European Mathematical Society

NEWSLETTER No. 9

1st September 1993

Isaac Newton Institute

Finnish Mathematical Society - 125 years old

European Postgraduate Program in Industrial Mathematics

Euronews

Book Reviews

Produced at the Faculty of Mathematical Studies, University of Southampton

Printed by Boyatt Wood Press, Southampton, UK

Editors

Ivan Netuka
Mathematical Institute
Charles University
Sokolovská 83
18600 PRAGUE, CZECHOSLOVAKIA

David Singerman
Faculty of Mathematical Studies
The University
Highfield
SOUTHAMPTON S09 5NH, ENGLAND

* * * * * * * * *

Editorial Team Southampton:
D. Singerman, D.R.J. Chillingworth, G.A. Jones, J.A. Vickers

Editorial Team Prague:
Ivan Netuka, Jiří Rákosník, Vladimír Souček

* * * * * * * * *

Editor - Mathematics Education
W. Dörfler, Institut für Mathematik
Universität Klagenfurt, Universitätsstraße 65-57
A-9022 Klagenfurt, AUSTRIA

Editor - History of Mathematics
J. Gray, Faculty of Mathematics
The Open University
Milton Keynes, MK7 6AA, UK

USEFUL ADDRESSES

President	**Professor F. Hirzebruch**, Max Planck Institut für Mathematik, Gottfried Claren Str 26, D-5300 Bonn 3, GERMANY	
Secretary	**Professor D.A.R Wallace**, Department of Mathematics, University of Strathclyde, Glasgow G1 1XH, Scotland, UK.	
Treasurer	**Professor A. Lahtinen,** Department of Mathematics, P.O. Box 4 (Hallitusakatu 15), SF-00014 University of Helsinki, FINLAND	
EMS Secretariat	**Ms. T. Mäkeläinen,** University of Helsinki (address above)	e-mail makelainen@cc.helsinki.fi
Newsletter editors	**D. Singerman,** Southampton (address above)	e-mail ds@maths.soton.ac.uk
	I. Netuka, Prague (address above)	e-mail netuka@cspguk11.bitnet
Newsletter advertising officer	**D.R.J. Chillingworth**, Southampton (address above)	e-mail drjc@maths.soton.ac.uk

Conference Information

Newsletter of Mathematisches Forschungsinstitut Oberwolfach

With effect from October 1993, the Mathematical Newsletter issued for many years by the Mathematisches Forschungsinstitut Oberwolfach, which contained much information about conferences in Europe and beyond, will be discontinued. The EMS intends to take over the service of collecting and disseminating the information on conferences via the EMS Newsletter. Some selection of material may be necessary for reasons of cost and practicality. Organizers should send information, which should consist of the title, location, date, organizer(s) and contact address to

Dr. D. Singerman
Faculty of Mathematical Studies
University of Southampton
Southampton S09 5NH UK

E-mail bjb@uk.ac.soton.mail
Fax 703593939

EUROPEAN COMMUNITY

HUMAN CAPITAL AND MOBILITY PROGRAMME

LEIBNIZ POST-DOCTORAL FELLOWSHIPS IN MATHEMATICS

Second Round

Applications are invited for a number of 2 year fellowships for research in any area of mathematics, to be held at any one of the institutions in the following network:

CRM, Institut d'Estudis Catalans, Barcelona
Max-Planck-Institut für Mathematik, Bonn
Department of Pure Mathematics & Mathematical Statistics or Newton Institute, Cambridge
DMI, Ecole Normale Supérieure, Paris
Département de Mathématiques, Orsay, Paris

Conditions Applicants must be citizens of a member state of the European Community or resident in the Community, be under 33 and expect to have completed a PhD or equivalent degree by 1 October 1994. Exceptionally, consideration may be given to applicants who expect to finish by 1 October 1995. Applicants should propose at least 2 institutions at which they would accept appointment; each of which must be outside their country of citizenship or residence, and other than the institution at which their doctoral studies have been carried out. In all cases successful candidates will be expected to take up their fellowships on 1 October 1994. Holders of the fellowships will be encouraged to spend 6 months at a second network institution. Information concerning salaries and the main mathematical interests of the various institutions can be obtained from the coordinator (e-mail: leibniz@pmms.cam.ac.uk).

Applications These must include a c.v., list of publications, concise description of research interests and the names of 3 referees, and should reach the coordinator

Dr. C.B. Thomas
Leibniz Fellows
Department of Pure Mathematics & Mathematical Statistics
University of Cambridge
16 Mill Lane
Cambridge CB2 1SB
England

(fax: 44-223-337920)

by **30 October 1993**. Each candidate must ensure that his/her referees send their reports so as to reach the coordinator by the same date. A network committee will make an initial selection of the fellows on 13 November 1993.

CAMBRIDGE, ENGLAND

UNIVERSITY OF CAMBRIDGE
Department of Pure Mathematics and Mathematical Statistics

University Lecturer or Assistant Lecturer in Pure Mathematics

Applications are invited for a University Lectureship (roughly equivalent to an Associate Professorship in North America) or a University Assistant Lectureship (roughly equivalent to a tenure track Assistant Professorship in North America) in any field of mathematics, to take up appointment from 1 October 1994. Further information, and details of application procedure, can be obtained from the Head, DPMMS, 16 Mill Lane, Cambridge CB2 1SB, England (e-mail: vacancies@pmms.cam.ac.uk; telephone: 44-223-337996; fax: 44-223-337920).

The closing date for applications is 1 December 1993.

Research Associate

Applications are invited for a 3 year Science & Engineering Research Council postdoctoral research associateship, beginning on 1 October 1994, to work with J.H. Coates and R.L. Taylor in the general area of arithmetic geometry and automorphic forms. Further information, and details of application procedure, can be obtained from J.H. Coates, DPMMS, 16 Mill Lane, Cambridge CB2 1SB, England (e-mail: vacancies@pmms.cam.ac.uk; telephone: 44-223-337996; fax: 44-223-337920).

The closing date for applications is 15 December 1993.

The University of Cambridge is an equal opportunities employer.

First Announcement

EUROPEAN MATHEMATICAL SOCIETY

Meeting of the Council
ETH Zentrum, Zürich, 12–13 August 1994

The meeting of the Council takes place every two years and the next meeting will be in Zurich at the ETH Zentrum 12–13 August 1994 (immediately following the International Congress of Mathematicians, Zürich, 3–11 August 1994).

The delegates to the Council will be elected by the following categories of membership.

(a) **Corporate Members**

The Corporate Members are national mathematical societies which elect 1, 2 or 3 delegates according to size and resources. The election of the delegates from a society is the responsibility of that society. Each society should notify the Secretariat in Helsinki of the names and addresses of its delegate(s) no later than 25 March 1994. At 1 July 93 there were 40 societies which would elect a maximum of 63 delegates.

(b) **Associate Members**

There are three associate members, namely, the Gesellschaft für Informatik, the Gesellschaft für Mathematische Forschung and the European Mathematical Trust. Arrangements will be made for their election of a delegate.

(c) **Individual Members**

An individual becomes an individual member either by belonging to a corporate member or by direct membership. On 30 June 1993 there were some 1620 individual members and, accordingly, these members should be represented by 17 delegates; of these 17 delegates, 12 were elected on 31 January 1992 for four years and so elections must be held for 5 delegates. Nomination papers for elections of these delegates will appear in a later issue of the Newsletter.

The **Executive Committee** is responsible for preparing the matters to be discussed at Council meetings. Items for the agenda of this meeting of the Council should be sent as soon as possible and no later than 13 May 1994 to the Secretariat in Helsinki.

The **Council** is responsible for electing the President, Vice–Presidents and other members of the Executive Committee. The present membership of the Executive Committee, together with current terms of office is as follows:

President	1990-94	Professor F. Hirzebruch
Vice-Presidents	1990-94	Professor A. Figà-Talamanca
	1993-96	Professor L. Márki
Secretary	1990-94	Professor E.C. Lance
	(Sept 1992 – Sept 1993)	Professor D.A.R. Wallace
Treasurer	1990-94	Professor A. Lahtinen
Other members	1993-96	Professor E. Bayer
	1993-96	Professor I. Labouriau
	1990-94	Professor P.-L. Lions
	1993-96	Professor A. Pelczar
	1993-96	Professor V.A. Solonnikov

Under Article 7 of the Statutes the President may not serve as President for more than one period, accordingly Professor F. Hirzebruch will demit office in December 1994. By Rule 16 of the By-Laws the incoming President must be elected from among the members of the Council. No such stipulations apply to the other members of the Executive Committee, all of whom, as appropriate, are eligible for re–election.

It would be convenient if potential nominations for membership of the Executive Committee, duly signed and seconded, could reach the Secretariat by 13 May 1994. If previous practice is followed the Council may, at its meeting, add to the nominations received and may set–up a nominations committee to consider the totality of nominations, the nominations committee being virtually disjoint from the Executive Committee. Following consideration by the nominations committee the Council would be expected to proceed to the elections for the Executive Committee.

Delegates to the Council meeting, who are to attend the ICM–94, are advised that their accommodation arrangements can be made through the ICM–94. Delegates to the Council, who are not to attend ICM–94, are advised that accommodation arrangements cannot be made through ICM–94 and that special arrangements will have to be made; any such delegates should notify the Secretariat as soon as possible.

D.A.R. Wallace
Acting Secretary EMS

Secretariat: Mrs. Tuulikki Mäkeläinen
Department of Mathematics
P.O. Box 4
SF–00014 University of Helsinki
Finland

First Announcement

The Organizing Committee is pleased to announce that the next International Congress of Mathematicians will take place in Zürich, Switzerland, from Wednesday, August 3, through Thursday, August 11, 1994. It will be held under the auspices of the International Mathematical Union and under the sponsorship of the Swiss Mathematical Society, the Swiss Academy of Sciences and the Swiss National Science Foundation.

Mathematical Program

The establishment of the scientific program is in the hands of the Program Committee appointed by the IMU. There will be about 16 invited one-hour expository addresses covering recent developments in the major areas of mathematics and about 145 invited 45-minute lectures in 19 sections. The sections are as follows:

1. Logic
2. Algebra
3. Number theory
4. Geometry
5. Topology
6. Algebraic geometry
7. Lie groups and representations
8. Real and complex analysis
9. Operator algebras and functional analysis
10. Probability and statistics
11. Partial differential equations
12. Ordinary differential equations and dynamical systems
13. Mathematical physics
14. Combinatorics
15. Mathematical aspects of computer science
16. Numerical analysis and scientific computing
17. Applications of mathematics in the sciences
18. Teaching and popularization of mathematics
19. History of mathematics

All Ordinary Members of the congress will have the opportunity to present short communications in the form of posters and to explain their work during scheduled poster sessions. Informal mathematical seminars may be organized on the initiative of groups of participants. All invited lectures will be published in the Proceedings of ICM 94; a complimentary copy of these Proceedings will be sent to each Ordinary Member after the congress. Abstracts of the invited lectures and of all short communications will be distributed to Ordinary Members at the beginning of the congress free of charge.

English, French, German and Russian are the official languages of the congress.

The plenary sessions of the congress will be held at the Kongreßhaus of the City of Zürich while the afternoon sessions in sections will take place in lecture theatres at the Federal Institute of Technology (ETHZ) and at the University of Zürich. On Sunday, August 7, no scientific activities are scheduled.

A program of mathematical films put together by the Organizing Committee will be shown at the end of afternoon sessions.

Social Events

An opening reception for all registered participants will be held in the late afternoon of Wednesday, August 3. On Friday evening, August 5, there will be a buffet-banquet on the Irchel campus of the University of Zürich. A concert of classical music will be given at the Tonhalle on Tuesday evening, August 9, on behalf of the congress. These three events are free to all Ordinary and Accompanying Members of the congress. During ICM 94, short day trips to several places of interest in Switzerland will be available. Preregistrants will have an opportunity to purchase these day trips in advance, as well as various pre- and post-congress tours. The excursions and tours will be arranged by the agency MCI Travel (see below). More detailed descriptions of these activities will appear in the Second Announcement.

Formal dress will not be required on any occasion during the congress.

Organization

All correspondence related to the congress (inquiries, requests, application and reservation forms, abstracts etc.) should be sent to the official congress address below. From there it will be forwarded immediately to the appropriate official, committee or organization.

ICM 94
International Congress of Mathematicians
ETH Zentrum
CH-8092 Zürich
Switzerland

The agency MCI Travel in Zürich, a professional congress and tour organizer, has been appointed by the Organizing Committee to handle all matters related to individual participants: hotel reservations, responding to requests for Announcements, preregistrations, collecting of fees and advance payments, excursions etc.

Accommodation

MCI TRAVEL
MEETINGS CONVENTIONS & INCENTIVES

Participants will be housed in a variety of hotels in Zürich and vicinity; the necessary reservations have already been made by MCI Travel. In addition MCI will make available student residences and try to provide a certain amount of private accommodation at a flat rate for Members willing to put up with less comfort. Detailed information on locations and rates will be provided in the Second Announcement, which will include a preregistration/housing request form.

Together with their registration material all Ordinary and Accompanying Members will obtain a pass which entitles them to travel free of charge on all public transport (trams, buses, trains, boats) in and around Zürich.

Official Carrier

swissair
Official Carrier

Swissair has been appointed Official Carrier for the congress. Please contact your nearest Swissair office for assistance with your travel arrangements and the handling of group flights.

Second Announcement

The Second Announcement of ICM 94 will describe the activities of the congress in more detail and provide instructions on how to complete the preregistration process and obtain accommodations. It will provide more, although not complete, information on the scientific program and give instructions regarding the submission of abstracts of communications to be presented in poster form. The Second Announcement will also include advice on how to proceed upon arrival at either Zürich airport or Zürich main station and it will be accompanied by a brochure describing the day trips and tours organized by MCI Travel.

The Organizing Committee is aware of several conferences of a more specialized nature scheduled immediately before or after ICM 94. The Second Announcement will contain a list of such meetings; deadline for entries is October 15, 1993.

If you wish to receive the Second Announcement, write your name and address on the the detachable form below and mail it to ICM 94 as soon as possible. The form must be received by ICM 94 no later than October 15, 1993. The Second Announcement will be mailed from Zürich before the end of 1993.

I would like to receive the Second Announcement of ICM 94. Please print

Name: _____
last/family/surname first/given name middle name/initial

Address: _____
institution

_____
street and number

_____
postal code city country

My two major areas of mathematical interest, according to the classification of the 19 sections are:

primary: _____, secondary: _____.
section nr section nr

The 125th anniversary of the Finnish Mathematical Society

Olli Lehto

This year the Finnish Mathematical Society celebrates its 125th anniversary. It is thus one of the oldest societies of its kind in the world. In 1868 the scientific grounds for its founding already existed in Finland. The University in Helsinki had assumed the Humboldtian ideology emphasizing the importance of fundamental research, and a multidisciplinary academy of sciences had been established in 1838. However, the Finnish Mathematical Society came into being for political rather than scientific reasons.

In the nineteenth century, Finland was a Grand Duchy of the Imperial Russia. Although the country enjoyed a far- reaching autonomy, the University was closely watched from St. Petersburg. In 1852 the student organizations were forbidden, as they were regarded as possible sources of anarchist ideas. They were replaced by "student faculties", which aimed at promoting the studies of its student members under the guidance of their teachers. When the old-type student organizations were allowed again in 1868, proposals were made in some cases to preserve the good aspects of the rather unpopular student faculties. Thus it was that the founding meeting of the Mathematical Society was held on November 20, 1868. The first Chairman was Lorenz Lindelöf, the Professor of Mathematics, the obvious choice as there was in Finland at that time only one university and that university had only one chair in mathematics.

At first, the origins of the Society were reflected in its activities. The lectures given at its meetings were rather elementary, and were intended for students of mathematics also. Only Lindelöf spoke about his new research results.

A marked change took place in 1892, with new statutes and a new Chairman, Professor E.R. Neovius, a cousin of Ernst Lindelöf and uncle of Rolf Nevanlinna. The Society became scientific in the modern sense of the word. The number of people doing serious mathematical research was growing, in addition to Neovius there were Hjalmar Mellin, the astronomer K.F. Sundman, the young Ernst Lindelöf, the son of Lorenz Lindelöf, and others.

Ernst Lindelöf was appointed Secretary of the Society in 1892 and Chairman in 1903. He held both these positions for more than 40 years, and his achievements were impressive both in quantity and in quality. Thanks to him, a development began in the 1910s which led to the "Finnish School of Function Theory". During World War I, one student of Lindelöf after another defended his doctoral thesis. Felix Iversen, P.J. Myrberg, Frithiof Nevanlinna, and Rolf Nevanlinna became international names in complex analysis, and many others won national recognition.

In the twenties and thirties, the Society represented the active pulse of Finnish mathematics. New research results were announced at its meetings, the great majority of them dealing with complex analysis. The brothers Nevanlinna and P.J. Myrberg were particularly frequent speakers, and from the late 20s on, Lars Ahlfors, too. International contacts only came slowly, the first foreign speaker being Marcel Riesz in 1926. The total number of visitors from abroad before World War II was a mere nine.

The war and its aftermath were a heavy blow to the Society. Lindelöf retired, Ahlfors and Rolf Nevanlinna left the country, and conditions generally were not favourable for scholarly research. It was not until the early 1950s that the worst effects of the war were overcome. War reparations were paid, the residents of the ceded Karelia were resettled, and the economy of the country finally began to improve visibly.

Parallel to this economic recovery, the international activities of the Mathematical Society greatly increased. In 1957 the Society organized a Colloquium in Helsinki on the theory of analytic functions, the first international mathematical conference in Finland. The outstanding achievement was the organization of the 1978 International Congress of Mathematicians, when 4000 participants from 85 countries assembled in Helsinki.

In the sixties and seventies, higher education expanded vigorously in Finland. New universities were founded all over the country. The number of scholars engaged in mathematical research grew considerably, and the Mathematical Society ably kept pace with these developments. In the eighties its material resources were enlarged, numerous international seminars, workshops and summer schools were organized, and the mathematical traffic from abroad became much heavier than before.

At the time of its founding the language of the Society was exclusively Swedish, which was then the language of the educated people in Finland. Finnish started to gain ground towards the end of the last century, and within the Society it gradually almost completely replaced Swedish. One more change has taken place. Foreign visitors have become so numerous that English is now the lingua franca at meetings. In spite of this increasing internationalization, the Finnish Mathematical Society has a very important national role to play in a country where higher education is largely decentralized.

GUIDO FUBINI, 1879 - 1943

Guido Fubini was born in Venice on January 19th, 1879. As a child he showed skill in mathematics and in 1896 he entered the Scuola Normale Superiore in Pisa where amongst his professors were Luigi Bianchi, Ulisse Dini and Eugenio Bertini. At 18 he published his first work, *Nuovo metodo per lo studio e per il calculo delle funzioni transcendenti elementari*, in Period di Mat, Vol. 12, 1897. He graduated in 1900 as the top student with his thesis, *Il parallelismo di Clifford negli spazi ellittici*, Ann. di Pisa Vol. 9, work he extended later in 1904 (Rend. Lincei, Ser 5ª, Vol.13 and Atti 1st. Veneto, Ser 8ª, vol.63.).

In 1901 he obtained a position as assistant Professor in the Scuola Normale. After his habilitation in 1903 he took charge of courses in Catania and then in 1906, got a chair in Mathematical Analysis at Genova. In 1908 he moved to the Polytechnic of Torino where he taught for 30 years and also wrote several textbooks. He married in 1910 and had two children.

Because of anti Jewish laws he was removed from the chair in 1936 and he moved to Paris and then to Princeton where he secured a position at the Institute of Advanced Study. Amongst his friends there was Albert Einstein. For health reasons he moved to New York where he died on 6th June 1943. He was a member of several Italian Academies and also of the Society of Mathematicians and Physicists of Czechoslovakia (Two of his textbooks were joint collaborations with Edward Čech on projective differential geometry: see the article on Čech in the previous edition of the Newsletter).

Fubini's mathematical work developed in several directions: these included the theory of discontinuous groups and automorphic functions, applications of continuous groups to differential geometry and the equations of dynamics, the minimum principle, projective differential geometry and applied mathematics and ballistics. He also made contributions to real analysis and together with Tonelli gave a theorem concerning the reduction of multiple integrals. He was not that keen on this work and was surprised to be known abroad for these simple results instead of his work in other fields which he regarded as being much deeper.

Fubini's list of publications includes 6 textbooks and 193 papers.

Adapted by Professor P.L. Papini, Università Degli Studi di Bologna, from the biographical sketch that appeared in the collected works of G. Fubini.

ISAAC NEWTON INSTITUTE
FOR
MATHEMATICAL SCIENCES

The Institute's scientific work started in July 1992 in its purpose designed building in west Cambridge. At any time there are two six-month visitor programmes in progress, each with about twenty scientists in residence. In addition, during these programmes, there are periods of more expanded activity including instructional courses and workshops. The first four programmes, on *Low-dimensional Topology and Quantum Field Theory*, *Dynamo Theory*, *L-functions and Arithmetic* and *Epidemic Models* have now been completed, and the programmes which have been chosen for the next two and a half years are:

Computer Vision (Jul - Dec 1993)
Random Spatial Processes (Jul - Dec 1993)

Geometry and Gravity (Jan - Jun 1994)
Cellular Automata, Aggregation and Growth (Jan - Jun 1994)

Topological Defects (Jul - Dec 1994)
Symplectic Geometry (Jul - Dec 1994)

Exponential Asymptotics (Jan - Jun 1995)
Financial Mathematics (Jan - Jun 1995)

Semantics of Computation (Jul - Dec 1995)
From Finite to Infinite Dimensional Dynamical Systems (Jul - Dec 1995)

The Institute is actively seeking new proposals for programmes for 1996 onwards which should be addressed to the Deputy Director *Professor Peter Goddard, Isaac Newton Institute for Mathematical Sciences, 20 Clarkson Road, Cambridge CB3 0EH, UK.* Further information about the Institute, about the programmes for 1993 - 1995 and advice on the submission of proposals are available from Peter Goddard (tel 0223 335999; email `i.newton@newton.cam.ac.uk`) who will answer any enquiries.

Information about the Institute is also available in electronic form. The Institute sends weekly lists of seminars by email in the form of a TEX source file or an ASCII file; anyone who wishes be sent these lists should send an email message to `info@newton.cam.ac.uk` indicating which programme he or she is interested in and which file format is preferred. The seminar lists and other information about the Institute's activities are also available via anonymous ftp. In order to use this facility, one should ftp to `newton.newton.cam.ac.uk` entering `ftp` as username and one's email address as password. All information is beneath the `pub` directory (e.g. seminar information is in the directory `pub/seminars`). The seminars and lectures held at the Institute are open to all who are interested.

UNIVERSITY OF CAMBRIDGE

Isaac Newton Institute for Mathematical Sciences

The Institute began its scientific work in July 1992 with its first two programmes, on **Low-dimensional Topology and Quantum Field Theory** and **Dynamo Theory**. On the advice of the Scientific Steering Committee, eight programmes have now been selected for 1993-94, to add to the two already completed in 1992. The full list of programmes for the 1993-94 is printed below the first two having been completed. The first programme has achieved international and popular fame due to the three lectures of Professor Andrew Wiles on Modular Forms, Elliptic curves and Galois Representations that culminated in a proof of Fermat's Last Theorem.

L-functions and Arithmetic

Organisers: B. Birch (Oxford), D. Blasius (UCLA), S. Bloch (Chicago), J. Coates (Cambridge), J.-M. Fontaine (Orsay), R. Heath-Brown (Oxford), K. Kato (Tokyo).

January to June 1993

Over the last thirty years, number theorists have come to realize that the mysterious connexions between arithmetic problems and the properties of zeta and L-functions, initially discovered in the first half of the nineteenth century, are far more extensive than had been imagined earlier. A vast web of overlapping conjectures has now been formulated, stretching from the Riemann hypothesis and Fermat's last theorem to the Tamagawa numbers of motives. The programme will bring together mathematicians from arithmetical algebraic geometry, automorphic forms, and classical analytic number theory, to work on several of these conjectures.

Epidemic Models

Organisers: B. Grenfell (Cambridge), V. Isham (UCL, London), D. Mollison (Heriot-Watt).

January to June 1993

The problems of understanding and controlling disease present a range of mathematical challenges, from broad theoretical issues to specific practical ones. This programme will bring together scientists with a wide variety of mathematical expertise (including probability, deterministic modelling and data analysis) and with close involvement in applied fields across the social, medical and biological sciences. The study of AIDS has stimulated much progress in diverse areas of epidemic modelling, better data and data analysis techniques have become available, and there have been exciting developments in relevant areas of mathematics. The programme will foster interdisciplinary cooperation and it will aim to contribute to the modelling of a wide range of human, animal and plant diseases.

Computer Vision

Organizers: A. Blake (Oxford), D. Mumford (Harvard), B.D. Ripley (Oxford).

July to December 1993

Computer vision has its roots in practical engineering problems such as the visual navigation of mobile robots and vehicles and the automated analysis of medical images. A rapidly advancing interdisciplinary subject, it has reached out to mathematicians, statisticians and computer scientists for analytic tools and algorithms, and to psychologists and biologists for insight into natural vision systems. The programme will bring together specialists from these subjects to study aspects of computer vision such as ideas from mathematical analysis applied to image analysis, using stochastic representations to guide object recognition, and active vision, *i.e.* the continuous guidance of motion to optimize acquisition of visual information.

Random Spatial Processes

Organizers: M.T. Barlow (Cambridge), G.R. Grimmett (Bristol), H. Kesten (Cornell).

July to December 1993

Many physical processes may be modelled using random processes involving space and (possibly) time, *e.g.*, the spread of disease and the structure of disordered media. Two of the principal targets of the theory of such *random spatial processes* are to understand the nature of phase transitions, and to describe the geometry of evolving processes. Recently the development of powerful and rigorous techniques has led to progress on some of the hardest problems. During this programme, probabilists and theoretical physicists will pursue such problems for interacting particle processes, percolation, random media, and models of population growth.

Geometry and Gravity

Organizers: G.W. Gibbons (Cambridge), S.W. Hawking (Cambridge), C.J. Isham (Imperial).
January to June 1994

The past successes of Einstein's *classical* General Relativity have raised deep and difficult problems, involving global differential geometry and the theory of hyperbolic differential equations, whose solution would throw light on the evolution of black holes and nature of space-time singularities. The solution of many of these physical problems requires the development of a *quantum* theory of gravity. This would inevitably involve ideas from differential geometry and it would have implications for mathematics. The programme will bring together mathematicians and theoretical physicists working on both the classical and the quantum aspects of these problems to clarify the mathematical and physical questions that need addressing, and to contribute to their resolution.

Cellular Automata, Aggregation and Growth

Organizers: B. Derrida (Saclay), A.J. McKane (Manchester), E.R. Speer (Rutgers).
January to June 1994

Over the last decade, the huge increase in the scale of computer simulations have revealed the remarkably complex objects which can be grown from simple probabilistic rules. The intricacy of the growing structures (having, for instance, a fractal surface) is in marked contrast to the simplicity of the microscopic rules which generate them. Interest in these phenomena originates in a broad range of disciplines from mathematics through physics, chemistry and computer science to biology. While computer simulations have uncovered many interesting features, such as scaling and universality, the mathematical understanding of these structures is less well developed and this programme will aim to advance this by bringing together researchers working in different fields.

Symplectic Geometry

Organizers: S. Donaldson (Oxford), D. McDuff (Stonybrook),
D. Salamon (Warwick), C. Thomas (Cambridge).
July to December 1994

Surfaces known as symplectic manifolds arise in many branches of pure and applied mathematics, for example they provide the natural framework in which to discuss classical mechanics. There has been dramatic progress in recent years in understanding their properties drawing on results from many disciplines, including differential geometry and topology, global analysis and the theory of partial differential equations. The programme will bring together mathematicians from all these fields together with theoretical physicists with the aim of further developing the theory for example by exploiting the parallelism between Yang-Mills theory in four dimensions (which was originally constructed by physicists to describe the strong nuclear force between elementary particles) and symplectic geometry in spaces of arbitrary even dimension.

Topological Defects

Organizers: A.J. Bray (Manchester), T.W.B. Kibble (Imperial), R.S. Ward (Durham).
July to December 1994

Topological defects appear in a vast array of physical situations, from cosmic strings which occur in unified field theories of elementary particles at the highest energies, to vortices which occur in superfluids at temperatures approaching absolute zero. These defects exhibit remarkably similar behaviour, whether it be the breaking and joining of cosmic strings or of superfluid vortices or the evolution of a network of defects in a liquid crystal. By bringing together experts in field theory, cosmology, condensed-matter physics and high-energy particle theory, the programme aims to exploit common themes and thus further the study topological defects in each of these contexts.

For further information, contact the Deputy Director, Professor Peter Goddard, Isaac Newton Institute for Mathematical Sciences, 20 Clarkson Road, Cambridge CB3 0EH, UK; tel. 0223 335999;
e-mail i.newton@newton.cam.ac.uk

EUROPEAN NEWS: Country by Country

ENGLAND

GADGET2 Workshop on "Harmonic Maps and curvature properties of submanifolds"

Date: **28 July - 1 August 1994**

Location: **Leeds**

Contact:
S. Carter email: s.carter@Leeds.ac.uk
A. West email: a.west@Leeds.ac.uk
J.C. Wood email: j.c.wood@Leeds.ac.uk

School of Mathematics
University of Leeds
LEEDS LS2 9JT, UK

PORTUGAL

6th Summer School University of Coimbra

6 - 17 September 1993

Organiser: **The Portuguese Mathematical Society**

Program:
Sheaf theory and applications to complex analysis
Teresa Monteiro Fernandes (Lisboa)

Finite semigroup theory from a profinite perspective
Jorge Almeida (Porto)

Evolution problems: analytical study and numerical simulation
Paula Oliveira (Coimbra)

Knot theory and low dimension topology
Eduardo Rego (Porto)

Location: University of Coimbra

Contact:
The Organizing Committee
Departamento de Matematica
Universidade de Coimbra
Apartado 3008
3000 Coimbra
Email: jfqueiro@ciuc2.uc.pt

TURKEY

Fifth Workshop of Stochastic Analysis of Oslo-Silivri

July 18 - 29 1994 **Silivri (Istanbul, Turkey)**

Scientific Committee: N. Bouleau, D. Nualart, E. Pardoux, M. Sanz, M. Zakai.

Organizing Committee: H. Körezlioğlu, B. Øksendal, A.S. Üstünel, T. Lindstrøm

Program: The first week will be devoted to three main lectures in three different but interrelated subjects

- Theory of Capacity on the Wiener space, by F.Hirsch (France),
- An introduction to recent developments in financial mathematics, by D. Duffie (USA),
- The mathematical theory of communication networks, by V. Anantharam (USA)

The second week will be devoted to the participants contributing papers and all the participants are encouraged to give a talk. On the first Wednesday there will be a guided visit of Istanbul, and during the second one a sight-seeing of the Bosphorous by ship will be organized.

Location: Silivri is a small town on the sea-shore (Marmara sea), fifty kilometers to the west of Istanbul, where there is a center of research belonging to the University of Istanbul, which has been founded by the Turkish mathematician Nazim Terzioğlu.

Accommodation: All the participants will be located at the Terzioğlu Research Center at a price of 4000 FF(French Franks) or 1700 DM. This price includes lodging, meals, and tea and Turkish coffee à volonté. The accompanying people will be charged to the amount of 3000 FF per person. For those who remain only the first week, the prices are respectively 2500 FF and 2000 FF.

Further Information: A second announcement with more details will be sent to the registered participants. For more information please contact:

- H. Körezlioğlu, A.S. Üstünel
  ENST, Dépt. Réseaux, 46, rue Barrault
  75634 Paris Cedex 13, FRANCE
  Fax: 33-1-45891664
  Email: korez(or ustunel)@res.enst.fr

  or
- B. Oksendal or T. Lindstrøm
  Dept. of Mathematics
  University of Oslo, Box 1053 Blindern
  N-0316 Oslo, NORWAY
  Fax: 47-22854349
  Email: oksendal(or lindstro)@math.uio.no

GERMANY

2ND GAMM/IFIP-Workshop on

"STOCHASTIC OPTIMIZATION: Numerical Methods and Technical Applications"

UniBw München, 15-17 June 1993 **Neubiberg/München, Germany**

Cosponsored by: GAMM (Gesellschaft für Angewandte Mathematik und Mechanik), IFIP (International Federation for Information Processing) and UniBwM (Federal Armed Forces University Munich), the 2nd GAMM/IFIP-Workshop took place from June 15-17, 1993, at the UniBw München, Neubiberg, Germany. The scientific program with twenty-five lectures was prepared by the following program committee:

P. Abel (D), H.A. Eschenauer (D), P. Kall (CH), K. Marti (D) (Chairman), J. Mayer (H,CH), F. Pfeiffer (D), G.J. Schuëller (A).

The objective of the Workshop was to bring together scientists from Stochastic Programming and from those Engineering areas where Mathematical Programming models are common tools, as e.g. in Optimal Structural Design, Optimal Path Planning for Robots, Power Dispatch, Target Costing etc., and the aim is to find solution procedures taking into account the inherent randomness of some data of these problems. Considering Stochastic Programming instead of standard Mathematical Programming models, solutions can be obtained which are more reliable with respect to parameter variations, but not much more expensive in terms of certain cost criterions. For solving the resulting deterministic substituting problems, several numerical solution procedures were presented based on Taylor expansions, discretization, decomposition and stochastic approximation methods. After an ordinary referee process the Proceedings of the Workshop will be published again in the Springer Lecture Notes Series on Economics and Mathematical Systems.

Readers may be interested in the article on page 17.

HERIOT-WATT UNIVERSITY "LOST GRADUATES"

Dear Editor

I am writing to ask you to assist in our efforts to trace graduates with whom we have lost touch.

Heriot-Watt University is increasingly active in initiating and supporting graduate activities of all kinds - reunions, whisky-tastings, public lectures and social and sports events. We also hope that graduates will benefit from access to a network both within and beyond their own particular fields.

However, over the years, the University has lost contact with many of its graduates, and I hope that, through your columns, we may be able to remedy this.

I would ask all graduates of Heriot-Watt College or University who have lost contact with us to write to me at the following Freepost address:

Mr Sandy Richardson - Alumni Officer, Heriot-Watt University
FREEPOST EH836, Edinburgh EH14 0NZ UK

I look forward to hearing from your readers who wish to rejoin a lively graduate community.

Yours sincerely

Mr Sandy Richardson

Special Interest Group in Optimization

Call for Membership

The special interest group for optimization (SIGOPT , i.e. *Fachgruppe Optimierung* in German) has been created under the auspices of the Deutsche Mathematiker Vereinigung (DMV) with the purpose of encouraging cooperation amongst its members, and of facilitating communication between them. It is primarily intended to meet the needs of all those interested in mathematical optimization, both theory and practice.

SIGOPT provides a forum for discussing actual and future developments in a broad variety of disciplines associated with optimization, and actively supports interdisciplinary research and applications to industry. In particular, SIGOPT encourages students and younger scientists to become involved in research in optimization.

The yearly Mathematical Optimization Conference is organized by its members, the first of which will be held at Vitte/Hiddensee in Germany in September this year. In the following three years, the conference will be part of larger conferences: in Berlin as part of OR '94 organized jointly with GMÖOR, DGOR, SVOR, ÖGOR, in Ulm under the sponsorship of DMV, and the year after under the sponsorship of GAMM. Further workshops shall be held on special aspects of mathematical optimization.

To facilitate communication amongst members of the optimization community, the electronic forum *opt-net* has been installed at the Konrad-Zuse-Zentrum in Berlin (ZIB). The main purpose of *opt-net* is to provide an efficient means of communication amongst its participants. Each member of *opt-net* has a unique e-mail identification at ZIB. In order to receive ones e-mail at a new address anywhere in the world, the user merely sends an e-mail message to ZIB, and all mail will be redirected to the new address. Members may also receive a weekly electronic digest, and will be able to use a number of other facilities. Access to *opt-net* is possible using Internet and all academic Post office networks.

Membership is encouraged particularly for those who are already members of societies as AMS, DMV, GAMM, GMÖOR, SIAM as well as for anybody else interested in optimization. Young people especially are encouraged to become members of SIGOPT. To cover administrative costs, members may be asked for a small, financial contribution.

For information concerning *opt-net* and joint registration to *opt-net* and SIGOPT send e-mail

To: opt-net-request@zib-berlin.de

Subject: help

H. Th. Jongen, RWTH Aachen
K. Lommatzsch, Humboldt University Berlin
U. T. Zimmermann, TU Braunschweig

European Postgraduate Program in Industrial Mathematics

Professor Dr. Heinz Engl

Chair for Industrial Mathematics
Johannes Kepler Universität, A-4-40 Linz, Austria

One of the most successful activities of the European Consortium for Mathematics in Industry (ECMI) has been the 2-year postgraduate program "Mathematics in Industry". The program has been planned and initiated about 7 years ago by ECMI centers in Austria, Germany, Great Britain, Italy and the Netherlands (Johannes Kepler Universität Linz, Universität Kaiserslautern, Oxford University, SASIAM (Bari), Universita degli Studi Firenze, Technical University of Eindhoven). In the meantime, universities in Glasgow (Strathclyde), Grenoble, Göteborg, Trondheim, Helsinki, Lyngby and Dresden have also joined the program.

The basic idea was and is to train graduates of mathematical or closely related curricula in the field of industrial mathematics. Naturally, industrial mathematicians should have a broad education in applied mathematics. Thus, the program aims at educating generalists. It is structured as follows:

A common "entrance level" is defined by contents of courses in mathematics, computer science, physics, and mechanics. In a preparatory phase, all applicants are brought to that entrance level. They can formally enter the program after 4 years of university education (regardless of the fact if they have already formally obtained a graduate degree). The course itself contains 16 courses (of about 30 hours each, of which at least 10 hours are devoted to computer exercises). A "common core" which is (as far as basic contents and philosophy are concerned) identical at all teaching centers consists of 8 of these courses covering analytical and numerical methods for ordinary and partial differential equations, nonlinear analysis and optimization, systems theory, statistics, and discrete mathematics. The remaining 8 courses can be chosen from a large list of special courses, which are not necessarily the same at all participating centers. In this phase, the students should take advantage of the various specializations at the centers. The centers exchange courses (i.e., lecturers) and students. It is compulsory for each student to spend at least one teaching period at one of the other participating centers. The common philosophy of all courses in the program is that they should involve mathematical modelling of real-world problems and that they should include computer exercises whenever this is appropriate.

In the final semester of the program, the students have to treat an industrial project: A problem coming from industry has to be modelled and (at least partially) solved with non-trivial mathematical methods. The students are expected to write both a mathematical report and a "management report" on their project; the latter report should explain their results to the industry from which the problem came.

Each student also has to take part in one "modelling week" which is organized by ECMI at one of its centers each year. In these modelling weeks, students from all ECMI centers meet for one week. Instructors from the ECMI centers present industrial problems (usually in non-mathematical terms) to them; under loose guidance by these instructors, the students work (in international groups of about six) on these problems for the whole week and present their results in the end (both orally and in a written report). In the opinion of most participants, these modelling weeks have been very exciting and successful. The groups usually obtained remarkable and very useful results. ECMI plans to publish a collection of reports from these modelling weeks in its book series with Teubner in the near future. It should be noted that (maybe inspired by the ECMI modelling weeks) similar activities have also been organized in the US (e.g., in the summer of 1992 at the IMA in Minneapolis).

The overall performance of the students (course work, industrial project, modelling week) is judged by a team of inspectors (currently consisting of Professor Fasano, Firenze, Professor Neunzert, Kaiserslautern, and Dr. Norbury, Oxford) and by the ECMI Educational Committee. The ECMI Board finally issues a certificate.

So far, about 30 students have received the certificate; currently around 50 students are formally enrolled in the program, about the same number is involved in parts of the program in addition.

Especially in its initial phase, the success of the program depended heavily on EC support. Since 1987 and 1988, ECMI has had continuous support for this program by COMETT and ERASMUS, respectively. This support has been used mainly for exchanging students, exchanging lecturers, and organizing modelling weeks and compact courses for industry.

More recently, ECMI has also obtained EC support for its research activities in the program HCM. Five of its centers (Eindhoven, Kaiserslautern, Linz, Milano and Oxford) will be able to fund one postdoc for one year each. The idea is to transfer specialized knowledge between the centers, which is needed for research cooperations with industry. The network will also organize "Study Group Weeks" (along the lines of the successful "Oxford Study Groups with Industry") and "Industry Days", where industry in various regions will be informed about the research areas represented in the ECMI framework.

ECMI also organizes conferences and issues a newsletter. More information about ECMI can be obtained from the ECMI Secretary, Professor Robert Mattheij, Department of Mathematics, TU Eindhoven, P.O. Box 513, NL-5600 MB Eindhoven, The Netherlands.

Journal für Mathematik-Didaktik (JMD)

Journal of the scientific society "Gesellschaft für Didaktik der Mathematik"

Publisher: Schöningh-Verlag Paderborn (FR Germany) (Address: Postfach 2540, D-4790 Paderborn)

Aims

The *Journal für Mathematik-Didaktik (JMD)* is an international scientific journal in which appears original contributions in German, English or French from the whole field of research and development in mathematics education (didactics of mathematics). It is the aim of the **JMD** to contribute to the further development of mathematics education as a scientific discipline, especially to the establishing and guaranteeing of standards of excellence in the field of didactics of mathematics. The **JMD** is open with regard to contents (in particular towards related disciplines) as well as methods. It requires contributions to bear upon the learning and teaching of mathematics.

The readers of the **JMD** are expected to be interested in scientific research and development in mathematics education. So, in the first place, readers are researchers or teacher trainers. However, many school teachers also belong to the readership of the **JMD**.

It is indispensable for articles published in the **JMD** to be of high quality as a contribution to research. This is guaranteed by certain criteria which articles are to fulfil, such as relevance to the learning and teaching of mathematics, originality, inventiveness, reference to the "state-of-the-art", suitability and correctness of contents and methods, and stringency and consistency of the arguments. Thus, with respect to these general features of research the papers in the **JMD** also exemplify contributions referring to the guiding question of the forthcoming ICMI study: "What is research in mathematics education, and what are its results?" (See Newsletter No.8)

Organization

JMD was launched in 1980. Each volume consists of four issues. At present, volume 14 (1993) is being published. The price for one volume is DM 52,00. For members of the "Gesellschaft für Didaktik der Mathematik", the membership fee includes a subscription to the **JMD**.

The responsibility for the planning and further development of the **JMD** is in the hands of three editors, elected on a temporary basis. The editors decide on acceptance or rejection of submitted articles, supported, as a rule, by two additional referees. The editors also receive support from an advisory board consisting of twelve scientists, elected on a temporary basis as well.

Between the editors, on the one side, and the advisory board, on the other side, there is a certain division of labour: The decisions on the acceptance or rejection of a paper submitted to the **JMD** is the function of the three editors as a body; it is the function of the advisory board to criticize the

decisions of the editors. The members of the advisory board also have the right to see submitted papers and the referees' reports and to give comments during the period of decision. (Insofar the temporary basis of the body of the editors and of the advisory board and these "checks and balances" of deciding and criticizing are a means of finding decisions on papers submitted to the **JMD** without privileging certain persons or certain perspectives of mathematics education but, instead, trying to remain "open minded" for new scientific developments.)

Contents

The **JMD** contains articles on all topics and at all levels of the learning and teaching of mathematics. The articles are roughly divided into *categories* (some of which, of course, overlap), each of which contains roughly one fourth of the articles published so far.

- Basic questions on the learning and teaching of mathematics (such as aims, learning theories, assessment or teaching conceptions),
- Curriculum development in mathematics (including analyses of mathematical subject matter),
- Empirical investigations into the learning and teaching of mathematics,
- Basic questions of mathematics education as a discipline.

The spectrum of topics can be seen in the following examples of articles taken from the existing volumes.

- A. Kirsch: On the training in mathematics of future teachers - with respect to the practice of geometry teaching (1980).
- E. Wittmann: Relations between operative "programmes" in mathematics, psychology and mathematics education (1981).
- S. Schmidt, W. Weiser: Numbers and comprehension of numbers by preschoolers: Counting and the cardinal aspect of natural numbers (1982).
- G. Herden et al.: An investigation on the discussion of problems in handling the concept of convergence (1983).
- W. Dörfler: Pocket calculators and mathematical reflection (1984).
- E. Cohors-Fresenborg: Different representations of algorithmic concepts (1985).
- G. Brousseau: Trends in research on mathematics education in France (1986).
- P. Bender: Critique of the Logo philosophy (1987).
- E. Puchalska, Z. Semadeni: A structural categorization of verbal problems with missing, surplus or contradictory data (1988).
- H.-J. Vollrath: Functional thinking (1989).
- C. Hoyles, R. Sutherland: Pupil collaboration and teacher intervention in the Logo environment (1990).
- H.-G. Weigand: On the influence of the mode of representation of sequences defined by iteration on the discovery of properties (1991).
- F. Schweiger: Fundamental ideas. A study of didactics of mathematics in terms of intellectual history (1992).

Most of the articles in the **JMD** (including those mentioned above) are written in German. In order to be accessible to everyone, each article commences with a summary in English.

Besides "regular" research articles, the **JMD** also contains "contributions for discussion" which either refer to published articles or to problems of immediate interest in mathematics education. Finally, the **JMD** gives regular information on recent doctoral dissertations or habilitations in the field of didactics of mathematics.

The Editors currently are:

Prof. Dr. Benno Artman, Technische Hochschule Darmstadt, Fachbereich Mathematik, Schloßgartenstraße 7, D - 6100 Darmstadt.

Prof. Dr. Hermann Maier, Universität Regensburg, Naturwiss. Fakultät I - Mathematik, Universitätsstraße 31, D- 8400 Regensburg.

Prof. Dr. Siegbert Schmidt, Universität Hamburg, Fachbereich Erziehungswissenschaften, Institut 9, Von-Melle-Park 8, D - 2000 Hamburg 13.

Integrated policy to increase the supply of personnel in the field of research into learning and teaching at the University of Regensburg

Professor Dr. Hermann Maier

Universität Regensburg, Naturwiss.
Fakultät I - Mathematik Universitätstraße 31, D - 8400 Regensburg

The University of Regensburg has decided to found an interdisciplinary centre for research into learning and teaching. Its aims are

a) to initiate, coordinate and promote research projects into the field of learning and teaching,

b) to increase the supply of personnel for research into this field.

Research into learning and teaching is mainly concerned with processes generated in schools and classrooms, but not necessarily restricted to them.

The centre is set up, not only provided to refine understanding of the didactical disciplines of different subjects (Fachdidaktiken) to put up research projects on their questions, but also to increase interdisciplinary cooperation among psychology, pedagogy, and these subjects. At the same time the centre creates an institutional and academic environment for the enhancement of the supply of personnel in this area.

Research in the centre is open for different subject specific methods. In order to achieve its aims and objectives it will organize research colloquia, seminars and Summer Schools, previously provided for postgraduate education.

All teachers of the University of Regensburg with full responsibility for their subject, whose field of research is related to problems of learning and teaching, and who are prepared to actively cooperate, can become members. One professor will be elected to coordinate the activities and represent the centre.

To enable the centre to fulfil its responsibility in research and education the state is requested to guarantee possibilities of cooperation with public institutions in the pedagogical area (mainly schools of different type). With regard to integration of research training and pedagogical practice it seems necessary to transfer teachers provided for further training to one of these institutions.

In order to safeguard procedures academically and lawfully the members of the centre - as far as they are full professors - must be able to take part in these procedures with all rights, given by the faculty to which the centre is attached. In addition the institution has to be equipped with adequate personnel, rooms and financial conditions.

The centre is due to start in the winter semester 1993/94. In advance there have been organized some colloquia in the former semesters, and some exercises carried out in cooperation between the professor of didactics of mathematics and colleagues in pedagogy and psychology, the topics of dissertations being taken from mathematics education.

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, 18600 Praha 8, Czechoslovakia.

I.Laine: Nevanlinna Theory and Complex Differential Equations, de Gruyter Studies in Mathematics 15, Walter de Gruyter, Berlin, 1993, viii+341 pp., DM 154.00, ISBN 3-11-013422-5

This book covers the global theory of differential equations (DE's) in the complex domain from the point of view of Nevanlinna theory. A concise treatment beginning from the classical results and leading up to current research trends is given. More concretely, the main theme is the study of the growth and zero distribution of entire meromorphic solutions of both linear and non-linear algebraic DE's. The first three chapters are preparatory. Besides some background material, Nevanlinna theory, including the Clunnie lemma, is explained and a brief review of Wiman-Valiron theory is given. The results in chapter 4 have been very carefully selected to motivate more specific questions considered in the subsequent chapters 5 - 8 devoted to linear DE's. The last six chapters are devoted to non-linear algebraic DE's. The exposition of this theme begins in chapter 9 with some special but characteristic types of non-linear DE, i.e. the Riccati, Painlevé and Schwarzian DE. This is methodically a very good preparation to the subsequent chapter where the renowned Malmquist-Yosida theorem and variations of Malmquist type reasoning are given. Chapter 11 contains classical results of Wittich, Rellich, Goldberg and Polya on non-linear first order DE's completed by the recent result of Bank. Chapters 12 and 13 bring results on non-linear DE's of second or arbitrary order, respectively. The final chapter, where a new idea arises, has a somewhat exceptional place in the book. The idea is to combine purely algebraic reasoning (differential fields, Ritt-Kolchin theory) with function theoretic reasoning (Nevanlinna theory). As a penetrating example of this idea, the author proves a generalization of the famous Hölder theorem asserting that the gamma function $\Gamma(z)$ is "transcendental" in the following sense: $\Gamma(z)$ cannot satisfy any algebraic DE with rational coefficients. A survey of the necessary algebraic background and the classical Siegel lemma with non-algebraic consequences is given before. The methodical conception of the book is very well-thought-out and the book can be used with advantage for graduate level lecture courses and seminars. (jf)

S.-T.Yau (Ed.): Essays on Mirror Manifolds, International Press, Hong Kong, 1992, vi+502 pp., $ 24.00, ISBN 962-7670-01-4

The past few decades are witness to an astonishing stream of new and fundamental ideas created by a close cooperation and interaction among mathematicians and physicists. The structures discovered will necessarily have a deep influence on the future evolution of mathematics. The topic of the book is an excellent example of this general fact. The consistency of string theory requires an additional six-dimensional space to be a compact Kähler manifold with vanishing first Chern class (Calabi-Yau manifold). Two such manifolds are called a mirror pair if they induce the same conformal theory. Intuition coming from physics makes it possible to formulate conjectures, to verify them for specific examples and indicate a way to a future complete mathematical theory. The computation of the number of rational curves on a quintic is the first example of the power of this approach. There are 21 contributions in the volume, some of which were presented at the workshop held in MSRI (Berkeley) in May 1991. The volume contains review papers as well as papers presenting recent results in the subject written both by mathematicians and physicists. This is an excellent collection warmly recommended to all mathematicians and physicists interested in recent fruitful cooperation between both disciplines. The book is also an example showing that it is possible to publish a top quality book containing a huge amount of material for a very low price making it available not only for libraries but for individuals as well. (vs)

P.J.Cameron, H.C.A.van Tilborg (Eds.): A Collection of Contributions in Honour of Jack van Lint, Topics in Discrete Mathematics, vol.7, North-Holland, Amsterdam, 1992, 504 pp., $ 243.00, ISBN 0-444-89808-5

Professor J.H. van Lint is a well known expert in coding theory, his name is - among other achievements - connected with the first nonexistence proofs for perfect codes. At the same time, he has devoted a lot of effort to the well-being of his home university, the Technological University of Eindhoven where he recently became the Rector Magnificus. The subsequent collection of contributions is dedicated to Van Lint on the occassion of his sixtieth birthday. It contains over fifty short papers written by his colleagues, friends and former students. It is not surprising that most of the papers concern coding theory; related subjects such as projective geometries, block designs, difference sets, Steiner systems etc. also appear (but rather occassionally) in the contents. Since the book is devoted mainly to specialized research papers (surveys on translation nets or toroidal embeddings

of graphs are exceptions from this point of view), the volume will be more valuable to specialists in coding theory than to a general audience. (jakr)

M.Cohen, E.D.Gaughen, A.Knoebel, D.S.Kurtz, D.Pengelley: Student Research Projects in Calculus, MAA Spectrum Series, The Mathematical Association of America, Washington, D.C., 1991, ix+216 pp., GBP 18.00, ISBN 0-88385-503-8

Student research projects in calculus sometimes form a part of the exercises in calculus classes and have the main task of supporting students' activities and independent thinking. Moreover, students are obliged to study several problems using the mathematical literature and to express their ideas in a written and/or a spoken form. The authors are teachers at New Mexico State University and during two and half years they collected material for student research projects. The book contains over 100 take-home projects of various degrees of difficulty. Each of them is a challenge for a student. The exercises resemble mini-research problems and most of them require creative thought, stimulating students to work both individually and in groups. Each project in the book contains notes to the teacher, prerequisites and hints. The book also includes the history and development of the projects and the authors' own experience. The book can be recommended to anybody teaching calculus and to those mathematicians fascinated by mini-problems in calculus. (jl)

J.Roberts: Lure of the Integers, MAA Spectrum Series, The Mathematical Association of America, Washington, D.C., 1992, xvii+310 pp., GBP 21.00, ISBN 0-88385-502-X

This charming book contains a great number of interesting stories and theorems (mostly of the number theoretical character) which are connected with more than 250 natural numbers. Many references. The goal of this really nice book is to show the beauty of many parts of mathematics. Some results presented here will be surprising even for experts. Warmly recommended to specialists as well as to amateurs. (bn)

S.Wagon: Mathematica in Action, W.H.Freeman and Company, New York, 1991, xiv+419 pp., 135 fig., GBP 31.95, ISBN 0-7167-2202-X, ISBN 0-7167-2229-1

The book contains *Mathematica* techniques applied mainly to number theory and graphics. It reveals immense possibilities of *Mathematica*. The examples are carefully selected and illustrate many of the important ideas in the field. The reader should have an elementary mathematical background to understand the problems involved and some experience with *Mathematica*. As for number theory, the emphasis is on prime numbers and various algorithms of number theory. Let us just mention the Chinese remainder theorem, linear Diophantine equations, a complete solution to the problem of solving $x^2 \equiv a \pmod{n}$ for any positive integers a and n, the Riemann Hypothesis, among others. Illustrations of some well-known theorems (e.g. the rational numbers are countable) are also given. The chapters devoted to graphics discuss assorted examples of 2D and 3D plotting including animation. The reader will find demonstrations of both theoretical and applied problems. The velocity vector of the cycloid, the Cantor function, complex Cantor sets, Chaos Game, and Julia sets serve as the examples. The book is well worth reading. It can be strongly recommended not only to *Mathematica* users but also to people engaged in methodology. (jh)

C.Reid: From Zero to Infinity, MAA Spectrum Series, The Mathematical Association of America, Washington, D.C., 1992, xiv+186 pp., GBP 16.00, ISBN 0-88385-505-4

One of the best books in popular mathematical literature especially for its fresh style making the main mathematical problems of number theory interesting for readers of any age between zero and infinity. The reader is acquainted with the way these problems came into existence during centuries, how mathematicians tried to solve them, sometimes being successful, sometimes meeting with failure. At the beginning of this fascinating book there is a "proof" of the "statement" that all natural numbers are interesting: For if there were any uninteresting numbers there would necessarily be the smallest uninteresting number and it, for that reason alone, would be very interesting. It seems, however, that this proof is not necessary: reading the book you will find out that not only the natural numbers but all numbers are interesting. (ec)

J.Ueberberg: Einführung in die Computeralgebra mit REDUCE für Mathematiker, Informatiker und Physiker, B.I. Wissenschaftsverlag, Mannheim, 1992, 333 pp., ISBN 3-411-15781-X

This book can be characterized as a gentle introduction to REDUCE, the well-known general purpose computer algebra system. After describing the role of computer algebra in mathematics, the author gradually passes to a description of how to use the most important features of the system (procedures, arrays and operators, lists, substitutions). Particular attention is payed to the basic algebraic notions (matrices, polynomials). A special chapter is devoted to Gröbner bases and "geometric reasoning". The final chapter may serve as a REDUCE

reference manual, since it contains a description of all the system commands. The book is written in a simple and clear style, with a lot of excercises. It is suitable "für Mathematiker, Informatiker und Physiker", as stated in its subheading. (jt)

N.Ja.Vilenkin, A.U.Klimyk: Representation of Lie Groups and Special Functions. Volume 1, Mathematics and Its Applications, vol.72, Kluwer Academic Publishers, Dordrecht, 1991, xxiii+608 pp., $ 249.00, ISBN 0-7923-1466-2, ISBN 0-7923-1494-8

N.Ja.Vilenkin, A.U.Klimyk: Representation of Lie Groups and Special Functions. Volume 2: Class I Representations, Special Functions, and Integral Transforms, Mathematics and Its Applications, vol.74, Kluwer Academic Publishers, Dordrecht, 1993, xviii+607 pp., $ 260.00, ISBN 0-7923-1492-1, ISBN 0-7923-1494-8

N.Ja.Vilenkin, A.U.Klimyk: Representation of Lie Groups and Special Functions. Volume 3: Classical and Quantum Groups and Special Functions, Mathematics and Its Applications, vol.75, Kluwer Academic Publishers, Dordrecht, 1992, xix+629 pp., $ 292.00, ISBN 0-7923-1493-X, ISBN 0-7923-1494-8

The main theme of this comprehensive treatise is the relation between homogeneous spaces and their geometry on one side and corresponding families of special functions on the other side. The importance of the subject is closely connected with the fact that the most important equations of mathematical physics are invariant with respect to certain classical transformation groups; special functions arise most often in the study of equations having a special symmetry – as eigenfunctions of differential and integral equations invariant with respect to a certain group.

The theory of special functions can be studied from different viewpoints. The approach presented here is based on general properties of representations of linear groups - various properties of special functions are deduced from the corresponding properties of matrix elements of certain representations of the considered group. This approach brings a very satisfactory unifying structure to the theory of special functions and makes it very systematic and comprehensible. Let us mention for illustration a few typical correspondences between the language of the representation theory and the language of special functions – scalar products of matrix elements of a representation can be interpreted as integral representations of corresponding special functions, orthogonality properties of matrix elements immediately imply orthogonality theorems on special functions, addition theorems express the group law and asymptotic behaviour of special functions is connected with deformations and contractions of groups.

All three volumes of the series have together over 1800 pages and contain an enormous amount of material. The first volume starts with two chapters summarizing necessary notions and theorems on Lie groups, Lie algebras and harmonic analysis on groups. The case of commutative groups (related to classical integral transforms) is disccussed then. The rest of the volume is devoted to a description of relations between representations of the second (and the third) order matrices and the classical special functions (Bessel, Macdonald, Henkel, Whittaker and hypergeometric functions, orthogonal polynomials). The case of matrix representations of any order and special functions corresponding to them are discussed in the second volume. The last chapter of it introduces q-analogues of special functions connected with representations of finite groups. The third volume starts with a discussion of a relation between q-analogues of special functions and representations of quantum groups. Then it is shown that special functions of a matrix argument are related to representations of general simple Lie groups and a connection between generalized hypergeometric functions and matrix elements in Gel'fand-Zetlin bases is discussed. The chapter on modular forms, theta functions and representations of affine Lie algebras closes the last volume. The book is written nicely and systematically. Not all cases are always discussed fully, often a typical case is described in detail and the others are left to the reader as an excercise. Most of the misprints (which cannot be avoided in such a complicated and comprehensive text) can be detected and corrected but, for example, the definition of the Kähler manifold (vol.1, p.22) can be misleading for beginners.

The three volumes represent together a monumental survey of the area, they contain new results as well as new points of view and they will be without any doubts very valuable not only for specialists but for a general audience interested in mathematics and mathematical physics. (vs)

W.Boehm, H.Prautzsch: Numerical Methods, Friedrich Vieweg & Sohn, Braunschweig, 1993, x+186 pp., DM 58.00, ISBN 3-528-06350-5, ISBN 1-56881-020-2

This book gives a survey of numerical methods of linear algebra, analysis and differential equations. It addresses undergraduate students in mathematics, computer science, engineering and other fields. The book is written in

a very nice style. The treatment is concise but clear and comprehensive and is accompanied by many examples, graphs, algorithms and exercises. The book can be recommended as a textbook for undergraduate courses, as well as a reference book. (mf)

D.Tall (Ed.): Advanced Mathematical Thinking, Mathematics Education Library, vol.11, Kluwer Academic Publishers, Dordrecht, 1991, xvii+289 pp., $ 89.00, ISBN 0-7923-1456-5

The title is misleading. It turns out that the authors have in mind, rather, some of the first basic notions which the students meet when leaving the realm of what is usually called "elementary", as for example the notion of a limit, or realizing that there is not only one infinity. The first part consists of several chapters concerned with generalities. Since they are written by several authors and since most of them want to tell you their views from the very beginning, the reading is rather repetitive. One cannot escape the feeling that a summary by one author would tell it all in half the space or less. And, I am sorry to say, I have grave doubts about the usefulness of most of the views (which concerns also the ideas behind most of the more concrete case studies in the second half of the volume). In my experience, the students are much more clever than the authors seem to think. They do not typically need all that help when coping with the obstacles discussed and usually do remarkably well on their own when getting to the notions the hard way - and gain much more by that. Of course, if the impression is created that it is primarily the task of the teacher to remove all the obstacles, and not so much the task of the student to try hard to understand, the rules of the game are gladly accepted: why waste the energy? The part concerning the concrete case studies is less repetitive and hence less tedious. But at some places, besides the doubts stated above, I also have some doubts about the methodology (biased interpretation of the data: lack of a parallel experiment to compare the new procedure with the usual one). (ap)

M.Atteia: Hilbertian Kernels and Spline Functions, Studies in Computational Mathematics, vol.4, North-Holland, Amsterdam, 1992, xii+386 pp., $ 150.00, ISBN 0-444-89718-6

This book is devoted to an extensive study of hilbertian approximation with emphasis to spline function theory. The first five chapters provide the theoretical background and chapters VI to VIII deal with fundamental applications. This excellent book will be interesting for those studying numerical analysis and can also be warmly recommended for upper-level undergraduates. Hilbertian kernels and hilbertian subspaces from the points of view of N.Aronszajn and L.Schwartz are studied in Chapter I. An extensive presentation of operations on hilbertian kernels are given. In Chapter II, the author collectes some fundamental results on linear interpolation theory in Hilbert and Banach spaces. The fundamental properties of interpolatory and fitting spline functions are established in Chapter III. The notions of minimizing spline Schoenberg functions and semi-hilbertian kernels are closely connected. The main operations on spline functions related to operations on Hilbert kernels are presented in Chapter IV. Chapter V is devoted to a detailed study of internal and external convergence of interpolatory and smoothing spline functions. Chapter VI deals with spline functions from the point of view of optimization theory of convex functionals. Chapter VII is devoted to the study of spline manifolds associated to a linear differential operator with constant coefficents. Some examples arising in Mechanics and Physics are given. In the final Chapter VIII, B-splines, box-splines and simplicial splines are studied. The results obtained yield techniques for studying Dirac's functionals which are very useful in wavelet theory. (kn)

R.M.Young: Excursions in Calculus. An Interplay of the Continuous and the Discrete, Dolciani Mathematical Expositions Number 13, The Mathematical Association of America, Washington, D.C., 1992, xiv+417 pp., GBP 33.00, ISBN 0-88385-317-5

In a way, it is a problem book: it contains more than 400 rather different (easy, difficult and even some unsolved) problems. But, as the subtitle says, it is on the interplay of "discrete notions" like induction, combinatorics and discrete probability with traditional calculus. Problems to be solved using induction range from those concerning Pythagorean triangle and square numbers and formulae for special finite sums to the properties of special sequences (monotonicity, etc.). Chapters are subdivided into parts each of which is accompanied by a list of problems; to illustrate what one can expect to find in the book we include the list of Chapters: 1. Infinite Ascent, Infinite Descent: The Principle of Mathematical Induction, 2. Patterns, Polynomials, and Primes: Three Application of the Binomial Theorem, 3. Fibonacci Numbers: Function and Form, 4. On the Average, 5. Approximation: From Pi to the Prime Number Theorem, 6. Infinite Sums: A Potpourri, Appendix: The Congruence Notation. The book contains a list of 463 references and a list of hints where solutions to the problems can be found. A nicely written book of a great value to stimulate active work of students and a unique source of nice illustrative examples. (jive)

P.C.Kenschaft, S.Z.Keith (Eds.): Winning Women Into Mathematics, Committee on the Participation of Women, The Mathematical Association of America, Washington, D.C., 1991, ix+78 pp., GBP 10.00, ISBN 0-88385-453-8

The goal of this collection is not only to provide a true picture of the current status of American women in mathematics but also to stimulate an increase in the number of women that study mathematics or are professionally active in the field and to draw the attention of the society to their problems and achievements. It results from activities of the Committee On Participation of Women of the Mathematical Association of America that was established in 1987. It is necessary to stress that both the members of the Committee and the authors believe that discrimination against women in mathematics is less than in any other field and that mathematics provides for them more satisfaction and career opportunities than most other fields. The content of the volume ranges from rigorous reports and analysis of the present situation through personal memories of leading female mathematicians and statistical surveys on various aspects of women involvement to jokes and humorous skits. It addresses problems specific for America as well as general ones. It is interesting to read and to be surprised by the fact that at many places the authors express and generalize your own feelings and experience. (jd)

W.Hodges: Model Theory, Encyclopedia of Mathematics and its Applications, vol.42, Cambridge University Press, Cambridge, 1993, xiii+772 pp., $ 99.95, ISBN 0-521-30442-3

The book is an up-to-date comprehensive textbook for advanced students, useful also for specialists as a reference book. In comparison with the classical Chang C.C., Keisler H.J.: Model Theory, North-Holland, Amsterdam 1973, it is different in its structure and it is more exhaustive. The contents is divided into twelve chapters, each being devoted to a special topic discussed from the very beginning to a high level. Let us mention some of them: Classifying structures, Structures that look alike, Interpretations, Saturation. Each chapter is concluded by historical and bibliographical notes. There is an appendix containing advanced examples concerning such common structures as modules, fields, linear orderings, groups, Abelian groups. The brief comments connecting the treated matterial with other branches in (or out of) the book are very pleasant to read. (kc)

F.Gordon, S.Gordon (Eds.): Statistics for the Twenty-First Century, MAA Notes and Reports Series Number 26, The Mathematical Association of America, Washington, D.C., 1992, xii+318 pp., GBP 18.00, ISBN 0-88385-078-8

The book is a collection of papers about teaching introductory courses in statistics. To avoid misunderstanding, it should be remarked that by statistics the authors do not mean mathematical statistics. An introductory course is usually the first course but in this case it should be rather called the last course in statistics for the overwhelming majority of students. The authors stress that statistics is not mathematics, its teaching should be based on real data, computers should be used for plotting and exploring data and a basic statistics course should cover no more probability than is actually needed. The book is divided into four parts: I. Issues in statistical education. II. Innovative curricula for statistical education. III. Technology in statistical education. IV. Resources for statistical education. It is interesting reading for everybody who teaches statistics to non-mathematically oriented students. It is clear that methods based on finite-dimensional probability spaces would be best for such audience. From this point of view the paper about nonparametrics could have demonstrated the principles of testing statistical hypotheses. Sampling techniques from finite populations are not mentioned at all. (ja)

Yu.V.Egorov, M.A.Shubin (Eds.): Partial Differential Equations IV. Microlocal Analysis and Hyperbolic Equations, Encyclopaedia of Mathematical Sciences, vol.33, Springer-Verlag, Berlin, 1993, 241 pp., 6 fig., DM 136.00, ISBN 3-540-53363-X, ISBN 0-387-53363-X

This book is a survey of recent results in selected topics of PDE's. The first part written by Yu.V.Egorov deals with microlocal analysis and its applications to problems of the theory of partial differential equations. The most important topics discussed are: evolution of singularities of solutions of PDE's, integral curves of Hamiltonian systems, pseudodifferential equations and canonical transforms, subelliptic operators and Poisson brackets. The second part of the book written by V.Ya.Ivrii is devoted to recent results in theory of hyperbolic linear equations and systems. Necessary and sufficient conditions for C^∞ and L_2 well possedness of the Cauchy problem are given. The same problem is studied in Gevrey classes. Finally the mixed problem for hyperbolic equations and systems is considered. A list of 17 interesting unsolved problems is included. It should be pointed out that the prerequisities are quite advanced. The bibliography to the first part contains 165 items (up to 1986) and tha to the second part 139 items (up to 1984). An "addendum" giving an account of results which appeared in 1985-87 is also included. (jikop)

G. Opfer: Numerische Mathematik für Anfänger, Vieweg studium, Bd.65, Grundkurs Mathematik, Friedrich Vieweg & Sohn, Wiesbaden, 1993, xiv+288 pp., 24 fig., DM 28.00, ISBN 3-528-07265-2

The book can be regarded as a textbook. Within the almost 300 pages one can find more than 60 illustrative examples, 20 figures and 30 tables. A list of those as well as a list of some 10 Pascal codes of basic algorithms is added to the contents of the book which makes all of them easy to find and the whole book easy to use as a handy reference. Each section is supplemented with exercises to be solved to practice the concepts learned.

The contents of the book cover the standard topics of a first course in numerics. After a short paragraph on round-off errors, the problems of interpolation are studied, like evaluation of functions, polynomial interpolation, spline techniques and trigonometric interpolation. Then one proceeds to study numerical integration. The level of study in this part of the book is basic, e.g. no sophisticated algorithms for evaluating/approximating function values for particular special functions like the gamma or the beta functions are included. The same basic level is kept as one proceeds to study linear systems of equations. Besides Gauss elimination process only some standard iterative processes are introduced such as Jacobi, Gauss-Seidel, SOR or the method of conjugated gradients. No attention is paid to the detailed study of the structure of a matrix, i.e. no special treatment for block matrices or large matrices with a few elements is done. Further, linear optimization and approximation problems are only touched on. The penultimate chapter then deals with problems of calculating eigenvectors and eigenvalues of a matrix. Again, only basic concepts are studied, not allowing one to solve the problem for large and/or particularly structured matrices. Finally, basic nonlinear calculations are introduced like Newton iteration formula. Both the size (smaller than A5) and the volume (less than 300 pages) of the book are handy which makes it comfortable to use. (mr)

T.M.Apostol, H.E.Chrestenson, C.S.Ogilvy, D.E.Richmond, N.J.Shoonmaker (Eds.): A Century of Calculus. Part I, The Raymond W.Brink Selected Mathematical Papers, The Mathematical Association of America, Washington, D.C., 1992, xv+462 pp., GBP 30.00, ISBN 0-88385-205-5

T.M.Apostol, D.H.Mugler, D.R.Scott, A.Sterrett,Jr., A.E.Watkins: A Century of Calculus. Part II, The Raymond W.Brink Selected Mathematical Papers, The Mathematical Association of America, Washington, D.C., 1992, xvi+481 pp., GBP 30.00, ISBN 0-883385-206-3

Part I was originally published in 1969 (*Selected Papers on Analysis*). Part I and II consist of 160 carefully chosen articles from American Mathematical Monthly (Vol. 1–98), Mathematics Magazine (Vol. 1–64) and College Mathematics Journal (Vol. 1-22). Selected articles are grouped into twelve categories forming chapters (e.g. 1. History, 2. Pedagogy, 3. Functions, ...). Part II contains one more chapter (13. The Light Touch) containing mathematical poetry and some interesting pearls (mistakes). The collection is a unique source of inspiring ideas most of which can directly serve to improve Analysis and Calculus courses, etc. To give an example: while teaching about sequences and series one can profit from 38 related articles and even more containing additional material. Among these two bring an "easy approach" to $\sum n^{-2} = \pi^2/6$ and one can also find a description of the Euler's original approach to it. Three other articles contain proofs of $\sum p^{-1} = \infty$ (p prime); however, material on harmonic series related topics is much larger. Similar examples to the one on series could be provided on subjects like integration, differentiation, applications, etc. References attached to each chapter provide a valuable source for further reading. One can hardly store in the office all volumes of the excerpted journals but to have there two soft-covered volumes of the best articles in a field is possible (and valuable); for a library of Universities (especially young) or colleges it is almost a must. I am pleased that it is provided for Mathematical Analysis – for some years I compiled a list of articles from AMM valuable for calculus courses and I am very glad that the editorial committee chose many of the articles I have also much appreciated. (jive)

M.Schroeder: Fractals, Chaos, Power Laws. Minutes from an Infinite Paradise, W.H.Freeman and Company, New York, 1991, xviii+429 pp., 196 fig., $ 24.90, ISBN 0-7167-2136-8, ISBN 0-7167-2357-3

The book treats popular topics indicated in the title. The reader will find basic descriptions of related mathematical notions and a lot of applications. No prior knowledge of anything but basic mathematics is assumed. Constructions based on elementary mathematical tools (as e.g. the one of the Sierpinski gasket, a finite-dimensional analogue of the Cantor discontinuum) are nice and clear; on the other hand, the author has not always been so successful in introducing somewhat more advanced notions, like the one of a Markov process. The spectrum of applications is very wide and reflects extensive interests of the author (by the way, M.Schroeder is a renowned specialist in concert hall acoustics, also the author of "Number Theory in Science and Communication"). The book is written in a good journalist style, full of wit, and includes many excursions into history. (dv)

L.A.Steen (Ed.): Heeding the Call for Change. Suggestions for Curricular Action, MAA Notes and Report Series, Number 22, The Mathematical Association of America, Washington, D.C., 1992, ix+247 pp., GBP 17.00, ISBN 0-88385-079-6

The report "A Call for Change" issued by the Mathematical Association of America in 1991 has been an impulse for a wide reform of all aspects of collegiate mathematics. This volume provides reactions to the challenge posed by the MAA report. Although themes covered are quite diverse, there is a "common denominator": instruction needs to become an active, constructive process in which students learn to communicate about mathematics, to build mathematical models and to connect mathematical ideas with the world around them. Five chapters summarize results of discussions within Focus Groups established by MAA and cover topics of current interest (statistics, quantitative literacy, geometry, environmental mathematics and assesment). There are two contributions more journalistic in spirit - on multiculturalism and on educational research in collegiate mathematics. The final two chapters are reprints of two reports: Challenges for College Mathematics (1990) and The Undergraduate Major in the Mathematical Sciences (1991). The opinion presented are inspiring for collegiate and university mathematics teachers. The volume proposes some answers but also induces a large number of questions to be discussed. (in)

Z.A.Karian (Ed.): Symbolic Computation in Undergraduate Mathematics Education, MAA Notes and Reports Series Number 24, The Mathematical Association of America, Washington, D.C., 1992, x+181 pp., GBP 18.00, ISBN 0-88385-082-6

This volume of the MAA Notes is a collection of more than 20 contributions to educational problems using Computer Algebraic Systems (*CAS's*). It consists of five parts: General Pedagogic Issues, Symbolic Computation in Calculus, Symbolic Computation in Linear Algebra and Differential Equations, Symbolic Computation in Advanced Undergraduate Courses, Getting Started and Review of the Literature. Some of the papers are of a rather philosophical nature and devoted to the Hamlet type question: *To use or not to use?* (*CAS's* in undergraduate Mathematics education). Five of the *CAS's* are discussed in more detail: Mathematica, Maple, Reduce, Derive, and MuMath. One of the prevailing opinions is that *CAS's* can particularly help in the technical part of teaching. The mathematical modelling process has three stages: (i) formulation of a scientific problem in mathematical terms, (ii) solution, (iii) interpretation, verification, and communication of the results. *CAS's* can reduce the amount of time spent by the instructor and student on step (ii). (Freely adapted from *Olwell*, p.83.) Another observation: "We teach mathematical **algorithms** – symbolic algorithms on symbolic data, anyway – reasonably well. We teach mathematical **ideas** poorly." (*Zorn*, p.20). The reader will also find many interesting examples from calculus and applied mathematics, and a useful bibliography in the last part. (jh)

J.M.Aarts, T.Nishiura: Dimension and Extensions, North-Holland Mathematical Library, vol.48, North-Holland, Amsterdam, 1993, xii+331 pp., $ 106.50, ISBN 0-444-89740-2

A famous result of de Groot in 1942 stating that a separable metrizable space X is rim-compact iff there is a compact metrizable $Y \supseteq X$ with ind $(Y \backslash X) \leq 0$ showed a link between dimension theory and a theory of extensions of topological spaces. In general, one may ask if there exist two dimension-like functions d_1, d_2 and a class of spaces C such that for a space X and natural $n, d_1(X) \leq n$, iff there is a space $Y \in C$ with $Y \supseteq X$ and $d_2\ (Y \backslash X) \leq n$. The book under review is an excellent complete survey of this branch of general topology. It starts with the fundamental properties of the standard dimensions dim, ind and Ind. Then a variety of other dimension-like functions are introduced, depending either on a space or on its extension, and mutual relationships are established. Simultaneously, various compactifications and completions enter. The book culminates with Kimura's theorem, the final solution of de Groot's problem. A systematic treatment, both of the properties of dimension-like functions as well as of the classes of extensions, a kind attitude to the reader and perfect organization are the main highlights of this fine book. (ps)

ARTICLES FOR FUTURE EDITIONS of EMS NEWSLETTERS

Files may be sent to Mrs B Betts email: **bjb@uk.ac.soton.mail**

Articles ready for printing or on disk (Wordperfect)($\TeX$)

Paper size: A4 **Single spacing** **Font size 11 point**

CAMBRIDGE

A Primer of Nonlinear Analysis
A. AMBROSETTI and G. PRODI
£25.00 net HB 0 521 37390 5 192 pp. 1992
Cambridge Studies in Advanced Mathematics 34

Sporadic Groups
MICHAEL ASCHBACHER
£35.00 net HB 0 521 42049 0 368 pp. 1993
Cambridge Tracts in Mathematics 104

Now in paperback

Finite Group Theory
MICHAEL ASCHBACHER
£16.95 net PB 0 521 45826 9 288 pp. 1993
Cambridge Studies in Advanced Mathematics 10

Polynomial Invariant of Finite Groups
D. J. BENSON
£19.95 PB 0 521 45886 2 128 pp. 1993
London Mathematical Society Lecture Note Series 190

Numerical Mathematics
A Laboratory Approach
The late S. BREUER and G. ZWAS
£30.00 net HB 0 521 44040 8 320 pp. 1993

Cohen-Macaulay Rings
W. BRUNS and J. HERZOG
£45.00 net HB 0 521 41068 1 415 pp. 1993
Cambridge Studies in Advanced Mathematics 39

Riemannian Geometry
A Modern Introduction
ISAAC CHAVEL
£35.00 net HB 0 521 43201 4 352 pp. 1993
Cambridge Tracts in Mathematics 108

Duality and Perturbation Methods in Critical Point Theory
N. GHOUSSOUB
£35.00 net HB 0 521 44025 4 288 pp. 1993
Cambridge Tracts in Mathematics 107

Primes and Programming
An Introduction to Computing with Number Theory
P. J. GIBLIN
£30.00 net HB 0 521 40182 8 251 pp. 1993
£12.95 net PB 0 521 40988 8

Theory of Algebraic Invariants
DAVID HILBERT
Translated by REINHARD C. LAUBENBACHER
Edited by and with an introduction by BERND STURMFELS
£25.00 net HB 0 521 44457 8 256 pp. 1993
£12.95 net PB 0 521 44903 0
Cambridge Mathematical Library

Algebraic Varieties
G. KEMPF
£22.95 PB 0 521 42613 8 173 pp. 1993
London Mathematical Society Lecture Note Series 172

Arithmetic of Quadratic Forms
Y. KITAOKA
£35.00 net HB 0 521 40475 4 252 pp. 1993
Cambridge Tracts in Mathematics 106

Exercises for Fourier Analysis
T. W. KÖRNER
£35.00 net HB 0 521 43276 6 400 pp. 1993
£15.95 net PB 0 521 43849 7

Now in paperback

Hydrodynamics
Seventh Edition
HORACE LAMB
Foreword by RUSS CAFLISCH
£19.95 net PB 0 521 45868 4 768 pp. 1993
Cambridge Mathematical Library

Representations of Solvable Groups
OLAF MANZ and THOMAS WOLF
£25.00 PB 0 521 39739 1 320 pp. 1993
London Mathematical Society Lecture Note Series 185

Now in paperback

Algebraic Curves Over Finite Fields
Error-Correcting Codes and Exponential Sums
CARLOS MORENO
£16.95 net PB 0 521 45901 X 254 pp. 1993
Cambridge Tracts in Mathematics 97

Geometric Group Theory
Edited by GRAHAM NIBLO and MARTIN ROLLER
Volume 1:
£22.95 PB 0 521 43529 3 224 pp. 1993
Volume 2: Asymptotic Invariants of Infinite Groups by M. Gromov
£22.95 PB 0 521 44680 5 304 pp. 1993
London Mathematical Society Lecture Note Series 181 & 182

Probability Theory, an Analytic View
D. W. STROOCK
£30.00 net HB 0 521 43123 9 464 pp. 1993

Asymptotic Behaviour of Solutions of Evolutionary Equations
M. I. VISHIK
£22.95 net HB 0 521 42023 7 168 pp. 1993
£10.95 net PB 0 521 42237 X
Lezioni Lincee

Surveys in Combinatorics, 1993
Edited by K. WALKER
£22.95 PB 0 521 44857 3 296 pp. 1993
London Mathematical Society Lecture Note Series 187

Complexity: Knots, Colourings and Countings
DOMINIC WELSH
£19.95 PB 0 521 45740 8 171 pp. 1993
London Mathematical Society Lecture Note Series 186

Shintani Zeta Functions
A. YUKIE
£25.00 PB 0 521 44804 2 351 pp. 1993
London Mathematical Society Lecture Note Series 183

To order or get further information 'phone Tom Peacock on 0223 325782, fax 0223 315052,
Email TW10002@PHX.CAM.AC.UK, or write to the address below.

CAMBRIDGE UNIVERSITY PRESS

The Edinburgh Building, Cambridge CB2 2RU, UK

Walter de Gruyter
Berlin • New York

de Gruyter Expositions in Mathematics

Editors: O. H. Kegel • V. P. Maslov • W. D. Neumann • R. O. Wells, Jr.

The Analytical and Topological Theory of Semigroups *Volume 1*
- Trends and Developments -

Editors: *K. H. Hofmann, J.D. Lawson,* and *J.S. Pym*
1990. 17 x 24 cm. XI, 398 pages.
Cloth DM 138,-- / sfrs 133.00 / ÖS 1077.00
ISBN 3-11-012489-0

H.J. Baues *Volume 2*
Combinatorial Homotopy and 4-Dimensional Complexes
With a preface by Ronald Brown

1991. 17 x 24 cm. XXVII, 380 pages.
Cloth DM 158,-- / sfrs 152.00 / ÖS 1233.00
ISBN 3-11-012488-2

A.M. Meirmanov *Volume 3*
The Stefan Problem
Translated from the Russian by Marek Niezgódka and Anna Crowley

1992. 17 x 24 cm. IX, 245 pages.
Cloth DM 148,-- / sfrs 143.00 / ÖS 1155.00
ISBN 3-11-011479-8

K. Doerk/T. Hawkes *Volume 4*
Finite Soluble Groups
1992. 17 x 24 cm. XIV, 891 pages.
Cloth DM 268,-- / sfrs 255.00 / ÖS 2091.00
ISBN 3-11-012892-6

A. A. Karatsuba / S. M. Voronin *Volume 5*
The Riemann Zeta-Function
Translated from the Russian by Neal Koblitz

1992. 17 x 24 cm. XII, 396 pages.
Cloth DM 198,-- / sfrs 190.00 / ÖS 1545.00
ISBN 3-11-013170-6

V. R. Nazaikinskii, V. E. Shatalov, B. Yu. Sternin *Volume 6*
Contact Geometry and Linear Differential Equations
1992. 17 x 24 cm. VII, 216 pages.
Cloth DM 148,-- / sfrs 143.00 / ÖS 1155.00
ISBN 3-11-013381-4

Yu. A. Bahturin, A.A. Mikhalev, V.M. Petrogradsky, M.V. Zaicev *Volume 7*
Infinite Dimensional Lie Superalgebras
1992. 17 x 24 cm. X, 250 pages.
Cloth DM 158,-- / sfrs 152.00 / ÖS 1233.00
ISBN 3-11-012974-4

E.I. Khukhro *Volume 8*
Nilpotent Groups and their Automorphisms
1993. 17 x 24 cm. XIV, 252 pages.
Cloth DM 158,-- / sfrs 152.00 / ÖS 1233.00
ISBN 3-11-013672-4

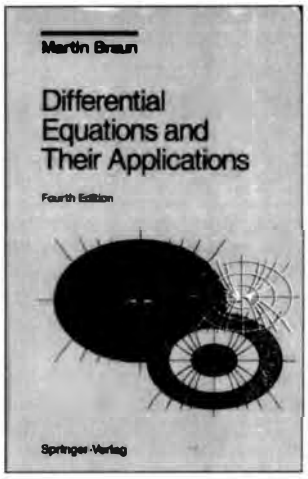
M. Jarnicki/P.Pflug *Volume 9*
Invariant Distances and Metrics in Complex Analysis
1993. 17 x 24 cm. XI, 408 pages. With 6 figures.
Cloth DM 178,-- / sfrs 171.00 / ÖS 1389.00
ISBN 3-11-013251-6

E. Guadagnini *Volume 10*
The Link Invariants of the Chern-Simons Field Theory
- New Developments in Topological Quantum Field Theory -

1993. 17 x 24 cm. XIV, 312 pages. With 157 figures.
Cloth DM 148,-- / sfrs 143.00 / ÖS 1155.00
ISBN 3-11-014028-4

Walter de Gruyter & Co., Berlin · New York Postfach 30 34 21, D - 10728 Berlin
Tel.: (030) 2 60 05 - 0, Fax: (030) 2 60 05 - 2 51

Exciting New Books from Springer



V.F. Lazutkin

KAM Theory and Semiclassical Approximations to Eigenfunctions

Appendix by A.I. Shnirelman

1993. IX, 387 pp. 66 figs. (Ergebnisse der Mathematik und ihrer Grenzgebiete, Vol. 24) Hardcover DM 198,-
ISBN 3-540-53389-3

It is a surprising fact that so far almost no books have been published on KAM theory. The first part of this book seems to be the first monographic exposition of this subject, despite the fact that the discussion of KAM theory started as early as 1954 (Komogorov) and was developed later in 1962 by Arnold and Moser.
Today, this mathematical field is very popular and well known among physicists and mathematicians.

M. Braun

Differential Equations and Their Applications

An Introduction to Applied Mathematics

4th ed. 1993. XVI, 578 pp. 68 figs. (Texts in Applied Mathematics, Vol. 11) Hardcover DM 98,- ISBN 3-540-97894-1

Fully understandable to students who have had one year of calculus, this book differentiates itself from other differential equations texts through its engaging application of the subject matter to interesting scenarios. This fourth edition incorporates earlier introductory material on bifurcation theory and adds a new chapter on Sturm-Liouville boundary value problems. Computer programs in C, Pascal, and Fortran are presented throughout the text to show the reader how to apply differential equations toward quantitative problems.

F.C. Hoppensteadt

Analysis and Simulation of Chaotic Systems

1993. XVII, 305 pp. 74 figs. (Applied Mathematical Sciences, Vol. 94) Hardcover DM 98,- ISBN 3-540-97916-6

This text is designed to be used at the graduate level in applied mathematics for students from mathematics, engineering, physics, chemistry and biology. It can be used as a stand-alone text for a full year course or it can be supplemented with material of more mathematical, engineering or scientific nature. Computations and computer simulations are used throughout this text to illustrate phenomena discussed and to supply readers with probes to use on new problems.

W. de Melo, S. van Strien

One-Dimensional Dynamics

1993. IX, 605 pp. 89 figs. (Ergebnisse der Mathematik und ihrer Grenzgebiete, Vol. 25) Hardcover DM 148,-
ISBN 3-540-56412-8

An account of the state of the art in one-dimensional dynamical systems is given here. The subject is studied from a combinatorial, continuous, ergodic and smooth point of view.
Several results in this book are new; moreover, the exciting new developments on universality and renormalization due to D. Sullivan are presented here in full detail for the first time. The study of circle maps, interval and holomorphic maps of the Riemann sphere are all shown to be based on similar principles. With this book, the reader is able to quickly get to the frontier of this exciting subject without studying many inaccessible papers.

Springer

Prices are subject to change without notice.
All prices for books and journals include 7% VAT. In EC countries the local VAT is effective.

d&p.881.MNT/V/1

Springer-Verlag ☐ Heidelberger Platz 3, D-14197 Berlin, F.R. Germany ☐ 175 Fifth Ave., New York, NY 10010, USA ☐ 8 Alexandra Rd., London SW 19 7JZ, England ☐ 26, rue des Carmes, F-75005 Paris, France ☐ 37-3, Hongo 3-chome, Bunkyo-ku, Tokyo 113, Japan ☐ Room 701, Mirror Tower, 61 Mody Road, Tsimshatsui, Kowloon, Hong Kong ☐ Avinguda Diagonal, 468-4° C, E-08006 Barcelona, Spain ☐ Wesselényi u. 28, H-1075 Budapest, Hungary

MMA 87

J. Prüss

Evolutionary Integral Equations and Applications

1993. 392 pages. Hardcover
DM 188.– / öS 1'466.40 / sFr 168.–
ISBN 3-7643-2876-2

This book deals with evolutionary systems whose equation of state can be formulated as a linear Volterra equation in a Banach space. The main feature of the kernels involved is that they consist of unbounded linear operators. The aim is a coherent presentation of the state of art of the theory including detailed proofs and its applications to problems from mathematical physics, such as viscoelasticity, heat conduction, and electrodynamics with memory. The importance of evolutionary integral equations - which form a larger class than do evolution equations - stems from such applications and therefore special emphasis is placed on these. A number of models are derived and, by means of the developed theory, discussed thoroughly. An annotated bibliography containing 450 entries increases the book's value as an incisive reference text.

MMA 86

M. Nagasawa

Schrödinger Equations and Diffusion Theory

1993. 332 pages. Hardcover
DM 158.– / öS 1'232.40 / sFr. 138.–
ISBN 3-7643-2875-4

Schrödinger Equations and Diffusion Theory addresses the question "What is the Schrödinger equation?" in terms of diffusion processes, and shows that the Schrödinger equation and diffusion equations in duality are equivalent. In turn, Schrödinger's conjecture of 1931 is solved. The theory of diffusion processes for the Schrödinger equation tell us that we must go further into the theory of systems of (infinitely) many interacting quantum (diffusion) particles. The method of relative entropy and the theory of transformations enable us to construct severely singular diffusion processes which appear to be equivalent to Schrödinger equations. The theory of large deviations and the propagation of chaos of interacting diffusion particles reveal the statistical mechanical nature of the Schrödinger equation, namely, quantum mechanics. The text is practically self-contained and requires only an elementary knowledge of probability theory at the graduate level.

Monographs in Mathematics

Managing Editors:
H. Amann, Universität Zürich, Switzerland / K. Grove,University of Maryland, College Park, USA / H. Kraft, Universität Basel, Switzerland / P.-L. Lions, Université de Paris-Dauphine, France

Editorial Board:
H. Araki, Kyoto University / J. Ball, Heriot-Watt University, Edinburgh / F. Brezzi, Università di Pavia / K.C. Chang, Peking University / N. Hitchin, Warwick / H. Hofer, Universität Bochum / H. Knörrer, ETH Zürich / K. Masuda, University of Tokyo / D. Zagier, Max-Planck- Institut, Bonn

The foundations of this outstanding book series were laid in 1944. Until the end of the 1970s, a total of 77 volumes appeared, including works of such distinguished mathematicians as Carathéodory, Nevanlinna and Shafarevich, to name a few. The series came to its name and present appearance in the 1980s. According to its well-established tradition, only monographs of excellent quality will be published in this collection. Comprehensive, in-depth treatments of areas of current interest are presented to a readership ranging from graduate students to professional mathematicians. Concrete examples and applications both within and beyond the immediate domain of mathematics illustrate the import and consequences of the theory under discussion.

MMA 85

K.R. Parthasarathy

An Introduction to Quantum Stochastic Calculus

1992. 304 pages. Hardcover
DM 158.– / öS 1'232.40 / sFr. 138.–
ISBN 3-7643-2697-2

An Introduction to Quantum Stochastic Calculus aims to deepen our understanding of the dynamics of systems subject to the laws of chance both from the classical and the quantum points of view and stimulate further research in their unification. This is probably the first systematic attempt to weave classical probability theory into the quantum framework and provides a wealth of interesting features:
The origin of Ito's correction formulae for Brownian motion and the Poisson process can be traced to commutation relations or, equivalently, the uncertainty principle; Quantum stochastic integration enables the possibility of seeing new relationship between fermion and boson fields; Many quantum dynamical semigroups as well as classical Markov semigroups are realised through unitary operator evolutions. The text is almost self-contained and requires only an elementary knowledge of operator theory and probability theory at the graduate level.

MMA 84

H. Triebel

Theory of Function Spaces II

1992. 380 pages. Hardcover
DM 188.– / öS 1'466.40 / sFr. 158.–
ISBN 3-7643-2639-5

MMA 82 + 83

V.I. Arnold / S.M. Gusein-Zade / A.N. Varchenko

Singularities of Differentiable Maps

Vol. I: The Classification of Critical Points, Caustics and Wave Fronts
1985. 392 pages. Hardcover
DM 218.– / öS 1'700.40 / sFr. 188.–
ISBN 3-7643-3187-9

Vol. II: Monodromy and Asymptotics of Integrals
1988. 502 pages. Hardcover
DM 298.– / öS 2'324.40 / sFr. 258.–
ISBN 3-7643-3185-2

MMA 81

R.I. Zimmer

Ergodic Theory and Semisimple Groups

1984. 220 pages. Hardcover
DM 168.– / öS 1'310.40 / sFr. 138.–
ISBN 3-7643-3184-4

MMA 80

E. Giusti

Minimal Surfaces and Functions of Bounded Variation

1984. 252 pages. Hardcover
DM 178.– / öS 1'388.40 / sFr. 148.–
ISBN 3-7643-3153-4

Please order through your bookseller or write to:
Birkhäuser Verlag AG
P.O. Box 133
CH-4010 Basel / Switzerland
FAX: ++41 / 61 / 271 76 66
For orders originating in the USA or Canada:
Birkhäuser
44 Hartz Way
Secaucus, NJ 07096-2491 / USA

Prices are subject to change without notice. 8/93

Birkhäuser

Birkhäuser Verlag AG
Basel · Boston · Berlin