by A.N.Kolmogorov (1903–1987) and A.P.Yushkevich (1906–1993). The first volume (Nauka, Moscow 1978; Birkhäuser Verlag, 1992, 322 pp., ISBN 3-7643-2552-6) contains four parts on the history of mathematical logic, algebra, number theory, and probability theory. The third volume (Nauka, Moscow 1987) includes discussions on Chebychev's approach to the theory of functions, ordinary differential equations and calculus of variations. This second volume (Nauka, Moscow 1981), translated from the Russian by Roger Cooke, consists of two parts - *Geometry* (B.L.Laptev, B.A.Rozenfel'd) and *Analytic function* (A.I.Markushevich). The first part of the book presents an extensive development in the main geometric branches of 19th century mathematics: analytic and differential geometry, projective geometry, algebraic geometry, non-Euclidean geometry, and multidimensional geometry. Many ideas and concepts of space are discussed, numerous connections with algebra emphasised and the development of basic notions of the subject traced. The second part of the book describes the evolution of analytic functions. The author starts from results achieved in the 18th century, from the development of the concept of a complex number and discusses the main ideas of Cauchy, Gauss, Jacobi, Abel, Riemann, Weierstrass and the others (the Cauchy integral theorem, the Jacobi Theta function, Abel's theorem, Abelian functions, automorphic functions, to cite a few). A list of the most important literature and an index of names are included at the end of the book. The book brings together a considerable amount of information and valuable insights into the mathematics of the 19th century. It can be warmly recommended to everyone interested in the history of mathematics of this period, both to specialists in the history of mathematics, and working mathematicians, as an in-depth look into

mathematical research. (jbe)

P.Habala, P.Hájek, V.Zizler: Introduction to Banach spaces, Matfyzpress, Praha, 1996, 329 pp., ISBN 80-85863-14-6

The first chapters contain an up-to-date elementary and self-contained introduction to basic principles and techniques in Banach and Hilbert spaces, spectral theory of self-adjoint compact operators and fixed points. In addition to the results that are usually presented in this area, the book contains a study on the James boundaries and the results of Asplund, Kadets, Lindenstrauss and Smulyan on the interplay of the differentiability of convex functions and geometry of Banach spaces. In the chapter on locally convex spaces, Banach-Dieudonné, Eberlein-Šmulyan and Choquet representation theorems are included. The second part of the text introduces the reader to several streams of contemporary research in Banach spaces and analysis therein. One chapter is devoted to the use of the Schauder basis in Banach spaces. Nonseparable Banach spaces are studied in the chapter on weak compact generating, where basic results on projectional resolutions of identity, Markuševič bases and various types of compacta are discussed. The chapter on superreflexive spaces contains Enflo's renorming theorem, the local reflexivity principle and the results of Kadets and Gurarii - Gurarii. The book ends with a chapter on nonlinear analysis on Banach spaces. It contains the Aharoni, Heinrich, Kadets, Mankiewicz and Lindenstrauss results on homeomorphisms and Lipschitz homeomorphisms of Banach spaces, together with a brief discussion on the smooth variational principle, smooth approximation in Banach spaces and norm attaining operators. An important part of the book is a large number of exercises. They complement the results in chapters and are all accompanied with detailed hints for their solution. The book is intended for graduate and senior undergraduate students and young researchers. (jl)

A.Ramsay, R.D.Richtmyer: Introduction to Hyperbolic Geometry, Universitext, Springer-Verlag, New York, 1995, xii+286 pp., 59 fig., DM 69.00, ISBN 0-387-94339-0, ISBN 3-540-94339-0

First, this book is a textbook and not a monograph. It is evident that the authors have great experience in teaching non-Euclidean geometry and they have paid a great deal of attention to the choice and presentation of the material. They build the whole axiomatic system of the hyperbolic plane and the hyperbolic space, but from the very beginning they use real numbers, so that the hyperbolic plane or space is considered already in the axioms as a metric space. They derive first the theorems which do not use the parallel axiom and are valid both in Euclidean and hyperbolic geometry, and then in a separate chapter continue with theorems requiring the parallel axiom. They devote great attention to the visual aspects of the presentation, and all the time point to the differences between hyperbolic and Euclidean geometry. Their considerations lead naturally to differential geometry in the hyperbolic plane and in hyperbolic space. They develop the elements of the differential geometry of curves and surfaces and immediately apply them to hyperbolic geometry. We find here of course several models of the hyperbolic plane and of hyperbolic space. As an interesting instance let us mention that they also present a model of the Euclidean plane in the hyperbolic plane. It is worth noticing that the authors consider carefully also the logical aspects of hyperbolic geometry. We find here also results about tilings, lattices and triangulations in the hyperbolic plane. A whole chapter is devoted to connections of hyperbolic geometry with the Minkowski geometry and special relativity. Also very interesting is the last chapter dealing with constructions by straight-edge and compass in the hyperbolic plane. One does not find these results very often in the literature. There is a great number of exercises in the book. Because of the carefully chosen presentation, the book should be reasonably accessible to physicists also. The prerequisites are calculus and basic knowledge of differential equations, complex numbers, basic linear algebra and group theory. (jiva)

R.Garnier, J.Taylor: 100 % Mathematical Proof, J.Wiley & Sons, Inc., Chichester, 1996, viii+317 pp., GBP 16.95, ISBN 0-471-96198-1, ISBN 0-471-96199-X

The book is designed to give help to students of mathematics but the authors hope that it will be useful also to other readers, for instance, teachers of mathematics or students of philosophy interested in understanding of nature of mathematical proofs, The mathematical background is assumed to be slightly higher than the one provided by the CGSE course in England and Wales. The aim of the book is to explain what mathematical proofs are and to give a list of some their types. Essential parts of the book are propositional logic, predicate logic, axiom systems and formal proof, direct proof, existence and uniqueness proofs, further proof techniques and mathematical induction. A selection of exercises is included together with hints and solutions. The book can well contribute to a better understanding of proofs and their role in mathematics in the whole and will be useful for the intended readership. (jml)

B.Gustafsson, Heinz-Otto Kreiss, J.Oliger: Time Dependent Problems and Difference Methods, Pure and Applied Mathematics. A Wiley-Interscience Series of Texts, Monographs, and Tracts, J.Wiley & Sons, Inc., New York, 1995, xi+642 pp., GBP 45.00, ISBN 0-471-50734-2

The book represents an interesting and concise text intended for graduate students interested in applied mathematics and scientific computations, as well as for physicists and engineers interested in numerical experiments. There are two main features of the book to be emphasised. The first one consists of the fact that an explanation of two tools needed in the book

(parts of the theory of PDEs and the numerical methods aspects) proceeds in parallel. The second one is the overall structure of the book: Part I (chapters 1-8) is devoted to periodic problems which can be discussed in a very transparent way by means of Fourier analysis and trigonometric interpolation; Part II (chapters 9-13) considers initial-boundary-value problems. A model equation approach is consequently used throughout the text. Much of the material included in Part II appears here for the first time. In the appendices one can find linear algebra results, Laplace transform and iteration methods. There are 6 pages of references included. (oj)

R.Jeltsch, M.Mansour (Eds.): Stability Theory. Hurwitz Centenary Conference, Centro Stefano Franscini, Ascona 1995, International Series of Numerical Mathematics, vol.121, Birkhäuser, Basel, 1996, vi+249 pp., DM 148.00, ISBN 3-764-35474-7, ISBN 0-817-65474-7

This book is the result of the international conference "Centennial Hurwitz on Stability Theory" which was held to honour Adolf Hurwitz, whose article on the location of roots of a polynomial was published one hundred years ago. It contains a collection of papers and open problems in stability theory and its application in control theory and numerical mathematics. In the book, the stability of the following problems is treated: linear, nonlinear and time-dependent systems, discretisations of ordinary and partial differential equations, systems with time delay and multidimensional systems. In addition, robust stability, pole placement and problems related to the stability radius are considered. In the Appendix, Hurwitz's original article is reprinted. The book will be of interest to mathematicians and engineers working in the areas of control theory and numerical analysis. (knaj)

D.Goldrei: Classic Set Theory. A Guided Independent Study, Chapman & Hall, London, 1996, viii+287 pp., GBP 24.99, ISBN 0-412-60610-0

The book is aimed at readers who undertake independent study, with no other additional reading or lectures. The subject is treated in the spirit of the standard Open University curriculum. A selection of exercises and problems are included, the solution of some of which would require the help of a tutor. A knowledge of a first course in real analysis is required to understand the context of the material of the book well. The book starts with constructions of real, rational and natural numbers and continues to discuss sets as general entities. After listing the Zermelo-Fraenkel axioms in chapter 4, some classical themes, namely the axiom of choice, cardinals, ordered sets, ordinal numbers and set theory with the axiom of choice are presented. The book is a well written and detailed exposition of the topic. (jml)

I.R.Shafarevich (Ed.): Algebraic Geometry II. Cohomology of Algebraic Varieties. Algebraic Surfaces, Encyclopaedia of Mathematical Sciences vol.35, Springer-Verlag, Berlin, 1996, vii+262 pp., DM 148.00, ISBN 3-540-54680-4, ISBN 0-387-54680-4

This part of the Encyclopaedia is devoted to contemporary algebraic geometry. It consists of two parts. The first contribution is "Cohomology of Algebraic Varieties" (by V.I.Danilov) and it brings a nice overview of the methods and results in the several cohomology theories of algebraic varieties. Among them, the main role is played by sheaf cohomology (esp. cohomology of coherent sheaves), cohomology of complex manifolds (as topological spaces) and étale cohomology. The second contribution is called "Algebraic surfaces" (by V.A. Iskovskikh and I.R.Shafarevich). The main part of the theory of two-dimensional complex algebraic manifolds is presented here, starting with a study of curves on algebraic surfaces, a study of birational correspondences and of several types of surfaces (e.g. elliptic surfaces, K3-surfaces, ruled and rational surfaces). At the end of this part, the surfaces over the field of finite characteristic and their properties are briefly discussed. (jbu)

R.B.Melrose: Geometric Scattering Theory, Stanford Lectures. Distinguished Visiting Lecturers in Mathematics, Cambridge University Press, Cambridge, 1995, xi+116 pp., GBP 9.95, ISBN 0-521-49810-4, ISBN 0-521-49673-X

The book presents lecture notes of a series of lectures on scattering theory given by R.B.Melrose at Stanford University and MIT. It starts with a discussion of the principal example of the Laplace operator on R^n. The next topic is various results in scattering theory for the Laplacian with a simple perturbation by a potential. One lecture is devoted to various types of more substantial deviation from the simple Euclidean case. Finally, the last three lectures contain a discussion of scattering theory in a much more general case of the Laplacian on a complete Riemannian manifold with a regular structure at infinity. Various classes of metrics are investigated here (e.g. asymptotically flat metrics, cylindrical ends, certain types of warped products). The book is written in a pleasant and relaxed style. A special feature of it is an unusual number of comprehensive footnotes (a few of them on almost every page), they successfully evoke a taste of genuine lectures with their small comments and short remarks on subtle points. As a whole, it is a nice and understandable overview of scattering theory, where main lines are clearly visible and technicalities are reduces to a minimum. A very useful book for graduate students or interested non-specialists. (vs)

S.A.Avdonin, S.A.Ivanov: Families of Exponentials: The Method of Moments in Controllability Problems for Distributed Parameter Systems, Cambridge University Press, Cambridge, 1995, xv+302 pp., GBP 35.00, ISBN 0-521-45243-0

The problem of controllability of a distributed parameter system $\dot{x} = Ax + Bu$ is very important e.g. in engineering. One of the possible approaches consists in

reducing it to the problem of moments for a family of (vector-valued) exponentials $e_n = e^{\lambda_n t} B^* \phi_n$ ($A\phi_n = \lambda_n \phi_n$) in the space $L^2(0,T;U)$. Various concepts of controllability correspond to various kinds of independence of (e_n). This book is a thoroughly revised version of the previous Russian text of the same authors (Controllability of Distributed Parameter Systems and Families of Exponentials, Kiev 1989). It is divided into two parts. The first part is devoted to the study of "the degree of linear independence" of a system (e_n) (i.e., nonharmonic Fourier analysis) and related topics (Hardy space H^2, inner-outer factorisation, interpolation of analytic functions, etc.). Applications to controllability of scalar linear parabolic, hyperbolic (both including boundary controls) and systems of string equations are explained in the second part of the book. This "method of moments" is compared with another approaches based on specific properties of PDEs, like Lions's Hilbert uniqueness method, microlocal analysis, etc. (jmil)

G.Tenenbaum: Introduction to Analytic and Probabilistic Number Theory, Cambridge studies in advanced mathematics, vol.46, Cambridge University Press, Cambridge, 1995, xiv+448 pp., GBP 45.00, ISBN 0-521-41261-7

This book is a revised and slightly expanded version of the previous French edition which appeared in autumn 1990 (issue No. 113 of the series Publications de l'Institut Élie Cartan). The book is based on graduate courses given by the author in Bordeaux, Paris and Nancy during the past fifteen years. The book consists of three parts. The first one describes elementary methods (Chebyshev, Möbius inversion formulae; average orders of some important arithmetic functions; sieve methods, the large sieve included; extremal orders of some functions and method of van der Corput). The second part describes methods coming from complex analysis (Dirichlet series; the Riemann zeta function and the prime number theorem following Selberg-Delange method; Tauberian point of view and primes in arithmetic progressions). The last one introduces probabilistic methods (densities; the Turán-Kubilius, Erdös-Winter and Rankin methods; the saddle point method). Important parts of the book are the "Notes" - contemporary results and remarks at the end of every chapter - and the "Exercises". The book includes almost two hundred nice exercises but: "... we have tried to break away from an unfortunate modern tendency by only proposing exercises which are soluble without excessive ingenuity or exceptional technical skill ... . Complete solutions will appear shortly as a joint volume with my colleague Jie Wu published by the Societé Mathématique de France." A very nice and useful book, strongly recommended to students, specialists and teachers; in its area, it is an excellent book, one of the best. (Review of the French Edition: "We guarantee that this work will rapidly become a classic." - Gazette des Mathématicians.) (bn)

A.A.Kirillov (Ed.): Representation Theory and Noncommutative Harmonic Analysis II. Homogeneous Spaces, Representations and Special Functions, Encyclopaedia of Mathematical Sciences vol.59, Springer-Verlag, Berlin, 1995, vii+266 pp., 2 fig., DM 148.00, ISBN 3-540-54702-9, ISBN 0-387-54702-9

There are two parts in the book. The first one written by V.F.Molchanov (Harmonic Analysis on Homogeneous spaces) and the second one by A.U.Klimyk and N.Ya.Vilenkin (Representation of Lie groups and special functions). The first part is a nice introduction to harmonic analysis on symmetric spaces of several types, one chapter being devoted to the semisimple symmetric spaces of rank one. The second part by Klimyk and Vilenkin is a survey of results on representations of certain matrix Lie groups and their relation to the special functions. There is also a description of the functional relations for special functions, generating functions, Laplace operators, differential equations and integral transforms. The book can be recommended to mathematicians, theoretical physicists as a good introduction to the topics. (jbu)

S.Cohen, H.Niederreiter (Eds.): Finite Fields and Applications. Proceedings of the third international conference, Glasgow, July 1995, London Mathematial Society Lecture Note Series 233, Cambridge University Press, Cambridge, 1996, xx+401 pp., GBP 27.95, ISBN 0-521-56736-X

These are proceedings of the Third International Conference on Finite Fields and Applications held in Glasgow in 1995. It consists of 27 contributions covering many different aspects and applications of finite fields, as for example number theory, algebra, analysis, algebraic geometry, information theory and computer science. To be more explicit, the most important areas reflected in the articles are: Polynomials over finite fields, coding problems, Latin squares, exponential sums, factorisations. Of course, this is only a partial survey; one can agree with the following words from the preface of the book: "··· in a number of cases, it would not have been easy to categorise [the articles]." I believe that the reader will also appreciate the open problems listed and the e-mail addresses facilitating direct contact. The book can be warmly recommended to experts in the above mentioned fields. (lbe)

R.J.Wilson: Introduction to Graph Theory. Fourth Edition, Longman, Harlow, 1996, viii+171 pp., GBP 14.99, ISBN 0-582-24993-7

In nine chapters the book provides a reader with the basic information about the character of graph theory and its possible applications. Using traditional graph theory problems (like Königsberg bridges or the marriage problems) to motivate the introduction of important notions and theorems, the book deals with problems which are more sophisticated or more practical (colourability, planarity, searching of a tree, Markov chains, network flows) further on. Also the algorithms

known to solve the described problems are displayed (Fleur's algorithm for the construction of an Eulerian trail or a greedy algorithm solving a minimum connector problem). The reader can learn about the interesting relationship between Hall's theorem on the solvability of a marriage problem and Menger's theorem on the maximum number of the vertex-disjoint paths, described in chapter 8. Additionally, the applications of matroids to the graph-theoretical problems are dealt with in the last chapter of the book. Readers will surely appreciate that the terminology of the present edition is consistent with that commonly used (walk, trail, path). From 250 useful exercises, about half are accompanied by solutions at the end of the book. (jtro)

Ch. Peskine: An Algebraic Introduction to Complex Projective Geometry. Geometry volume 1: Commutative Algebra, Cambridge Studies in Advanced Mathematics, vol.47, Cambridge University Press, Cambridge, 1996, x+230 pp., GBP 25.00, ISBN 0-521-48072-8

In the book, a theory of commutative rings and their modules is presented. It is a basic tool for a study of complex projective geometry. The theory is developed systematically and in detail, illustrated by examples and exercises to solve. For example, one chapters is devoted to the study of affine schemes and their morphisms and Weil and Cartier divisors. The book can be recommended to anybody wanting to commence a study of commutative algebra and algebraic geometry from an algebraic view-point. It is also a good source on which to base lectures in projective algebraic geometry. In the next book (second volume), an extended theory for advanced study will be presented. (jbu)

C.Reid: Hilbert, Springer-Verlag, New York, 1996, ix+228 pp., DM 24.00, ISBN 0-387-94674-8

This is a classical biography of one of the greatest 20th century mathematicians: David Hilbert (1862 - 1943). The book is an account of the scientific life of Hilbert – from his youth in Königsberg, through his studies, to the years in Göttingen before Hitler came to power and destroyed Hilbert's school. The book explores the dramatic scientific history of the life of this exceptional man. Most parts of the book were written based upon the memories of Hilbert's assistants, students, friends and colleagues. Together with personal interviews and a study of Hilbert's correspondence, the author was able to gather a great deal of information about David Hilbert himself and so has been able to present him in his totality as a human being. The book is written with a kind of "mathematical innocence" and in a non-mathematical style. It was written not only for mathematicians but also for laymen interested in mathematics. This book is printed under the Copernicus imprint of Springer-Verlag. Photographs of Hilbert and his friends and an index are included. (mne)

S.B.Yakubovich: Index Transforms, World Scientific, Singapore, 1996, xiii+248 pp., GBP 44.00, ISBN 9-810-22216-5

The value of this monograph is, above all, the fact that it is the first, if not the only monograph, since the books by Zemanian and Ufliand, which deals simulateneously with a broad scope of integral transforms. Apart from the Laplace and Fourier transforms, it covers, mainly, Kantorovich-Lebedev, Mehler-Fock transforms but also includes information on many others. Properties of transforms in weighted Lebesgue spaces, method of inversions and other techniques are investigated always very precisely and in the most general, as well as in concrete, cases. The title is derived from the fact that integral transforms where the integrations proceeds by the index (i.e. the parameter) of a special function, and not by the argument, are also investigated. The book is very helpful as a reference book for engineers and scientific workers who need to apply special functions and integral transforms. The book itself neither contains applications nor does it make up for the absence of a textbook in this area. (jj)

T.Constantinescu: Schur Parameters, Factorization and Dilation Problems, Operator Theory: Advances and Applications, vol.82, Birkhäuser, Basel, 1996, ix+253 pp., DM 148.00, ISBN 0-817-65285-X, ISBN 3-764-35285-X

The subject of the book is the ubiquity of the Schur parameters, whose introduction goes back to a paper of I. Schur in 1917 concerning an interpolation problem of C. Carathéodory. In the first chapter "Schur parameters and positive block matrices" the role of Schur parameters in connection with the structure of the positive definite kernels on the set of integers is explained. Two methods concerning the structure of triangular contractions are treated in chapter two. Chapter 3 deals with interpolation and moment problems while the next one dealing with the displacement structures presents several algorithms related to the description of the positive and contractive block matrices. Chapter 5 studies the factorisation of positive block matrices with positive definite kernels. In the last three parts applications to the nonstationary processes, graphs and completion problems and determinantal formulae and optimisation are investigated. (lbo)

POSTDOCTORAL POSITIONS

The final contract with the EU establishing a network in non-commutative geometry is expected to be signed shortly. Its full title is "Implementation of Concepts and Methods from Non-Commutative Geometry to Operator Algebras and its Applications in Mathematical Physics and Quantum Physics". Consequently, there will be a postdoctoral position over a period of three years at each of the following Universities:

Copenhagen, Cork, Heidelberg, Marseille, Odense, Orleans, Oslo, Paris, Rome La Sapienza, Rome Tor Vergata, Swansea, Trondheim.

To be eligible one needs to have a Ph.D. or an equivalent degree (or to be very close to receiving such a degree). Furthermore, one must be a citizen of the EU or of Norway or to have been resident there for at least two years at the moment of the application. However, applications are possible only to a University of a Country different from the one of citizenship or possibly of residence.

Applications are invited for the positions at the two Roman Universities. They should include:

- a curriculum vitae
- a copy of the Ph.D. Thesis and of any publications
- two names who might be contacted for a recommendation
- the date at which the applicant would like to start his/her activity in Rome
- any information relevant to the application
- indications of any other universities in the network to which applications have been or are about to be made.

There is no deadline for applications but prospective candidates are advised to signal their interest soon by e-mail. The salaries vary from country to country to allow for the different costs of living. The gross salary in Rome should be roughly 2,200 Ecu/month. The way the 36 months of salary will be divided will depend on the applications received.

Applications for La Sapienza should be sent to Sergio Doplicher and for Tor Vergata to John Roberts.

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It is preferable to apply electronically, filling out the form in TEX. This form is sent to you by email upon request. The completed file then can be sent by email to

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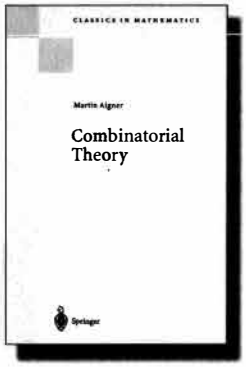

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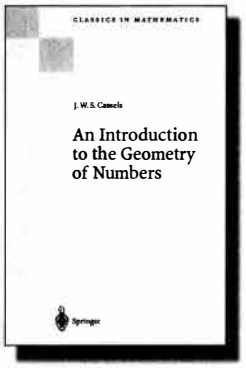

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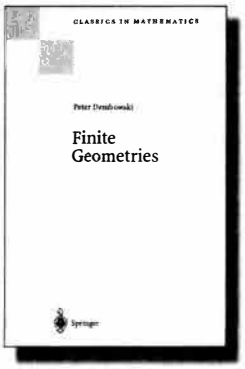

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