European Mathematical Society

NEWSLETTER No. 10

1st December 1993

Executive Committee Report

Elections to Council

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The Henri Poincaré Institute

The St. Petersburg Mathematical Society

European Conferences

Mathematics Education

Book Reviews

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Editors

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Please note change of e-mail for I.Netuka above

Editorial Note

As announced in Newsletter 9, the EMS Newsletter intends to take on responsibility for collection and circulation of information on mathematical conferences in Europe and beyond that may be of interest to EMS members. At present we devote generous individual coverage to such items, but in order to control editorial, printing and distribution costs, we shall in future normally only accept and publish announcements communicated to the editor in the following standard pattern.

Title of conference
Venue and Dates
Names of organisers
Short list of invited participants
Contact addresses: postal, telephone, fax, e-mail.

Consolidated lists of activities at Research Institutes, etc., will also be considered.

Organisers can send details by email to

bjb@uk.ac.s•t•n.mail

SUPPORT TO CENTRAL AND EASTERN EUROPE MATHEMATICIANS FOR PARTICIPATING IN SPECIALIZED MEETINGS

In order to help active mathematicians having limited means to participate in specialized conferences which they could not otherwise attend, the EMS has created a budget with 10 000 ECUs.

This (experimental) fund is intended to cover **travel expenses,** or part of them, for mathematicians from central and eastern Europe who have been **invited to a specialized meeting** being held in **any part of Europe.**

Applications must be made by the scientific organizer or committee in charge of the conference. Individual applications will not be considered, but will be sent to the organizer of the meeting.

Applications should contain at least :

- a description of the meeting : title, theme, scientific organizer or committee, main speakers (with explicit mention of those who have already accepted), total number of participants, place, date, provisional budget, as well as the addresses, fax etc... of the applicant,
- a short CV of the mathematician(s) (at most two) for whom a support is requested. Supporting letter(s) will be specially welcome in the case of young mathematicians,
- a statement from the organizer that the application concerns speaker(s) whose local expenses will be taken care of by the conference.

Applications may be sent at any time by ordinary mail or fax to :

Pr. Jean-Marc DESHOUILLERS
EMS (Equipe de Mathématiques Stochastiques)
Université Bordeaux 2
33076 BORDEAUX Cedex (France)

Fax (33) 56 98 57 36

Applications received before end of February 1994 will be answered not later than end of April ; further applications will normally be answered within two months.

The money will be transfered to the organizer of the meeting who will send back a copy of the travel ticket(s) and a short report, after the conference.

EC HUMAN CAPITAL AND MOBILITY PROGRAMME

MRI POST-DOCTORAL FELLOWSHIPS IN MATHEMATICS

Second Round

Applications are invited for a number of fellowships for research in mathematics at the Mathematical Research Institute (MRI) in the Netherlands.

The Mathematical Research Institute (MRI) in The Netherlands has been set up jointly by the mathematics faculties of the universities of Groningen, Nijmegen, Twente and Utrecht. Its aim is to promote research, organise graduate courses and seminars, and stimulate international contacts and exchange. The MRI is one of the main mathematical institutes in The Netherlands. The MRI research programme is divided into three main streams:

Algebra and Geometry
Analysis
Stochastics

Conditions. Applicants must be citizens of a member state of the European Community or resident in the Community; similar rules applys to applicants from several non-member states which participate in the HCM-programme (Austria, Switserland, Sweden, Norway, Finland, Iceland). The activity is intended primarily for the benefit of young researchers at post-doctoral level, defined as researchers having at least six years of higher education and who hold a doctorate or an equivalent degree, or have had two or more years of research experience following a post-graduate course.

Applications. These must include a c.v., list of publications, concise description of research interests and letters of recommendation and/or names of 3 referees, and should reach :

Mathematical Research Institute	
Postdocs Committee	Tel:+31-30-531421
P.O.Box 80.010	Fax:+31-30-518394
3508 TA Utrecht	Email:mri@math.ruu.nl
The Netherlands	

by **1 January 1994.** Scientific information is available from the following people:

Prof.dr. J.H.M. Steenbrink - Algebra and Geometry- +31-80-653144 email: steenbri@sci.kun.nl

Prof.dr. J.J. Duistermaat - Analysis- +31-30-531513 email: duis@math.ruu.nl

Prof.dr. R.D. Gill - Stochastics - +31-30-533763 email: gill@math.ruu.nl

Duration: 6-12 months, exceptionally 24 months.
An MRI committee will make an initial selection of the postdocs in February 1994.

RESEARCH TRAINING IN MATHEMATICS

(European Community Human Capital Mobility Programme)

Applications are invited for a number of 8 month fellowships for research in any area of mathematics, both at doctoral and post-doctoral level, to be held at the

Dipartimento di Matematica, Universita' di Roma "La Sapienza"

Conditions: Applicants must be non Italian citizens of a member state of the European Community or of a Country of EFTA, or be resident in the European Community. Applicants must not have carried out their normal activity in Italy for more than two years prior to the date of submission of the application.

Applicants should be under 33 and expect to have completed a PhD or equivalent degree by 1/1/1996. In all cases succesful candidates will be expected to take up their fellowship on 1 October 1994.

Applications: These must include a Curriculum Vitae, a list of publications, a concise description of research interests and the names of 3 referees. A FAX number and an E-mail address were is possible to reach the candidate should be included.

Applications should reach the coordinator

Prof. Dina GHINELLI, Dipartimento di Matematica,
Universita' di Roma "La Sapienza", P.le Aldo Moro 2, I-00185 ROMA, ITALY

E-Mail: DINA @ ITCASPUR
FAX: 39 6 49913 285

by 15 december 1993.

Each candidate must ensure that her/his referees send their reports so as to reach the coordinator by the same date. A committee will make an initial selection of the fellows on 20 december 1993.

CORRESPONDENCE

LITHUANIA

The President of the Lithuanian Mathematical Society, writes the following letter.

Professor J Kubilius
Lithuanian Mathematical Society
Vilnius University, Universiteto 3
232734 Vilnius
LITHUANIA

Dear Editor,

Lithuanian mathematicians are glad to witness that the international solidarity of mathematicians remains a constant in our unstable, changing world.

Facing great hardship in supplying our libraries with the new mathematical literature we asked Professor F. Hirzebruch for help. His response was a generous donation, which includes various monographs and mathematical periodicals.

Professor W.Schwarz from J.W.Goethe University in Frankfurt am Main, when visiting Vilnius University, also realized our difficulties and has sent us a generous gift of periodicals.

On behalf of all mathematicians enjoying the new enrichment of their library I express the deepest gratitude to these donors, and to all others who may wish to help us.

Sincerely,

J. Kubilius

EUROPEAN MATHEMATICAL SOCIETY

Executive Committee Meeting, Lisbon, Portugal 8–10 October 1993.

The labours of the Executive Committee and its officers seem to be on a steeply increasing curve, reflecting perhaps a growing influence on the part of the EMS.

The Committee was pleased to endorse an offer by Springer–Verlag for a reduction in price of the Zentralblatt für Mathematik (ZBL) for members of the EMS. As the implementation of the offer will involve the various national societies it is important that the precise mechanics of the offer, which have still to be fully worked out, are quite clear. The role of the ZBL as a reviewing journal was actively considered. The question of what the European mathematical community expects of reviewing journals is here pertinent. As a first step a small advisory committee on reviewing database systems is being set up.

As reported previously the EMS nominated three members to the International Scientific Committee of the Banach Center. Congratulations are due to the President, Prof. F. Hirzebruch on his being nominated as Chairman of this Committee at its first meeting in Warsaw.

Arrangements for the European Congress of Mathematics – Budapest are moving forward. This will take place over a 5 day period within 21–27 July 1996 with a format similar to that of the corresponding Paris Congress. The Organising Committee consists of A. Katona (Chairman), C. Szabados (Treasurer), A. Balog (Secretary), and L. Marki. The Round Tables, Scientific and Prize Committees are being set up. The Executive Committee is very pleased B. Prum, J. Moser and L. Lovàsz have agreed to be the chairmen of the respective committee. While the preparation time is greater for the Budapest Congress than for the Paris Congress the latter, as the theatrical metaphor says, will be a hard act to follow.

Application will be made to the European Science Foundation (ESF) to run two series of euroconferences on pure mathematics, one on "Algebra and Discrete Mathematics" and the other on "Mathematical Analysis". An application has previously been submitted for a series of euroconferences on Applied Mathematics. Let us hope that the ESF can share its largesse around!

Possible support for East European mathematicians was fairly easily considered. A Sub–Committee under the chairmanship of J.–M. Deshouillers has been set up with a budget not exceeding 10,000 ECU per annum to give travel and offer support for East European mathematicians. Applications will shortly be solicited.

The needs of the Developing Countries are now under active consideration by a Sub–Committee under the chairmanship of P. Bérard.

The Committee gave close attention to possible future activities of the EMS. What does the membership want of the EMS? Certainly some members want their subscriptions to

be processed more expeditiously! But what of future policies? The Committee has decided to establish an EMS lectureship, but terms and conditions have yet to be prescribed. Is the membership satisfied with the comparatively lowly level of publication? The Committee debated and agonised over this question at length. Relations with EUROMATH would also seem to require attention. Within its limited resources the Committee is trying, on behalf of European mathematics to be as effective as possible, but it does need the views of the Society's membership! An important channel for communication will be the already announced Council Meeting in Zurich in 1994. Elections to the Committee require to take place, most particularly for the office of President which, under the constitution, may only be held for four years. An opportunity for the membership to influence events! *Vivat Societas Mathematica Europaea!*

D.A.R. Wallace

IMPORTANT NOTICE

ELECTION OF COUNCIL DELEGATES

As announced in the previous issue of the Newsletter, nominations are required for Council delegates representing individual members of the Society. On 1 November 1993 there were 1681 individual members, and this means that there should be 17 delegates representing them. There are already 12 such delegates, elected for a four-year term starting in 1992, namely

T. Aubin (France)
P. Bérard (France)
B. Branner (Denmark)
J.-M. Deshouillers (France)
N. Desolneux-Moulis (France)
S. Dineen (Ireland)
R.A. Fenn (UK)
J.M. Howie (UK)
M. Karoubi (France)
P. Malliavin (France)
H.H. Martens (Norway)
M. Martin-Deschamps (France)

Nominations are now sought for five delegates to serve for the years 1994–1997. Attached to this notice is a nomination form. Completed nomination forms must arrive at the Society's office in Helsinki by 31 January 1994. If there are more nominations than the allowed number of delegates, a postal election will be held; members will receive ballot forms in February 1994 and these must be returned by 31 March 1994.

Nominated delegates must be individual members of the Society and they must be proposed and seconded by individual members. The Society will pay subsistence costs for them to attend Council meetings, but is not able to cover travel costs except perhaps in cases of particular hardship.

Candidates for election are invited to submit with their nomination form a short biography (not more than 200 words) together with a Statement of not more than 100 words in support of their candidature. These will be circulated to members with the ballot forms.

NOMINATION FORM FOR COUNCIL DELEGATE

NAME:

TITLE:

ADDRESS:

PROPOSER:

SECONDER:

I certify that I am an individual member of the EMS and that I am willing to stand for election as a delegate to Council.

SIGNATURE OF CANDIDATE:

DATE:

Completed forms should be sent to:

Ms T. Mäkeläinen
Department of Mathematics
University of Helsinki
Hallituskatu 15
SF-00100 Helsinki
Finland

to arrive by 31 January 1994.

A photocopy of this form is acceptable.

The "Institut Henri Poincaré" resumes activity

P.-L. Lions

The Henri Poincaré Institute (I.H.P. below) opened in 1928, within the Science Faculty of the University of Paris, subsidised by the French administration, the Rockefeller foundation, the Rothschild family and several other sponsors.

Its first chairman Emile Borel, and the wealth of its library, inheriting the G.Darboux collections of the old Sorbonne, made I.H.P. known worldwide.

In 1969, however, the University of Paris split up and mathematical activity at I.H.P. began to slow down. The premises themselves were allowed to fall into disrepair. Fortunately, a decree of 1990, signed by the French Prime Minister, has resulted in a spectacular revitalisation of I.H.P. After comprehensive renovation of the old building, now completed, the new aims of I.H.P. will be pursued in its four divisions, as follows:

The Emile Borel International Research Centre;
The House of Mathematics;
The Henri Poincaré Library and its documentation centre;
The amphitheatres (and lecture rooms).

A phased reopening of I.H.P. is scheduled from October 1993 to February 1994.

The Emile Borel International Research Centre

This research Centre will organise yearly and half-yearly programmes in Mathematics and Theoretical Physics. It provides office accommodation to a "temporary laboratory" made up of associate professors and post-doctoral fellows for the period of each programme. These programmes are defined, one year ahead, by the scientific steering committee of the I.H.P.

The two levels of its facilities are designed to promote interaction between the various guests. Beside being a high level research centre, it aims at attracting and training young research workers in currently developing topics. It does not accommodate any permanent group.

Out of town colleagues benefit by the centre's activities through visits of the invited professors within each programme.

The first programme, scheduled from February to July 1994, will be on Symplectic Geometry (see details below). This will be followed by programmes on Non Linear Waves (Autumn 1994) and Algebraic Curves (Spring 1995).

The House of Mathematics

The House accommodates activities of general interest for the community of Mathematicians and Theoretical Physicists.

In particular it provides, on a contractual basis, office space to (i) learned societies (SMF, SMAI, SFP etc.) and (ii) various other associations which are involved in programmes aimed at communicating the sciences of Mathematics and Theoretical Physics.

The Library and its Documentation Centre

This distinguished Library has been reorganised, up-dated, and relocated to the larger setting of the first floor. It is a general public Library on Mathematics and Theoretical Physics and their interaction. Its collections excel in History of Mathematics and ancient works. Loans are restricted to Library quarters in order to secure permanent availability of its holdings. In addition it serves as a Documentation Centre by (i) sending, upon request, photocopies of scientific papers, (ii) elaborating and circulating bibliographical selections in connexion with the current programmes at the Emile Borel International Research Centre, and (iii) offering access to the main mathematical data bases.

The Amphitheatres

The renovated Hermite and Darboux lecture-halls and new seminar rooms accommodate meetings and common seminars to the Universities in the Ile de France area and the post-graduate courses of the Emile Borel Centre.

I.H.P. continued

Details about the programme of symplectic geometry (February-July 1994)

Scientific programme: One of the purposes of this semester is to provide advanced instruction in the fields of symplectic geometry and symplectic topology and their connexions with hamiltonian dynamics. The courses may be validated as part of the "DEA" of the main Parisian universities.

Courses:
V.Arnold (Paris-Dauphine): Singularities in symplectic geometry and contact geometry.
Y.Eliashberg (Stanford), E.Giroux (ENS Lyon): 3-dimensional contact topology.
H.Hofer (ETH Zurich, C.Viterbo (Paris-sud): Variational methods in symplectic geometry.
A. Weinstein (U.C. Berkeley): Geometry of the semi-classic approximation in quantum mechanics.
Other activites: Workshop and weekly seminars. A meeting organised by the "Séminaire Sud-Rhodanien".
Other Lecturers: M.Audin (Strasbourg), D.Bennequin (Paris 7), J.Franks (Northwestern), A.Givental (Berkeley), M.Herman (Polytechnique), M.Karasev (Moscow), J.Krichever (Landau Institute), Y.Kosmann (Polytechnique), J.Mather (Princeton), L.Polterovitch (Tel Aviv), J-C.Sikorav (Toulouse 3).
Scientific organisers: F.Laudenbach and C.Viterbo.

Further information: Institut Henri Poincaré, 11 Rue Pierre et Marie curie, 75231 Paris cedex 05, telephone: (33) 1-40-51-76-03, fax(33) 1-43-25-40-67

EUROPEAN NEWS: Country by Country

Gesellschaft für mathematische Forschung e.V.

Geschäftsstelle: Albertstraße 24
D - 79104 Freiburg i.Br.

Die Gesellschaft für mathematische Forschung vergibt 1995 für Arbeiten aus dem Fachgebiet

Angewandte Mathematik und Numerik

den

Förderpreis des
Mathematischen Forschungsinstituts Oberwolfach

Der Preis wird an Mathematiker(innen) bis zum Höchstalter von 35 Jahren aus Europa vergeben. Bei besonders hervorragenden Leistungen kann unabhängig vom Fachgebiet zusätzlich ein weiterer Preis vergeben werden. Vorschlagsberechtigt sind Hochschullehrer aus Europa. Vorschläge müssen bis zum 31. Januar 1994 eingegangen sein.

Nähere Informationen erhalten Sie bei der Geschäftsstelle des Mathematischen Forschungsinstituts Oberwolfach, Albertstraße 24, D-79104 Freiburg.

EUROPEAN NEWS: Country by Country continued

CZECH REPUBLIC

Spring School: Potential Theory and Analysis

Following a longstanding tradition, the Faculty of Mathematics and Physics of Charles University, will organize a Spring School on Potential Theory and Analysis.

The School will be held at Paseky, in a chalet in the Krkonoše Mountains, **May 29 - June 4, 1994**

The program will consist of a series of lectures on:

Harmonic Analysis Techniques for Elliptic Problems with Minimal Smoothness

delivered by: **Carlos Kenig**, University of Chicago, USA

Mailing address: Katedra matematické analýzy
Matematicko-fyzikální fakulta UK
Sokolovská 83, 186 00 Praha 8, CZECH REPUBLIC
Phone/Fax: 42-2-231 76 62
E-mail: kottas@karlin.mff.cuni.cz or umzjk@csearn.bitnet

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International Conference on Potential Theory

ICPT 94

Within the tradition of meetings devoted to potential theory, a conference on potential theory (ICPT 94) will take place on

13 - 19 August 1994

shortly after the International Congress of Mathematicians .

The conference will be concerned with various aspects of potential theory including its applications.

ICPT 94 will be organized in a small conference centre at Kouty near Ledeč n/S. in Czech Republic.

Those interested in receiving the first announcement with a more detailed information should contact the organizers.

ICPT 94 - MFF UK
Matematicko-fyzikální fakulta UK
Sokolovská 83, 186 00 Praha 8
Czech Republic
Phone/Fax: 42-2-231 76 62
E-mail: icpt94@cspguk11.bitnet or icpt94@karlin.mff.cuni.cz

Josef Král, Ivan Netuka, Jaroslav Lukeš, Jiří Veselý

GERMANY

Title: **International conference on Commutative Algebra**
(A satellite conference to the ICM, Zurich, 3-11 August 1994)

Date: 27 July - 01 August 1994

Location: Vechta, Germany

Host institution: Universität Osnabrück, Standort Vechta

Organizing committee: W. Bruns (Vechta), J. Herzog (Essen), M. Hochster (Ann Arbor), U. Vetter (Vechta)

Contact address: Prof. Dr. W. Bruns, Universität Osnabrück, Standort Vechta, Postfach 15 53, D-49364 Vechta.
E-mail: wbcomalg@dosuni1.rz.uni-osnabrueck.de
FAX: +4441-15-444

SPAIN

Thirty Years After Šarkovskii's Theorem

New Perspectives

Dates: 13-18 June 1994

Location: Murcia

Organising committee: Lluís Alsedà
Michal Misiurewicz.

Information: Secretaría del Congreso, Departamento de Matemáticas, Universidad de Murcia, Campus de Espinardo, E-30100 Murcia, SPAIN.
tel: (34-68) 83 3661 fax: (34-68) 83 3803
e-mail: Balibrea@fc.um.es

CATALONIA

1994 BCAT

Barcelona Conference on Algebraic Topology

Organiser: Centre de Recerca Matemàtica (CRM)

Dates: June 1-7, 1994

Location: Sant Feliu de Guíxols

Organising committee: Jaume Aguadé, Manuel Castellet, Guido Mislin

Topics: The conference will focus on new trends in localisation and periodicity, although other areas in homotopy theory are not excluded.

Information: Centre de Recerca Matemática, Apartat 50, E-08193 Bellaterra, SPAIN.
tel: (34-3) 581 1081 fax: (34-3) 581 2202 e-mail: icrm0@cc.uab.es

UNITED KINGDOM

CONFERENCE ON EVOLUTION EQUATIONS

University of Strathclyde, Glasgow, Scotland

Date: 25 - 29 July 1994

The conference will be devoted to research in linear and nonlinear differential equations, semigroups of operators, control theory, mathematical physics and related areas and applications.

Refereed Proceedings of the Conference will be published by Longman.

Organising Committee: G.F. Roach (Chair), W. Lamb (Treasurer), W.M. Anderson, C. Constanda, A.C. McBridge and D.F. McGhee.

Enquiries to: Professor G.F. Roach, Department of Mathematics, University of Strathclyde, Glasgow, G1 1XH, Scotland, U.K.
Tel: +44-41-552 4400 Ext 3800
Fax: +44-41-552 8657 E-mail:caas24@uk.ac.strath.vaxa

THE INSTITUTE OF MATHEMATICS AND ITS APPLICATIONS

Miss Pamela Irving, Conference Officer, The Institute of Mathematics and Its Applications, 16 Nelson Street, Southend-on-Sea, Essex, SS1 1EF, UK

Conferences and Symposia to be held in 1994 and 1995

1994

March 28-30 **IMA Conference on mathematical education of Engineers.** *Loughborough University of Technology*

March 28-30 **Flow and Dispersion through groups of obstacles.** *University of Cambridge*

continued.....

April 8	**IMA 30th anniversary meeting.** *Royal Society, London*
April 14-15	**RISK: analysis and assessment.** *University of Edinburgh*
July 5-7	**IMA Conference on applications of finite fields.** *Royal Holloway, University of London*
September 5-7	**Mathematics of surfaces VI.** *Brunel University*
September 19-21	**Quantitative modelling in the management of health care.** *University of Salford*
November 7-9	**Esorics'94 - European symposium on research computer security.** *Brighton*
December 14-16	**IMA Conference on the applications of combinatorial mathematics.** *Wadham College, Oxford*

1995

April 19-21	**Mathematics in industrial maintenance II.** *University of Salford*
	Mathematics of dependable systems II. *Venue and dates to be confirmed*
July 10-12	**Linear algebra and its applications.** *University of Manchester*

Conferences which the IMA are co-sponsoring - 1994

January 25-27	**Seminar on adaptive computing and information processing: neural networks, Bayesian belief networks, genetic algorithms & simulated annealing.** *London*
February 10	**IEE Colloquium on mathematical aspects of digital signal processing.** *University of Bristol*
March 21-24	**IEE International conference on control 94.** *University of Warwick*
March 29-30	**IMC 5th International conference on application of multivariable system techniques.** *University of Bradford*
April 12-14	**IEE 2nd International conference on computation in electromagnetics.** *University of Nottingham*
April 13-15	**CSG 94 Set-theoretic solid modelling: Techniques and applications.** *Winchester*
April 21-22	**Quieter transport with rubber.** *University of the West of England, Bristol.*
April 26-28	**Seventh International conference on road traffic monitoring and control.** *London.*
July 4-7	**Sixth International conference on HP radio systems and techniques.** *University of York*
September 5-8	**Second European computational fluid dynamics conference.** *Stuttgart*

INTERNATIONAL CENTRE FOR MATHEMATICAL SCIENCES, EDINBURGH

Stochastic Partial Differential Equations

21 March - 1 April 1994

Preliminary announcement

Infinite-dimensional Markov processes have been the focus of intense activity over the last twenty years. These processes arise naturally as models for those physical and biological problems in which one is modelling a stochastically evolving distribution over a continuous space. However, although it is often possible to formulate a problem in the infinite dimensional language of stochastic partial differential equations, we are far from a complete understanding of the associated infinite-dimensional random processes.

The programme will take the form of two weeks of intensive study, with some visitors in residence for longer. The two weeks will be broken into intensive sessions focusing on Measure Valued Processes, the approach to Stochastic Partial Differential Equations provided by Skorohod integrals and Malliavin Calculus, and Mean Field Theory (Ginzburg/Landau models converging to deterministic equations etc). Two days will de devoted to applications, with biologists and engineers talking about the systems they would like to model and the difficulties they face.

Confirmed participants:
D.A.Dawson (Carleton), * P.J.Donnelly (QMW), * S.N.Evans (Berkeley), K.Fleischmann (Berlin), * T.J.Lyons (Imperial), B.Oksendal (Oslo), E.A.Perkins (UBC), F.Rezakhanlou (Berkeley)

* Scientific adviserFor further details contact A.Etheridge, Department of Mathematics, University of Edinburgh, James Clerk Maxwell Building, Kings Buildings, Edinburgh EH9 3JZ. e-mail alison@uk.ac.ed.castle

continued....

RESEARCH PROGRAMME

Harmonic Analysis and Partial Differential Equations

April - July 1994

Under the auspices of the International Centre for Mathematical Sciences, and with financial support from SERC, a research programme on Harmonic Analysis and Partial Differential Equations will be held in Edinburgh from 1 April to 31 July 1994. One of the main aims of the programme will be to focus on the interaction between these two area of analysis. A number of analysts will be resident in Edinburgh for substantial periods of time, with informal activities and seminars taking place throughout. In addition, there will be three periods of more concentrated activity as follows.

(a) 5 - 15 April: An Instructional Conference consisting of expository lectures by E.M. Stein and C.E. Kenig, with introductory series by A. Carbery and F. Soria. Professor Stein will lecture on "Aspects of Harmonic Analysis related to Curvature and Oscillatory Integrals" and Professor Kenig on "Well-posedness and local smoothing effects in nonlinear hyperbolic and dispersive partial differential equations".

(b) 29 May - 4 June: A Workshop on harmonic analysis and oscillatory integrals, together with their uses and applications in hyperbolic and dispersive partial differential equations.

(c) 17 - 23 July: A Workshop focusing on elliptic partial differential equations and related areas of harmonic analysis.

The programme is being directed jointly by A. Carbery and D.E. Edmunds (Sussex) and T.A. Gillespie (Edinburgh), with an Advisory Committee comprising of E.B. Fabes (Minnesota), C.E. Kenig (Chicago) and E.M. Stein (Princeton).

Anyone interested in participating in any part of the programme should contact T.A. Gillespie, Department of Mathematics and Statistics, University of Edinburgh, James Clerk Maxwell Building, The Kings Buildings, Edinburgh EH9 3JZ (e-mail: tagicms@edinburgh.ac.uk; FAX: 031-650 6553).

Nonlinear Optics and Guided Waves

1st - 20th August 1994

A three-week study centre is being organised to address challenging mathematical and technical problems of nonlinear optics, wave-guiding structures and related evolution equations.

The aim of the study centre is to bring about a dialogue between mathematicians, physicists, electronic and communication engineers and computer scientists, to produce advances in these fields. The programme will include survey lecture series and individual topical lectures containing suggestions of topics for group study in workshop discussions. These investigation groups will be guided by an activity panel and encouraged to formulate, analyse and compute new models. Access to established computing software will be available. Likely investigation topics include: Modulational instabilities, soliton dynamics and asymptotic methods in optical fibres; "Active" materials and novel guiding geometries; Lasers as dynamical systems; Large scale computation for problems in nonlinear optics; Ultra long distance soliton propagation.

The following have accepted invitations to speak or act as activators of research investigation:

A.B.Aceves (Albuquerque), J.S.Aitchison (Glasgow), D.Anderson (Gothenburg), J.M.Arnold (Glasgow), A.D.Boardman (Salford), J.C.Eilbeck (Heriot-Watt), J.N.Elgin (Imperial College, London), W.J.Firth (Strathclyde), R.G.Harrison (Heriot-Watt), R.Indik (Tucson), W.F.Kath (Evanston), Yu S.Kivshar (Canberra), S.Koch (Tucson), J.Lega (Nice), L.A.Lugiato (Milan), B.A.Malomed (Tel Aviv), L.F.Mollenauer (AT&T, New Jersey), J.V.Moloney (Tucson), A.C.Newell (Tucson), L.A.Ostrovsky (Nizhni Novgorod), A.Taflove (Evanston), S.Trillo (Rome), S.Wabnitz (Rome), E.M.Wright (Tucson).

Funding for the programme is being provided by the European Science Foundation. Support for UK Mathematicians is available from the London Mathematical Society grant to ICMS.

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XIth INTERNATIONAL CONGRESS

OF MATHEMATICAL PHYSICS

PARIS, July 18 - 23, 1994

Mailing address: ICMP-Paris, Service de Physique Théorique, CE-Saclay, F-91191 Gif-sur-Yvette Cedex, France.
Fax: 33/1/69.08.81.20

The ICMP-Paris is the XI[th] International Congress of Mathematical Physics, following Moscow (1972), Warszawa, Kyoto, Rome, Lausanne, Berlin, Boulder, Marseille, Swansea and Leipzig (1991). It is open to everyone working in or interested in mathematical physics. Coorganized by the IAMP and Universities and Institutes of the Paris area, it benefits from the crucial cooperation and support of the UNESCO, the CEA and the CNRS, and from the further sponsorship and support of the Mayor of Paris, the Commission of European Communities, the French Ministères of Education and Research and the French, European and International Physical and Mathematical Societies, in particular the IMU and IUPAP.

The invited program indicated below will be completed and is subject to some minor changes. The invitation program in the sessions in only partial so far. More information will be given later.

Plenary lectures. Two lectures will be given in parallel in very few cases, if needed.

I. Affleck (Vancouver), A.Connes (Paris and Bures), L. Kadanoff (Chicago), M.Konsevich (Bonn), A.Kupiainen (Helsinki), J.Magnen (Palaiseau), M.Viana (Rio de Janeiro and Porto), J.Wisdom (MIT), E.Witten (Princeton), S.T.Yau (Harvard), J.Yngvason (Reykjavik), Al.B.Zamolodchikov (Rutgers).

Sessions (and session organizers)

Dynamical systems (Y.Sinai, Moscow), *Operator algebras and quantization* (V.Jones, Berkeley), *Non-equilibrium statistical mechanics* (J.Lebowitz, Rutgers), *Equilibrium statistical mechanics, random media and disordered systems, constructive field theory methods, condensed matter* (M.Aizenman, Princeton; J.Avron, Haifa; T.Balaban, Zurich), *General field theory* (D.Buchholz, Hamburg), *Conformal field theories, topological theories, strings, quantum gravity* (C.Itzykson, Saclay), *Integrable systems* (T.Miwa, Kyoto), *Quantum mechanics* (E.Lieb, Princeton), *Quantum chaos* (A.Voros, Saclay), *Relativity* (G.W.Gibbons, Cambridge, England), *Fluid mechanics* (K.Moffat, Cambridge, England).

Detailed information on all aspects of this Congress, including Social Events, on request at the above address.

continued.....

SATELLITE COLLOQUIA

TOPOLOGY, STRINGS AND INTEGRABLE MODELS
Satellite colloquium of the ICMP-Paris

Dates : 25-28 July 1994
Place : Institut Henri Poincaré, Paris (July 25-27) and Ecole Polytechnique, Palaiseau (July 28)
Organizing committee : C. Bachas, D. Bernard, M. Broué, P. Cartier, P. Di Francesco, J.-L. Gervais, V. Pasquier

For information : bachas@orphee.polytechnique.fr
philippe@amoco.saclay.cea.fr
pasquier@amoco.saclay.cea.fr

MATHEMATICAL PHYSICS OF DISORDERED SYSTEMS
Satellite colloquium of the ICMP-Paris

Dates : 25-27 July 1994 - **Place** : PARIS, probably the Sorbonne
Scientific committee : M. Aizenman (Princeton), B.Derrida (Saclay), G. Grimmett (Cambridge), F. Koukiou (Palaiseau), L. Pastur (Kharkov)

Organizer : **F. Koukiou**, Centre de Physique Théorique,
Ecole Polytechnique, F-91198 Palaiseau Cedex, France
e-mail : koukiou@orphee.polytechnique.fr

NEW PROBLEMS IN THE GENERAL THEORY OF FIELDS AND PARTICLES
Satellite colloquium of the ICMP-Paris

Dates : 25-27 July 1994 - **Place** : PARIS, probably the Sorbonne
Advisory Scientific Committee (to be announced)

Organizer : **J. Bros,** Service de Physique Théorique
CE-Saclay, F-91191 Gif-sur-Yvette Cedex, France
Tel. (33) 1 69 08 80 74 - *Fax* : (33) 1 69 08 81 20

CONSTRUCTIVE RESULTS IN FIELD THEORY AND STATISTICAL MECHANICS
Satellite colloquium of the ICMP-Paris

Dates : 25-27 July 1994 - **Place** : Ecole Polytechnique, Palaiseau
Scientific Committee : T. Balaban (Boston), J. Imbrie (Charlottesville, to be confirmed), G. Mack (Hamburg), V. Rivasseau (Palaiseau), R. Seneor (Palaiseau)

Organizer : **V. Rivasseau,** Centre de Physique Théorique,
Ecole Polytechnique, F-91128 Palaiseau Cedex, France
Tel. (33) 1 69 33 47 17 - *Fax* : (33) 1 69 33 30 08
e-mail : rivass@orphee.polytechnique.fr

Centre International des Sciences Mecaniques — *International Centre for Mechanical Sciences*

Preliminary Programme 1994

July, 1993

Courses

Eddy Structures Identification Techniques for Free Turbulent Flows Coordinator: J.P. Bonnet (Poitiers)	May 23 - 27
Summation Theorems and their Applications to the Theory of Structural Stability Coordinator: T. Tarnai (Budapest)	June 27 - July 1
Biomechanical Aspects of Artificial Joints Coordinator: A. Strozzi (Udine)	July 11 - 15
Mechanics of Musical Instruments Coordinators: J. A. Hirschberg (Eindhoven); J. Kergomard (Les Mans)	July 18 - 22
Crack and Contact Problems for Viscoelastic Bodies Coordinator: G.A.C. Graham (Dublin)	September 5 - 9
Polymer Mechanics. Conditions of Solidification and Ageing Coordinator: H. Janeschitz-Kriegl (Linz)	September 12 - 16
Modern Issues in Non Saturated Soils Coordinators: P. Jouanna (Montpellier); B. Schrefler (Padova)	September 19 - 23
Steel Plated Structures Coordinators: M. Ivanyi (Budapest); M. Skaloud (Prague)	September 26 - 30
Protection of Historical Buildings against Earthquake Coordinator: M. Save (Mons)	October 3 - 7

Other Events

CISM - Friuli-Venezia Giulia Region Civil Defence - Department of Georesources-University of Udine. Symposium on: Advanced Methods for Groundwater Pollution Control Coordinator: G. Verri (Trieste)	May
International Summer School on: Lambda Calculus and Functional Programming Coordinators: F. Honsell (Udine); P. Serafini (Udine)	September 19 - 30
10th CISM-IFToMM Symposium on: Theory and Practice of Robots and Manipulators Coordinators: A. Morecki (Warsaw); G. Bianchi (Milano)	Gdansk Sept. 12 - 15

Meetings Hosted by CISM

Computer Aided Assessment and Control of Localized Damage Coordinator: C. Brebbia (Southampton)	June 21 - 23

Additional and more detailed information will be available in October-November 1993.

I-33100 Udine (Italy), Palazzo del Torso, Piazza Garibaldi, 18
Tel.: +39 0432 - Secretariat 294989 or 508251 - Administration 294795 - Printing Office 45533 - Fax 501523
Partita I.V.A. 00401650304

KdV'95

International Symposium to be held in

Amsterdam, The Netherlands

April 23 - 26, 1995

To commemorate the centennial of the publication of the equation by and named after

Korteweg and de Vries

Aims and scope

In 1995 it will have been exactly one hundred years ago that de Vries defended his thesis under Korteweg about what is now known and the 'Korteweg de Vries equation' (KdV equation).

After the publication in the *Philosophical Magazine* in 1895 of the joint paper with title "On the change of form of long waves advancing in a rectangular canal, and on a new type of long stationary waves", nothing much happened. And if there was other work done relevant to the matter - and in fact there was - it was not noticed. Starting in the sixties, research on this and related equations exploded. By now there are some 3100 papers in mathematics and physics that mention the phrase 'Korteweg de Vries equation' in title or abstract, and there are thousands more papers in sciences and technologies such as biology, chemistry, electronics, geology, oceanology, meteorology, ... And of course the KdV equation is only one of several infinite families of what are now called (Liouville) completely integrable systems. The KdV equation and its relatives turn up in many different concrete physical, chemical, ... situations when for wave type phenomena one wants to incorporate nonlinear and dispersive effects. At this level there is still much to understand, just as at the deeper technical mathematical levels.

This centenary provides a unique occasion to try to survey as many different aspects of the KdV equation and its relatives as possible in a moderate length symposium. to do it all is plainly impossible. but it remains possible to give a good idea of the diversity of aspects, both as regards theory and applications, and to give the attentive participant some feeling of the KdV equation.

The KdV equation has both depth, subtlety, and breadth in applications, a rarity that deserves special attention and exposition. Such is the aim of this symposium.

Symposium themes

Soliton equations in fluids and optics, completely integrable systems, analytic, algebraic and geometric methods, super-extensions and theoretical physics.

Invited lectures

Some twelve invited lectures will be presented; a definite list of lecturers, with titles of their contributions, will be given in the second announcement .

At this moment, the following scientists have been invited (an asterisk denotes confirmation):

M.J. Ablowitz*	D.G. Crighton*	W. Eckhaus*	L.D. Faddeev*	I.M.Frenkel
A. Hasegawa*	A.J.M. Kox*	I.M. Krichever*	M.D. Kruskal*	A.C. Newell
F.W. Nijhoff*	N.J. Zabusky	V.E. Zakharov*		

Participation and Call for papers

Scientists and young researchers who are arrive for one of the themes of the symposium, are invited to participate. The number of participants must unfortunately be limited to about one hundred, which may require a selection that will be based mainly on the participants' proposed contributions.

Therefore, people interested to participate are invited to submit a one-page summary of a poster contribution. The posters of all participants can be presented and the summaries will be published in the symposium book. From these contributions, some twelve contributed papers on exciting developments will be selected by the organizing committee for oral presentation and for publication in the proceedings.

The aim is to have the proceedings ready at the time of the symposium.

To achieve this, the following schedule applies:

- before May 1, 1994: summary of poster to received;
- June 15, 1994: invitation to selected authors to submit a contributed paper;
- before September 15, 1994:
  contributed papers to be received in prescribed TEX-format.

The one-page summary of posters should be sent to:

Professor M Hazewinkel
KdV'95-posters
CWI
P.O. Box 4079
1009 AB Amsterdam, **The Netherlands**

Location and Organisation

The symposium is organised by the Dutch Association for Mathematical Physics.

The symposium will start Sunday April 23 1995 with opening lectures in the historic Aula of the University of Amsterdam, the University at which Korteweg was appointed and worked throughout his career as full professor.

The next three days of lectures and poster presentations will take place at the CWI (Center for Mathematics and Informatics), also at Amsterdam.

Further information and request for second announcement

All enquiries and request for second announcement can be addressed to the secretariat mentioned below.

Mrs. M.I. van der Kooij
Department of Applied Mathematics
University of Twente
P.O. Box 217
7500 AE Enschede, The Netherlands

Phone: +31 53 893380
Fax: +31 53 356695
e-mail: mirande@math.utwente.nl

European Science Foundation Network on

HIGHLY STRUCTURED STOCHASTIC SYSTEMS

The European Science Foundation (ESF) has agreed to establish a Scientific Network to encourage research into Highly Structured Stochastic Systems. The objective of the Network is to create opportunities for researchers in related fields throughout Europe to meet and interact, and so to stimulate collaborative work and the exchange of ideas. This is the first announcement from the Highly Structured Stochastic Systems Network, to tell interested people about (a) the research fields covered by Highly Structured Stochastic Systems, (b) the planned Network activities, and (c) proposals to involve and inform the research community.

HIGHLY STRUCTURED STOCHASTIC SYSTEMS

Modern stochastic modelling techniques are capable of building very complex probabilistic structures, to represent a great variety of practical problems. The key to both the construction and analysis of such models is the concept of conditional independence, whereby each variable is related locally (conditionally) to only a few other variables. Therefore, although the model exhibits great complexity globally, it has relatively simple local structure. The essential points of this approach are:

(a) complex models are built up using modular components, and

(b) the graph structure provides the key to global analysis using local computations or simulations.

Research into these Highly structured models has developed in several fields; this Network focusses on three of the most important.

- Image analysis
- Expert systems and graphical models
- Bayesian statistics and applications

NETWORK ACTIVITIES

Activities are planned by a Coordinating Committee. chaired by Professor Peter Green of Bristol University. The Network will operate over a three year period from 1993 to 1996. Planned activities comprise an opening workshop in April 1994, two smaller workshops focussing on specific topics, a general conference in the first half of 1996, and a programme of short visits to stimulate collaborative research.

PARTICIPATION AND INFORMATION

Funding for ESF Networks is relatively modest, being intended to stimulate contacts rather than to fund research directly. Within the limitations of the Network budget, a strategy has been developed to inform the Highly Structured Stochastic Systems community and to give the greatest possible opportunities for participation.

The first priority is to identify who is interested in the field and what research is being done. Anyone interested in Highly Structured Stochastic Systems is invited to contact the Network giving the following information.

1. Name
2. Present employment position
3. Full address
4. E-mail address
5. A description, in up to 150 words maximum, of interests and research being done
6. Publication details of up to 2 relevant articles.

Electronic mail is strongly preferred; please send you information to the following e-mail address: HSSS@maths.nott.ac.uk. Ordinary mail can, however, be sent to HSSS Mailbase, Department of Mathematics, University of Nottingham, University Park, Nottingham NG7 2RD, U.K. Please keep strictly to the above requested information and length limits. Please note also that the Network's resources for this are limited and HSSS Mailbase cannot answer questions or enter into any correspondence. (By sending this information, you will consent to its retention by the Network committee in an electronic database, to be used in accordance with the objectives of the Network.)

Everybody in this database will be sent bulletins about Network activities. Further information about the Network will be available by anonymous ftp from ftp.cwi.nl.

From: "Proceedings of St. Petersburg Math.Soc." Vol.1. 1990

The St. Petersburg Mathematical Society

A.M.Vershik

The St. Petersburg Mathematical Society was founded in 1890. It was the third such in Russia — after the Moscow (1867) and Kharkov (1879) societies. Thus this year we can mark the first century of the Society. However, the presently acting Leningrad Mathematical Society, reconstituted thirty years ago (in September 1959), is the third in a row in our city; its on and off history is not accidental.

The constitution of the St. Petersburg Society was affirmed only in 1893, and by that time it had 98 members. It looks strange that in St. Petersburg, which was undoubtedly the main mathematical center of Russia in the nineteenth and the beginning of the twentieth centuries, a mathematical society was created that late and played, apparently, a nonessential role, being less known than its counterpart in Moscow, for example. However, one should keep in mind that the Academy of Sciences, and most of its members, resided in the then capital, and essentially, performed the functions of a mathematical society, such as conducting scientific meetings, evaluation of papers, awarding prizes, etc. Apparently, this explains why the Moscow Mathematical Society played a bigger role in the scientific life in Moscow than its counterpart in St. Petersburg.

The social tremors of 1917 and subsequent years destroyed many existing scientific institutions and structures. Although we do not have precise data, it seems that the Mathematical Society ceased to exist as well at that time. In 1919 Vladimir Andreevich Steklov was elected vice-president of the Russian Academy of Sciences and started his work on organizing the Society anew. He succeeded in 1921, when the Petrograd Physical-Mathematical Society was recreated. Nikolai Makismovich Gyunter was elected President of the Board.

Ya.V.Uspenskii (who later emigrated to the USA), V.I.Smirnov, B.N.Delone, G.M.Fikhtengol'ts, and others played an active role in the work of the Society, V.A.Steklov, D.Hilbert, F.Klein, A.N.Krylov, Yu.V.Sokhotskii, O.D.Khvol'son, and others were among the honorary members. Regular sessions started being conducted in 1922 (a list of presentations can be found in volume 2 of the "Journal of the Leningrad Mathematical Society"; it is truly impressive). Lectures were given by V.A.Steklov, A.A.Fridman (Friedmann), V.A.Fok, Ya.V.Uspenskii, A.S.Besikovich, S.N.Berstein, V.I.Smirnov, Ya.D.Tamarkin, B.N.Delone, N.M.Gyunter, R.O.Kuz'min, N.I.Muskhelishvili, L.G.Loitsyanskii, Yu.A.Krutkov, B.G.Galerkin, and many others. For the duration of the Society about 150 sessions took place. On April 1st, 1927 it had 102 members.

In 1926 V.A.Steklov finally succeeded in founding the "Journal of the Leningrad Physical-Mathematical Society", about which he had dreamt since 1910. Unfortunately, the scientist did not last to see the publication of the first volume,[1] which he personally edited and prepared for print.

The first issue of the "Journal" opens with the obituaries of Steklov and of the well-known mathematician and physicist A.A.Fridman, who died a little earlier. From 1926 to 1929 only four issues of the "Journal" were published (two volumes with two issues in each, once a year). They contained articles on mathematical physics, mechanics, number theory, topology, analysis, and geometry. Among the authors were N.M.Gyunter, B.N.Delone, I.M.Vinogradov, E.L.Nikolai, V.A.Fox, V.I.Smirnov, N.S.Koshlyakov, I.A.Lappo-Danilevskii, A.A.Markov (Jr.), L.V.Kantorovich, and others. The editorial board was comprised of Ya.V.Uspenskii (editor after the

[1] Steklov died on May 30, 1926

death of Steklov), N.M.Gyunter, B.N.Delone, G.M.Fikhtengol'ts, I.M.Vinogradov, V.I.Smirnov, A.F.Gavrilov, and K.V.Melikov. The "Journal" started its publication at a time when there were almost no mathematical journals in the country. The journal became widely known, although for a brief period, due to the high scientific level and the strong array of authors. At present it is all but forgotten.

Toward the end of the twenties the situation in the country was becoming more and more difficult for independently thinking people, scientists in particular; an open hunt was beginning on different thinking, real or invented. It did not pass by even such a science outside politics, one would think, as mathematics. Various societies fell from grace. The history of persecution, which was joined by semiliterate activists as well as by some serious mathematicians, needs special scrutiny. Objects of these persecutions in Moscow were, for example, the remarkable mathematician D.F. Egorov (president of the Moscow Mathematical Society, 1922—1931) who was sent to Kazan, where he died in a special hospital, and somewhat later his student N.N.Luzin (the prominent mathematician and founder of the modern Moscow School), and others. In Leningrad, very precarious was the position of the president of the Board N.M.Gyunter, whose independent character and courage had for a long time irritated those who "kept an eye" on the state of affairs in the sciences. In this circumstance at a session of the Society, on the initiative of V.I.Smirnov (Gyunter's deputy on the Board) a resolution was adopted for self-dissolution of the Leningrad Mathematical-Physical Society. This unusual resolution preempted, possibly, the course of events usual for those times. In any case Gyunter continued his work and teaching. He died on May 4, 1941, in Leningrad.

Thus, in 1930 there occurred a second break in the history of mathematical societies in our city.

Starting with the mid-thirties, in connection with the relocation of the Academy of Sciences and its institutes to Moscow, many mathematicians, founders of scientific directions, moved to the capital. This process continued; in the fifties and sixties many leading mathematicians moved to Novosibirsk. Although this was a drain on Leningrad mathematics, nevertheless both the thirties and the post-war years were years of its intensive development, and the mathematical life of the city was not weakening. In 1953, on the initiative of Vladimir Ivanovich Smirnov, the Leningrad general mathematical seminar was organized; its sessions were held twice a month during the academic year in the club of scientists. Smirnov was presiding. The organization of the seminar was accepted as a virtual creation of a Leningrad Mathematical Society (about the work of the seminar see Uspekhi Mat.Nauk [translated into English as Russian Mathematical Surveys]).

In the six years of its existence, about 150 reports of both survey and original character were heard, as well as informational reports on publication of mathematical literature and jubilee reports. Among the lecturers were A.D.Aleksandrov, A.A.Markov, S.M.Lozinskii, L.V.Kantorovich, O.A.Ladyzhenskaya, P.S.Novikov, and many others. Members of the presidium of the seminar, in addition to Smirnov, were Yu.V.Linnik, B.A.Venkov, S.M.Lozinskii, A.A.Markov, A.A.Ivanov, and M.F.Shirokhov.

During all that time attempts to organize the Leningrad Mathematical Society (LMS) never ceased, and, finally, after six years(!) they were crowned with success: on April 13, 1959, the Ministry of higher education of the USSR affirmed the constitution of the Society,[2] and on September 19, 1959, the constituent assembly of the LMS took place. A.D.Aleksandrov, the then rector of the Leningrad State University (LSU), rendered much help to Smirnov and others in the re-creation of the Society. The Leningrad Mathematical Society was created at the University rather than at the Academy of Sciences of the USSR and not as an independent society. Such a solution of the problem simplified the procedure of constituting the Society, and, maybe, there was no other possibility of creating it at that time. By its constitution the LMS is a voluntary scientific society whose purpose is to assist the development of the mathematical sciences. It may be considered the direct successor of the Leningrad Mathematical-Physical Society (1921—1930) and thus of the St. Petersburg Mathematical Society.

At its founding the Society had 49 members — mainly all doctors in mathematics and in mechanics in Leningrad. V.I.Smirnov was elected honorary president, and Yu.V.Linnik was elected president.

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[2] Presently the constitution of the Society is under review. The new wording will be published in the next volume of Trudy of the LMS.

By 1963 LMS already had 92 members. The members were, as a rule, local mathematicians. However, there were also exceptions; for example, M.G.Krein (1907—1989). By the Constitution, the members of the Society were required to have a scientific degree, but here also there were exceptions. The Constitution envisaged instituting honorary members. In the second half of the sixties the activity of the Society dropped sharply. This was due to various causes, one of which being that there was no intensive co-opting of new members; from 1963 to 1970 only six members were accepted. In May, 1970, the composition of the Board was renewed, and it was decided to organize a cycle of survey reports on contemporary problems in mathematics and to widely engage mathematicians from other cities, as well as to accept as members a large number of young mathematicians. By May, 1973, LMS had 123 members, in 1978 150, in 1984 209, and in 1985 224 members. On January 1, 1990, the Society had 241 members.

In all the years of its existence (since 1959) the Society had about 350 people as members. Besides the ones who passed away, some moved to other cities or emigrated. The current membership of the Society encompasses the majority of the active mathematicians in the city.

From 1962 on, practically annually, a prize for outstanding work has been awarded to a young mathematician (up to age 30). Since 1987 LMS has organized a competition of students' scientific articles.

The main work of the Society, as before, has been holding sessions dedicated to scientific problems. In the thirty years of the existence of the Society, about 350 reports on a wide variety of themes have been heard: approximately two-thirds of them delivered by Leningrad mathematicians, the rest by Muscovites and mathematicians from other cities and from abroad. An account on all sessions of the Society, with the exception of the fall semester 1969, is published in "Uspekhi" (Russian Math. Surveys). An Analysis of this material for the period up to 1984 was presented by the president of the LMS, S.M.Lozinskii, at the session devoted to the twenty-fifth anniversary of the Society (see Uspekhi, 1986, vol. 1, issue 1).

We do not intend, in this first volume, to go into a detailed analysis of the themes covered, a survey of most interesting reports, discussions, memorial and jubilee sessions for all these years, or into a description of all the types of activity of the Society. Possibly, this will be done later. We restrict ourselves to considering only several facts.

In 1976 a Mathematical seminar for students was created at LMS, where special popular lectures for a general audience are read. A list of these can also be found in "Uspekhi".

In 1980, with the relocation of the department of mathematics and mechanics of the LSU to Petergof, the question arose of where to hold the seminars. Before that they always took place twice a month, on Tuesdays, at the department. A solution was found in organizing a mathematical section at the club of scientists of the Academy of Sciences of the USSR, where it was decided to hold one of two sessions. On occasion the all-city mathematical seminar held its sessions there. The president of the section from its inception in October 1981 till 1985 was S.M.Lozinskii, and since May 1985 was A.M.Vershik. The transfer of the sessions and organization of the section gave the work of the Society a more "open" character, by allowing the sessions to be attended not only by mathematicians, but also by specialists from other scientific sections.

In 1988, the educational council of the LMS was created. Among its tasks are work with teachers, organization of mathematical education in schools, conducting olympiads, etc.

Finally, it should be mentioned that for a long time the leadership and the members of the LMS have endeavored to organize a Leningrad mathematical journal; these efforts have been fruitless for a very long time (almost 30 years!). Only now the reader holds in his hands the first volume of "Trudy of the LMS".

On February 6, 1990, O.A.Ladyzhenskaya was elected president of the Leningrad Mathematical Society.

[Editor's note: the Leningrad Mathematical Society has subsequently been renamed the St. Petersburg Mathematical Society]

Changing needs for computer-based learning in modern University Mathematics

Dr Robert D. Harding, Department of Mathematics and Theoretical Physics, University of Cambridge, Silver Street, Cambridge CB3 9EW.

National educational policy is having a double effect on University teaching. Increasing numbers of students need to be taught without a corresponding increase in resources, and at the same time the style and content of A-Level is changing. In addition there are world-wide influences at work: computers are used both as a 'number-crunching slave' (as in the search for the monster group or solving and graphing complex mathematical systems), and as an aid to symbolic thinking. Another general influence is, I believe, a growing understanding of how to use interactive software as an educational tool.

For historical reasons some may still have a lingering prejudice that computer assisted learning is all about automating teaching. There were experimental projects of this sort in the Sixties, but for the last two decades the emphasis has been firmly on the use of computers to enhance the quality of learning: computers can provide a resource for calculation, visualisation and experimentation.

My own interest began in 1968 with the CATAM Project ("Computer Aided Teaching of Applied Mathematics"), which was one of the earliest projects of this type in the UK. CATAM set out to enhance the teaching of applied mathematics for the Cambridge 3-year degree course by encouraging investigative or problem-solving computing by students with an emphasis on graphical output.

The experience of CATAM gave rise to the idea of the *Computer Illustrated Text* (CIT); each CIT is an integrated text and software package in which the software component is used to illustrate concepts explained in the text. This combines the advantages of a book (for example the ability to browse), with the advantages of using a computer (for example, the illustrative powers of computer graphics). Since 1986, 14 active authors have published (by the Institute of Physics Publishing Ltd) 13 CIT titles [for example, references 1, 2, 3], and there are a growing number of products with a similar philosophy from other publishers.

By the late 1980s multi-media technology was becoming cheap enough for educational use, prompting Apple Computer UK to sponsor the Renaissance Project, from October 1989 to September 1991. There were 4 main teams each concerned with a different discipline area: Dr Douglas Quinney (University of Keele) and I were responsible for the Mathematics team, which produced two compact discs [References 4, 5] with 5 modules ranging from basic mathematics to simple harmonic motion, and some degree level materials on numerical analysis.

The Renaissance work made innovative use of Apple's HyperCard system; similar hypertext products have been developed for the IBM-compatible environment. Hypertext systems allow academics with a minimum of expert help to write materials which are simple and attractive for learners to use. The combination of hypertext with features like calculation and graph plotting is a powerful educational

tool, and is often known as "courseware". The Nuffield Foundation supported Douglas Quinney and me in an 18-month project ending June 1993 to explore its use in university mathematics teaching. We focused on the new style syllabi which will soon be introduced. Although these will be of equal standard to current A-Levels the style will be different, encouraging a more open exploratory style of learning. Our materials are intended to help with this transition. The materials have evolved from the Renaissance work, and from the start we involved partners in other universities and departments to evaluate the materials. Two pilot modules *Matrices* and *Data Fitting* have been written.

It will be apparent that the prime motivation for the work described above was to improve the range and quality of learning. However there is now a need to teach many more students whilst maintaining quality, and the HEFCE (Higher Education Funding Council England) announced the TLTP (Technology in Teaching and Learning Programme) in the winter of 1992 in a bid to address this problem. One of the projects funded under the TLTP is the "UK Mathematics Courseware Consortium" (UKMCC), which includes over 20 UK Mathematics departments and has plans to write over 30 modules for basic mathematics. A courseware style, based on the Renaissance and Nuffield work, is being developed collaboratively which we hope will lead to common standards across the major platforms (Macintosh and IBM-compatible) and a greater exchange of computer-based materials than has been the case in the past. These materials will usually not replace entire lecture courses, but they should enable some lectures and examples classes to be replaced by computer-based self-study.

Over the past two decades there have been many projects emphasising different aspects of the influences mentioned. It now seems likely that these influences are combining, and that this will reinforce the significant increase in the use of computers in mathematics teaching that is already occurring.

References:

1. Harding R.D. *Fourier Series Transforms.* IOP Publishing Ltd (1985).

2. Harding R. D. and Quinney D.A., *A Simple Introduction to Numerical Analysis.* IOP Publishing Ltd (1986).

3. Harding R. D. and Quinney D.A., *A Simple Introduction to Numerical Analysis 2: Interpolation and Approximation.* IOP Publishing Ltd (1989).

4. Harding R. D. and Quinney D.A., Renaissance Project, *Mathematics Vol 1 CD.* Xploratorium, Anglia Polytechnic (1991).

5. Harding R. D. and Quinney D.A., Renaissance Project, *Mathematics Vol 2 CD.* Xploratorium, Anglia Polytechnic (1991).

Mathematics Education Project at Chalmers University of Technology

(Working report) C-H Fant, S. Jørner, M Martinsson 1/4 1993

1. Background

In the autumn of 1990 a three-year project was started with the aim of investigating different ways of improving the mathematics education for our future engineers.

One factor giving rise to the project was the realisation that the constantly increasing use of computers would place new demands on engineers' mathematics. Fundamental mathematical knowledge is going to become more and more important as the opportunity to solve increasingly complex problems with computers assistance leads to the usage of more sophisticated mathematical models.

Another reason for initiating the project lay in the results of investigations which had already been undertaken into how mathematics is used in the later stages of the degree programmes. It was seen that although the content of our course syllabuses agrees well with the expressed needs, shortcomings were still experienced in the student' mathematical abilities, including reported difficulties in recognising the mathematics in a new situation, and overall lack of perspective.

Initially the project was organised in three parts:

A: The content to be taught

B: The organisation of teaching

C: Examination and evaluation.

The first year was spent in making preparatory analyses and planning the work ahead. In addition to a number of teachers from the Department of Mathematics, researchers from the Department of Education and Educational Research at the University of Göteborg were brought in.

Since the project started a number of changes have been made in the structure of three parts listed above. The work on alternative forms of teaching and examination were fused, while the content to be taught and the overriding goals were treated separately.

This report concerns the part of the project "Forms of Teaching and Examination".

2. The project in outline

In general, teaching at Chalmers takes the form of whole-class lectures (commonly for 150-200 students) in which theory is presented, followed by practice classes in groups of about 30 students, in which the teacher solves practice problems on the board. There is sometimes the opportunity for students to solve problems for themselves while the teacher goes round and helps. The examination generally consists of a problem section (approx. 70\%) and a theory section with questions on definitions, theorems and proofs. During the project's first year we made a critical study of these forms of teaching and assessment, and came more and more to concentrate on the questions of, on the one hand, deep learning versus surface learning, and, on the other hand, learning which is oriented towards understanding versus that which is reproductive in nature. We discovered that many aspects of the traditional modes of teaching and assessment favoured reproductive learning to far too high a degree. Therefore we determined to experiment in a controlled way with alternative forms of examination and teaching, with the specific goal of favouring the sort of learning which is oriented to understanding.

The questions which we seek to illuminate include the following:

- The form of examination exerts a powerful influence on students' approaches to study. Can one change students' attitudes to their own learning by varying the way in which questions are asked, thereby getting them to focus more on the mathematical content and less on the text to be read in their book?

- Lectures are experienced by many students as a first look at new work, in which a large number of new concepts are introduced, and where one soon loses the thread. Many students believe that it is in the practice classes that they really learn. In what way could the teaching situation be changed so that lectures have a better effect?

- Practice classes are all too often occasions where students copy complete and correct solutions to problems as they are written up on the board. How could these classes be organised to that the students work more independently and train their own powers of mathematical thought?

We started the studies in three different courses:

- Mathematics for first year students of civil engineering (V1)

- Linear algebra for first year students of automation engineering (Z1)

- Mathematics for first year students of mechanical engineering (M1)

3. The three studies

3.1 Mathematics V1

This part of the project has been undertaken over a three year period with approximately 130 civil engineering students. After a planning period spring 1990 this subproject was started autumn 1990. Three first-year courses named A, B and C were involved. A and B are mixed courses in linear algebra and calculus and C is a pure calculus course. Each course runs for 8 weeks. A rough description of this experiment is given below:

- First year: tentative experimental changes with examination and with content and form of full class lectures in comparison with the traditional forms. Small group teaching - in four groups - was unchanged. All first-year courses in mathematics A, B and C were involved.

- Second year: continued experiments with examination and lecture forms in full-class. In practical classes "minor diagnostic tests" were introduced. Subcourses A and B were involved.

- Third year: In this final year, weekly diagnostic tests were given in the practice classes during subcourse A. In the following course B "explorative exercise complex" were used as the focus in practice classes The full-class lectures were changed to become review lectures and were given after the practice class lectures.

The aim of the experiments during these three years was to make it easier for the students to develop a more efficient approach to their studies in mathematics. We want the students to seek for new mathematical knowledge with their own mathematical knowledge and experiences as the point of departure and encourage them to relate the new knowledge to this personal firmament of previous mathematical knowledge. The goal has been to improve the students' ability to handle new situations in a mathematical context. We have used the expression "to improve their mathematical power".

This we have hoped to achieve with the following changes in teaching and examination.

- The content presented in the lectures in the courses has been changed towards a more structural content (represented in the form of "structure graphs") with more explanations (often in the form of illuminating proofs, interpretations and examples). Furthermore, we have tried to make the students aware of their own learning process, and in this connection we have introduced some elements from qualitative learning theories from educational research.

- Exercises. "Explorative exercise complexes" have been introduced as a complement to the traditional exercises. By an "explorative exercise complex" we mean a sequence of exercises beginning with some very easy exercises, involving concepts and procedures which are familiar and meaningful for the students (sometimes taken from lower grades in comprehensive school), followed by a sequence of exercises with an increasing grade of difficulty. This complex of exercises is arranged in a way that makes it possible for the students to, in their own way, reveal the main ideas in, or behind, one or more mathematical concepts, algorithm and eventually (a part of) a mathematical theory. With this kind of exercise complex two goals are surely reached. First the students and their teacher get information about the students previous understanding and its limits. This is very important for us because one of our main ideas is to take the students' previous knowledge as point of departure for the learning process. The second goal achieved is that the process always generates grounded questions. Some of these questions are answered by the individual (in some exceptionally good cases all the up-coming questions) and the remaining questions make a good starting point for subsequent teaching sessions.

- "Minor diagnostic tests" have been introduced in the practice classes in order to get some information about the students' knowledge during the course. These "minor diagnostic tests" consist of a small number of crucial questions given with a very short time (5-10 minutes) for answering them. These diagnostic tests are not a form of examination, instead they are only a way to get information about the students to the teachers as well as to the students themselves, in order to improve the quality of the educational process. These diagnostic tests often have the function of an "alarm clock" both for students and teachers.

- Practice class teaching has successively moved from classical lectures with some "explorative exercises" in the first year to experiments with "minor diagnostic tests" and more "explorative exercises" in the second year, to the greater changes of the last year. In subcourse A, third year, we focused on diagnostic tests. We gave these "minor diagnostic tests" once a week, corrected them and returned them to the students on the next teaching occasion. We also introduced more explorative examples and encouraged students to work in small groups with four participants during the practice classes. In the following subcourse B we took the final step. The content in every practice class occasion was a set of "explorative exercise complexes". In general there were no full class lectures introducing this material before the practice class lessons. The students worked with them at home before they were taken up by the teacher. It was always possible for the students to solve some of the introductory problems in the "explorative exercise complex" for themselves, and those exercises they were not able to solve generated grounded, good questions. These questions were discussed and some of them solved in the four-groups during the practice class lessons followed by class discussions.

- The intention with the full class lectures was from the beginning to avoid the reproducing character of the traditional full class lectures and instead we wanted to give a picture of the nature of mathematics and mathematical thinking. We were trying to achieve this by the content changes mentioned above and also by the way these lectures were conducted. They contained short introductions to new areas, more overview and a lot of repetition of important areas in the course. The "exemplarily principle" was used. A part of, for example, the theory was carefully chosen and used both as a model and as a metaphors that an example was worked through thoroughly in different ways.

In the final course (B) the last step was taken. Here we had changed completely to have practically only "review lectures". As described above, we started in an area for example eigenvectors and eigenvalues with an "explorative exercise complex", without any introductory full-class lectures. After the practice class experience the generated questions were taken as one point of departure for a comprehensive fullclass lecture. In this lecture the students' "practical" experience, often unarticulated, from their work with the "explorative exercise complexes" could be articulated, generalised and explained. The general theory could in this way be formulated and proved, grounded on the students' own experience.

- The examination has from the beginning of the project been in focus as one of the most important factors for the quality of the students' learning. The examination has been changed in two different ways. First we have changed the nature of the ordinary examination at the end of every course and secondly we have introduced an oral examination containing all mathematics in the first year (A,B and C).

In accordance with our aim to improve the students' ability to handle new situations, in the teaching we have focused on training in new situations by help of the "explorative exercise complexes". Observe here that these exercises were worked through by the students without any preparatory lectures and were thus new situations for the students. As a consequence of this, the examination can not be an effective support of these teaching and learning strategies if the examination consists of tasks with more or less standardised solutions and answers. We have therefore changed the examination at the end of the course in the following ways so that there are no distinct difference between theory and problem sections, and there are more new situations in the examination questions.

3.2 Linear algebra Z1

We chose this course as the focus of a study for the practical reason that it has a small number of students (36). Further, the small number of students means that both lectures and practice classes are held together. The teaching model we have applied can be described as follows:

- Instead of traditional lectures, a comprehensive lecture is held after each section of the course, six in total, where an overview of the mathematical theory is systematically presented.

- Prior to the comprehensive lecture, teaching consists of minimal presentations aimed at getting the students working, both with the normal exercises in the text-book and also with special theory exercises which are handed out as guides for study.

- The class is divided up into groups of 6 students. Prior to the comprehensive lecture we hold what we have called a diagnostic discussion with each group. In these the teacher talks with the group for about 20 minutes, discussing a tutorial problem which the students have been asked in advance to prepare.

- For each section of the course we prepare and hand out a, which indicates the relations between the most important definitions, theorems and applications.

- The examination has been changed such that it is no longer possible to answer theory questions by producing proofs learned by heart. This was made clear during the course, not least during the theory exercises mentioned above.

The course has now been run twice. The first time, autumn 1991, it was extensively evaluated together with researchers from the Department of Education and Educational Research at the University of Göteborg, including a questionnaire-based survey of the students, interviews with students and observations of classes. The second time, autumn 1992, it was virtually unchanged, apart from some changes-in the details.

3.3 Mathematics M1

In this study we have tried to develop a way to work in the practice classes which forces the students to copy less and do more on their own. We have retained the traditional lectures, attended by approximately 220 students. To these we have added 'how-to-solve-it' lectures two hours a week, still 220 students, where the copying is done. During the practise classes, also two hours a week, the teachers have been 'resource persons' answering questions instead of giving solutions. As the student meets the practice class teacher only once a week this way to work should be, and has been, combined with an exercise book with a lot of hints and complete solutions.

We also believe that explaining is a good way to learn for understanding. For this reason we have tried to make the students cooperate in small groups both when solving the exercises and when questioning the exercise class teacher. Group-questioning is also timesaving, instead of 3 minutes a week for each student we can give each group 15 minutes. To form these groups and to make the students feel that this cooperative way to work is worth the effort has been the most difficult part of this study.

We started this development in the academic year 90/91. Now, the third year that we are working in this way, we have been influenced by the ideas of doing mathematics using the computer, by the ideas of doing classical analysis and numerical analysis simultaneously, and by the results obtained in another part of this project described above (3.2).

The work in the exercise classes is focused on certain exercises that the group has to provide an account of. These exercises can be either purely mathematical chosen out of the textbook, or computer exercises which help the students to understand mathematical concepts, or computational in order that they might learn some numerical method. The main part is purely mathematical.

The teacher in the exercise class is not examining the group members, but is supposed to find out what the difficulties are, what the group or individuals have not understood and finally to explain that.

Mathematica as a system for teaching and learning mathematics

Ralf Schaper, Fachbereich Mathematik/Informatik, Gesamthochschule Kassel.

The progress in computer technology influences not only the way of teaching and learning mathematics but also some directions of mathematical research. There are conferences under titles such as: The Mathematical Revolution inspired by Computing [6]. The computer, invented as a tool for elementary calculations, is after fifty years of existence a universal system for doing mathematics. Mathematicians (especially the older ones) are enthusiastic about the layout of TEX-written papers produced on laser printers in their own offices, young students have no fear to rummage in Internet, but at the greatest part of European universities there is today only little influence of computers in „normal" mathematical courses. New visualizations with computer graphics are rare even in TEX-written books e.g. about calculus or linear algebra. The discussions on connections of computer science and constructive mathematics sometimes produce hostility.

In the seventies several people constructed „little" special mathematical purpose programms in different computer languages, often therefore incompatible on different machines. In the eighties some groups were courageous and designed large systems and founded companies. I think it will be a chance for mathematical institutes at universities to coorperate with such companies. It is not necessary to produce every two years a new, different CAS. In my opinion CMS: Computer Mathematical System, would be a better name. See also [4, p. 35]. I hope, that there will be no „religious war" between Maple-users and *Mathematica*-users. The competition between these two systems will improve and correct the systems. That may be a chance for the mathematical scientific community.

Mathematica consists of a kernel which is the same for all computers and a „front end" which handles the interaction of the user on the individual machine. A special feature of these front ends on Macintosh- and NeXT-computers and PCs with MS-Windows is called „Notebook":

You begin a Mathematica Notebook just as you would begin a document in a word processor—you just start typing. You can do everything with a Mathematica Notebook that you do with any standard document—you can create it, save it on you disk, open and edit it, and print it.

Notebooks, however, have many advantages over ordinary text files. Notebooks are structured, hierarchical documents in which text, Mathematica input and output, and graphics can be joined together. You can produce Notebooks that are interactive documents, uniting explanatory text with illustrative computations.

A Notebook version of a calculus lesson on Simpson's rule, for example, can include a discussion of the mathematics involved, an algebraic derivation of the formula complete with illustrations, a segment of executable code that implements the rule, and worked-out examples that show how the code is used. Students can read about Simpson's rule and immediately exercise their newly aquired knowledge by performing computations. [12, p. 3]

I think such an explanation in the user's guide of *Mathematica* for the version under MS-Windows shows that the developers of this system wished to improve the teaching of mathematics at universities. There are also discussions (e.g. at the European *Mathematica* Conference at Rotterdam in September 1992) about the idea of getting a „smaller" *Mathematica*-version for special purposes of schools.

The didactic possibilities encouraged several authors to write calculus courses with *Mathematica*, e.g. [2], [9]. Some of these books are also „translated" to Maple. Beside a lot of books serving as an introduction to Mathematica in English, French, Japanese, and German, there are books on special topics for university courses: on differential equations [1], [11], numerical analysis [8], electrical engineering [7], and economic modeling [10], or books on general themes: [3], [5].

At the Institute of Theoretical Computer Science of the ETH Zürich, Oliver Gloor and Roman Meader (one of the developers of *Mathematica*) are building up a library of visualizations (graphics and animations) of mathematical objects and write Notebooks on topics from analysis. A lot of people are fascinated by the graphics capabilities of *Mathematica*, espacially by the possibility to make little films by producing a sequence of graphics and show them with the command `Animate`.

Two journals inform about the usage of *Mathematica* in the scientific community:

The *Mathematica* Journal. (With electronic supplement): San Francisco, Miller Freeman Inc.

Mathematica in Education. Department of Mathematics. Sonoma State University, Rohnert Park, CA.

You can get a lot of information on *Mathematica* by E-mail from `info-euro@wri.com` or `mathsource@wri.com` at Wolfram Research, Inc. Wolfram Research offers an academic site licence program. So, for instance, we at our university at Kassel have to pay only 220 DM (440 DM resp.) for for a single user licence for MS-Windows (UNIX resp.) for five years.

Literature

[1] Abell, Martha L.; Braselton, James P.: Differential equations with *Mathematica*. Boston: Academic Press, 1993. - 0-12-041538-0

[2] Brown, Donald T.; Davis, Bill; Porta, Horacio; Uhl, Jerry J.: Calculus & *Mathematica*. Reading: Addison-Wesley, 1991. - 0-201-54340-0

[3] Crandall, Richard E.: *Mathematica* for the Sciences. Redwood City: Addison-Wesley, 1991. - 0-201-51001-4

[4] Fuchsteiner, Benno: Computer algebra: Implications and perspectives. Euromath Bulletin, 1 (1), 21-38, 1992.

[5] Gray, Theodore W.; Glynn, Jerry: Exploring mathematics with *Mathematica*. Redwood City: Addison-Wesley, 1991. - 0-201-52818-5

[6] Johnson, Jeffrey H.; Loomes, Martin J. (eds.): The mathematical revolution inspired by computing. Oxford: Clarendon Press, 1991. - 0-19-853658-5

[7] Riddle, Alfy: Applications of electrical engineering with *Mathematica*. Reading: Addison-Wesley, 1993. - 0-201-53477-0

[8] Skeel, Robert D.; Keiper, Jerry B.: Elementary numerical computing with *Mathematica*. New York: McGraw-Hill, 1993. - 0-07-057820-6

[9] Stroyan, Keith D.: Calculus using *Mathematica*. Boston: Academic Press, 1992. - 0-12-672968-9

[10] Varian, Hal R. (ed.): Economic and financial modeling with *Mathematica*. Santa Clara: Telos, Springer, 1993. - 0-387-97882-8

[11] Vvedensky, Dimitri: Partial differential equations with *Mathematica*. Wokingham: Addison-Wesley, 1992. - 0-201-54409-1

[12] Williams, Timothy; Walsh, Jerry: *Mathematica*. User's Guide for Microsoft Windows. Champaign: Wolfram Research, 1992.

[13] Wolfram, Stephen: *Mathematica*. A system for doing mathematics by computer. 2nd ed. Reading: Addison-Wesley, 1991. - 0-201-51502-4

[14] Wolfram, Stephen: *Mathematica*. Ein System für Mathematik auf dem Computer. 2. Aufl. Bonn: Addison-Wesley, 1992. - 3-89319-371-5

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, Czech Republic.

Ch.Pommerenke: Boundary Behaviour of Conformal Maps, Grundlehren der mathematischen Wissenschaften, Springer-Verlag, Berlin, 1992, x+300 pp., 76 fig., DM 98.00, ISBN 3-540-54751-7

The book deals with the boundary behaviour of a conformal wrap of the unit disk onto an arbitrary simply connected plane domain. It emphasises the interplay between analytic properties of the mapping and geometric properties of the domain. Topics covered in the book include: continuity and smoothness properties of conformal maps, Bloch functions, the angular derivative, harmonic measure, length distortion, quasidisks, domains with rectifiable boundaries, Smirnov and Lavrentiev domains, integral means, curve families and capacity, Hausdorff measure and conformal mappings, local boundary behaviour. Most sections contain exercises of various difficulty and an overview of relevant results. This allows easy orientation concerning the subject in question. An extremely successful selection of material (a substantial part of which is as yet not covered in books) is one of the significant features of the book. Strongly recommended to anybody who wants to learn about classical as well as very recent results in conformal mappings. (in)

S.Axler, P.Bourdon, W.Ramey: Harmonic Function Theory, Graduate Texts in Mathematics, vol.137, Springer-Verlag, New York, 1992, xii+231 pp., 16 fig., DM 81.00, ISBN 0-387-97875-5, ISBN 3-540-97875-5

This is a nice and accessible introduction to basic notions of classical potential theory. The basic theory of harmonic functions is presented (e.g. mean value property, the Poisson integral, Harnack's inequality, Liouville theorem). Harmonic functions on a half-space are studied via the Kelvin transformation and a local Fatou theorem is proved. Less standard material includes spherical harmonics, harmonic Bergman spaces and Hardy spaces. The last chapter gives basic facts about subharmonic functions and the Perron method of solution of the Dirichlet problem. Some simplifications of known proofs appear in the text and also new proofs are presented, e.g. the proof of the Bôcher theorem. Explicit formulae and calculations are typical for the book. There is also one interesting feature of the book: the offer of software (available from the authors by e-mail) making possible symbolic manipulation of the expressions that arise in the study of harmonic functions. The book (including also a series of exercises to each of 12 chapters) will be appreciated by students with knowledge of real and complex analysis. It may serve as a reference text for basic notions and formulae of the fundamentals of potential theory. (in)

B.Iversen: Hyperbolic Geometry, London Mathematical Society. Student Texts 25, Cambridge University Press, Cambridge, 1992, xiv+298 pp., $ 54.95, ISBN 0-521-43508-0, ISBN 0-521-43528-5

This book can be recommended either to students of mathematics as their first book on hyperbolic geometry (I do not have in mind future secondary school teachers) or to mathematicians working in other fields. The book can be divided in a natural way into two parts. The first part (chapters I–III) is devoted to a detailed study of the hyperbolic plane. The second part (chapters IV–VIII) represents the core of the book. It deals with discontinuous subgroups of the group of isometries of the hyperbolic plane and their relations to hyperbolic surfaces (i.e. metric spaces locally isometric to the hyperbolic plane). The central result here is the Poincaré polygon theorem. We find here also a chapter on hyperbolic 3–space, and a chapter dealing with the axioms for the hyperbolic plane (somewhat untraditional ones as the author remarks). The presentation is very attractive. The author shows various points of view, mentions the current trends of the research, and brings in the relationship to physics. All this makes the book very interesting. And last but not least, each chapter is followed by non-trivial exercises. (jiva)

S.-T.Yau (Ed.): Chern – A Great Geometer of the Twentieth Century, International Press, Hong Kong, 1992, vi+319 pp., $ 20.00, ISBN 962-7670-02-2

The influence of S.S.Chern's work on differential geometry in the second half of the century is as big as É.Cartan's in the first half of it. A charming collection of articles written by many of his friends and colleagues (including A.Weil, W.L.Chow, I.M.Singer, P.Chu, I.Kaplansky, L.Nirenberg, F.E.Browder, R.Lashof, R.Bott, L.Auslander, H.Suzuki, P.A.Griffiths, W.Klingenberg, J.Simons, M.P. do Carmo, B.Lawson, J.Cheeger, A.Weinstein, R.Greene, S.Y.Cheng, S.M.Webster, J.P.Bourguignon and J. Wolfson) bring many personal reminiscences showing how deep the influence of S.S.Chern was both on the mathematical as well as on the human level. The book also contains a paper describing his life and scientific work (by R.S.Palais and C.Terng), his influence on the value distribution theory (by W.Stoll), a paper on tight smooth surfaces (by F.Haab and N.H.Kuiper) and a historical essay on Riemannian manifolds (by M.Berger). Open problems are always a very important characteristic of a field - the last paper by S.T.Yau brings 100 open problems in metric geometry, classical Euclidean geometry, PDE's

and Kähler geometry. It is a well known fact that gauge fields used by physicists to describe interactions and connections on fibre bundles in geometry are identical concepts developed independently of each other in both disciplines. A Nobel prize winner for physics C.N.Yang found it "both thrilling and puzzling, since mathematicians dreamed up these concepts out of nowhere". Chern's reply was: "No. These concepts were not dreamed up. They are natural and real." Indeed, Chern's contributions to mathematics are not so much inventions as important discoveries in the land of mathematics. (vs)

A.Defant, K.Floret: Tensor Norms and Operator Ideals, North-Holland Mathematics Studies, vol.176, North-Holland, Amsterdam, 1993, xii+566 pp., $ 150.00, ISBN 0-444-89091-2

The subjects of this book are well known - the theory of products of Banach spaces as it was initiated by Schatten and widely developed by Grothendieck and the theory of ideals of operators on Banach spaces in the sense of Pietsch. There is a natural correspondence between the tensor norms on tensor products $X \otimes Y$ of finite dimensional Banach spaces and between operator norms on the space of operators $L(X', Y)$. This correspondence may be prolonged in different ways to infinite dimensions and the differences allow for the interplay between these two theories. In the present book both of these attitudes are developed simultaneously. This makes the theory easier to understand and also richer. The authors naturally covered subjects such as: Approximation property, type and cotype, absolutely p-summing, integral nuclear, K-convex, factorable representable mixing operators, Grothendieck's inequality, Kwapień's, Pisier's and Maurey's factorization theorems, the Radon-Nikodym property. Of course the book contains a lot of material about general and special tensor norms and duality of these. The speciality of the authors is Pietsch's tensor product trick which may be used to derive results on the distribution of eigenvalues of p-summing operators. Many other things are treated in the book, the authors discuss locally convex tensor products and were even able to present Taskinen's solution of Grothendieck's problem of topologies. The book is carefully written, and the exercises enlarge its richness. In a sense it may be considered as almost an encyclopedia about the subjects it treats (however Pisier's counterexample, the geometry of tensor products, tensor products of Banach lattices and C^*-algebras and applications to harmonic analysis are not treated). A list of symbols and index is included. This rich book will be usefull to all interested in the subject. (kj)

U. Dierkes, S. Hildebrandt, A. Kaster, O. Wohlrab: Minimal Surfaces I. Boundary Problems, Grundlehren der mathematischen Wissenschaften 295. A Series of Comprehensive Studies in Mathematics, Springer-Verlag, Berlin, 1992, xi+507 pp., 172 fig., DM 148.00, ISBN 3-540-53169-6, ISBN 0-387-53169-6

U. Dierkes, S. Hildebrandt, A. Kaster, O. Wohlrab: Minimal Surfaces II, Grundlehren der mathematischen Wissenschaften 296. A Series of Comprehensive Studies in Mathematics, Springer-Verlag, Berlin, 1992, xi+421 pp., 59 fig., DM 178.00, ISBN 3-540-53170-X, ISBN 0-387-53170-X

The main topic of both volumes is the theory of 2-dimensional parametric minimal surfaces. The first volume is more introductory. Basic facts on differential geometry of surfaces are reviewed first. The second chapter introduces a general concept of a minimal surface as a harmonic map satisfying the conformal relations. Useful consequences of the fact that minimal surfaces can be represented as real parts of holomorphic maps from C to C^3 together with many explicit examples and beautiful drawings are contained in the third chapter. The second part of the first volume contains existence theorems for Plateau's and free boundary value problems with proofs based on Dirichlet's principle. Inclusion theorems and relations between area of minimal surfaces and length of their boundary curves conclude the first book.

The second volume is more advanced. The main theme discussed is the boundary behaviour of minimal surfaces. Chapters 7, 8 and 9 include a discussion of regularity questions, singular boundary points and partially free boundary value problems. The second part of the book is devoted to the thread problem (a generalization of the isoperimetric problem) and the general Plateau's problem (where finitely many disjoint boundary components are allowed).

A special feature of both volumes is the inclusion of very interesting and helpful Scholia presented at the end of each chapter describing the main lines of historical evolution and the authorship of the results proved in the text; they nicely complement a careful presentation of results in individual chapters with an overview of the evolution of the field. Geometric intuition and imagination is especially valuable and helpful in the theory of minimal surfaces. Both books are very well equipped in this respect - there are 230 very nice drawings (prepared by use of computer graphics) and 12 colour plates. Extended bibliography (56 pages) and Indices (25 pages) are printed for convenience of the reader in both volumes. The books can be warmly recommended both to beginners as well as to specialists. (vs)

D. J. Albers, D. O. Loftsgaarden, D. C. Rung, A. E. Watkins: Statistical Abstract of Undergraduate Programs in the Mathematical Sciences and Computer Science in the United States, 1990-91 CBMS Survey, MAA Notes and Reports Series Number 23, The Mathematical Association of America, Washington, D.C., 1992, xx+173 pp., GBP 16.00, ISBN 0-88385-080-X

This volume of MAA Notes reports on undergraduate programs in mathematics and computer science at American universities. The report contains a detailed information on course enrollment, faculty, baccalaureate degrees as well as format for selected introductory courses. Also, statistics on mathematical science libraries, on program for majors, requirements for mathematics majors and other useful information is included. Altogether 93 tables accompanied by figures provide a good picture of undergraduate education in the United States. Among the respondents of the survey, there were 79 Universities with Ph.D. programs in mathematics, 83 Universities with master's program in mathematics and 102 two-year Colleges. Mathematics teachers at the university level will find the survey interesting and useful. (in)

B.Straughan: Mathematical Aspects of Penetrative Convection, Pitman Research Notes in Mathematics Series, vol.288, Longman Scientific & Technical, Harlow, 1993, xi+120 pp., GBP 20.00, ISBN 0-582-09100-4

This research note is concerned with problems of penetrative convection. The main emphasis is on the study of continuous dependence of solutions on various parameters, and the investigation of nonlinear stability of specific practical problems, as nonlinear buoyance laws, internal heating, multi-layer theories, radiation heating at the lower boundary and variable gravity. The results presented in the research note have applications, e.g., in geophysical and astrophysical settings. The book equips the reader with a survey of the most important results obtained mainly during last two decades. A large bibliography is included. The book could be of interest to mathematicians, chemists, geophysicists, astrophysicists and engineers. (mf)

S.Lang: Complex Analysis. Third Edition, Graduate Texts in Mathematics, vol.103, Springer-Verlag, New York, 1993, xiv+458 pp., 140 fig., DM 124.00, ISBN 0-387-97886-0, ISBN 3-540-97886-0

This is a new (third) essentially revised and extended edition of Serge Lang's popular book. (Second edition 1985, 367 pp., this edition 458 pp.) The book consists of three parts. The first one covers basic material of complex analysis; the author uses the power series technique very systematically, Artin's as well as Dixon's proofs of Cauchy Theorem are given, calculus of residues, elementary theory of conformal mappings, basic information concerning Mellin and Fourier transforms and some topics from the theory of harmonic functions are also included. The second and third parts cover some chapters for a more advanced course. Besides "standard" topics – convexity theorems, Weierstrass product, Mittag-Leffler theorem, Riemann mapping theorem, Schwarz reflection etc., some parts of complex analysis which seldom appear in textbooks of this kind are also included: entire functions with rational values (with a sketch of application in the theory of transcendental numbers), Borel's proof of Picard's theorem, gamma and zeta functions (the very nice Lerch formula included) and D.J.Newman's short elegant proof of the prime number theorem). The appendix now has five parts – the part concerning differential equations is very important. Many nice, carefully chosen exercises are included. Short bibliography, index. Altogether: strongly recommended to specialists, to teachers, students, to everybody. (bn)

R.Honsberger: More Mathematical Morsels, Dolciani Mathematical Exposition, Number 10, The Mathematical Association of America, Washington, D.C., 1991, xii+322 pp., GBP 17.00, ISBN 0-88385-313-2

This book is a collection of mathematical examples and elementary problems mostly from arithmetics, algebra and geometry with accompanying solutions; some of them are taken from Math-Olympiads in the U.S.A., Canada and European countries. The book can be used by mathematically gifted students to advance their mathematical level by solving suitable problems, and also by their teachers for their schoolwork. It can give pleasure to everybody who is interested in mathematics, but it can also bring enjoyment to more advanced mathematicians because the collection contains many problems which have unexpected results, in which different parts of mathematics are connected and which solutions are rather surprising. In the preface of this book the author quotes the words of J.L.Synge: "The mind is at its best when at play." Reading this book your mind will really be at its best. (ec)

M.Braun: Differential Equations and Their Applications. An Introduction to Applied Mathematics. Fourth Edition, Texts in Applied Mathematics, vol. 11, Springer-Verlag, New York, 1993, xvi+578 pp., 68 fig., DM 98.00, ISBN 0-387-97894-1, ISBN 3-540-97894-1

As one of the users of previous editions of this book I have found it always very inspiring - it helped me to make my lectures more vivid and (perhaps) more interesting for students. The main feature of the book consists of emphasizing the fact that: (i) There are a lot of interesting real situations which can be modelled in the language of ordinary differential equations. (ii) If the problem is linear, we have a powerfull tool for treating it by linear

algebra methods. (iii) Even in the (almost generic) case when we cannot give any explicit formula for the solution there is no reason to resign. The proper location for the various components (motivating examples and problems, linear algebra, exact theory of ODE and numerical aspects of it completed by the programs) throughout the whole text as well as the clearness of the explanation are the secrets of popularity of this book. The computer program part of this edition is changed – all the APL programs are replaced by Pascal programs and C programs. Further, a new Chapter 6 is added concerning Sturm - Liouville boundary value problems. Here, after a short introduction to the corresponding parts of linear algebra (inner-product spaces, self adjoint matrices theory) the regular Sturm - Liouville problem is formulated (second order equations, bounded interval) together with the main results. (The proofs of convergence statements are omitted.) Some features of the problems on unbounded intervals are mentioned, too. In examples, Hermite, Legendre, Laguerre and Tchebychev equations are considered. (oj)

Y.Meyer: Wavelets and Operators, Cambridge studies in advanced mathematics 37, Cambridge University Press, Cambridge, 1992, xv+223 pp., $ 49.95, ISBN 0-52142-000-8

Decomposition into wavelet series appeared in various branches of science (in particular, in signal processing) as an alternative to traditional Fourier analysis. The present book offers a mathematically rigorous treatment of wavelets addressed to a wide audience of mathematicians, physicists and engineers. Chapter 1 recalls classical facts of Fourier analysis and describes some prototypes of wavelets appearing in the work of Luzin and Calderon. Chapter 2 explains the importance of the so-called multiresolution approximations of L^2 representing a useful tool in connection with construction of wavelets as described in Chapter 3. The usefulness of wavelet decompositions is illustrated by giving characterizations, in terms of wavelet coefficients, of the Hölder spaces and the Sobolev spaces. Periodic wavelets are also constructed providing Schauder bases in various function spaces on the torus and analysis by wavelets is compared with Fourier analysis. Non-orthogonal wavelets are treated briefly in Chapter 4. Chapter 5 applies wavelet theory to the real Hardy space H^1 of Stein and Weiss and its dual BMO. Chapter 6 shows that wavelet series permit one to obtain lucid criteria for belonging to $L^p(1 < p < \infty)$, to the $L^{p,s}$ space of fractional integrals or derivatives of L^p-functions, Hölder spaces and Besov spaces. Some function algebras related to the Wiener algebra are also treated. The book represents a translation into English of the first six chapters of a comprehensive treatise consisting of sixteen chapters written originally in French; the English edition includes an additional brief list of recent publications for readers interested in applications. The mathematical audience will certainly welcome the appearance of volume 2 (treating Calderon - Zygmund operators) and volume 3 (dealing with complex analysis, holomorphic functionals on Banach spaces, Kato theory, elliptic partial differential equations in Lipschitz domains and nonlinear partial differential equations). (jokr)

M.B.Ruskai et al. (Eds.): Wavelets and Their Applications, Jones and Bartlett Books in Mathematics, Jones and Bartlett Publishers, Boston, 1992, xiii+474 pp., ISBN 0-86720-225-4

The core of the book is formed by invited lectures delivered in the conference on wavelets at the University of Lowell in June 1990 and the special session on wavelets at the July 1990 meeting of SIAM; several other contributions of experts in the field have also been included. The content splits into five parts. Part I is a short introduction describing most basic definitions, historical development and relevant bibliography. Part II (containing 6 contributions) is devoted to signal analysis. The following three contributions in part III demonstrate usefulness of wavelets in numerical analysis, construction of bases for fast matrix operations and numerical resolution of nonlinear partial differential equations. Various applications are described in four contributions in part IV treating optical transforms, turbulent flows, quantum mechanics and the renormalization group analysis. Part V deals with theoretical developments; it contains five contributions concerning non-orthogonal wavelets and Gabor expansions of wavelet transforms to the theory of function spaces, spline-wavelets, wavelets with rational dilation factor and wavelet packets. The rich material presented in the book illustrates broad possibilities using wavelet-like techniques and will be interesting to readers working in applications. This volume may be considered as a useful companion to Y.Meyer's book on wavelets reviewed above. (jokr)

R.Benedetti, C.Petronio: Lectures on Hyperbolic Geometry, Springer-Verlag, Berlin, 1992, xiv+330 pp., 175 fig., DM 50.00, ISBN 0-387-55534-X, ISBN 3-540-55534-X

This is an excellent book for studying hyperbolic geometry at an advanced level. The first chapter of the book contains classical material on hyperbolic spaces (e.g. description of models and of the isometry group) and can be used as a nice introduction to hyperbolic geometry. Other parts are at a more advanced level. The second chapter gives us a description of the Teichmüller moduli space of hyperbolic structures on a compact surface. In the third part, the Mostov rigidity theorem, its complete proof and consequences are given. The fourth part is devoted to the study of complete hyperbolic manifolds which are not necessarily compact. The main tool is the Margulis lemma which is proved here. Basic properties of the thin-thick decomposition and of some facts on the shape of ends of

a hyperbolic space are also presented. The fifth part contains a study of the space of hyperbolic manifolds in all dimensions. Special attention is paid to the three dimensional case where a complete and elementary proof of the hyperbolic surgery theorem is given. The last part brings in some related topics such as bounded cohomology, the Sullivan conjecture and amenable groups. The book can be warmly recommended to everybody interested in hyperbolic geometry. (jbu)

V.M.Tikhomirov: Stories about Maxima and Minima, Mathematical World, Vol.1, American Math. Society, The Mathematical Association of America, Washinton, D.C., 1990, xi+185 pp., GBP 19.00, ISBN 0-82180-165-1

Part One deals with ancient maximum and minimum problems (e.g. Dido's problem, the refraction of light, geometric problems, extremal problems in algebra and analysis, Kepler's problem on a cylinder of maximal volume inscribed in a given sphere, the brachistochrone problem, Newton's aerodynamical problem). The author says: "In the first half of the book I tried to entertain the reader. I told fairy tales, parables, stories, and anecdotes, strained for variety, dished out romance, fable, and poetry, followed the thoughts of great men... And in the second half everything changed, everything became mundane, routine, and prosaic. No stories, no poetry, no frills... What a bore!" Not for those who like mathematics! The notion of function is introduced and illustrated, the idea of extremal problem is explained, extremes of functions of one variable as well as of several variables are investigated. The tools of differential calculus are then used on problems already considered in Part One. One chapter deals with the calculus of variations (a sample title: What is a function of an infinite number of variables?). "The book is primarily aimed at high school students", the author says. In my opinion, it is also recommendable to first years university students, in particular future teachers. In fact, the last story is directed above all to teachers: how and why to teach. In my opinion, the book is a very pleasant mixture of mathematics and history of mathematics and deserves a wide range of readers. (in)

M.Sved: Journey into Geometries, MAA Spectrum Series, The Mathematical Association of America, Washington, D.C., 1991, xv+182 pp., GBP 18.00, ISBN 0-88385-500-3

The reader will find Alice (rather grown up), accompanied by her Uncle Lewis Carroll and Dr. Whatif (a visitor from the twentieth century), on a trip through the Wonderland of Geometry. In a very entertaining way at the beginning of the journey, Alice becomes acquainted with elementary properties of orthogonal circles and circular inversions, which pave the way to the use of the Poincaré model of hyperbolic geometry later on. Basic notions and relations are introduced in the course of discussion in company, the core of which is formed by the above mentioned essential characters. Some information is only hinted to Alice (and to the reader) in the disputations and some curious questions of hers remain unanswered. The facts so concealed are then the subject of a collection of problems at the end of every chapter. The less entertaining but more rigorous second part of the book contains the answers to all problems with many detailed explanations. A list of suitable further publications where the encouraged reader can broaden and deepen her/his knowledge, is supplied at the end of the book. (jtro)

J.Gimbel, J.W.Kennedy, L.V.Quintas (Eds.): Quo Vadis, Graph Theory? A. Source Book for Challenges and Directions, Annals of Discrete Mathematics, vol.55, North-Holland, Amsterdam, 1993, viii+398 pp., $ 128.50, ISBN 0-444-89441-1

Graph Theory is a modern and extremely fast developing discipline. Though tightly connected to practical applications, it provides striking interconnections between pure mathematics and theoretical computer science. The collection under review was inspired by informal discussions of participants of an international meeting in Alaska, 1990, who considered directions of further research in graph theory. Though the book is not structured into chapters, the first three articles – a philosophical essay of Tutte, a very good mathematical essay "The future of graph theory" by Bollobás and a commented guide to the book, "New directions in graph theory" by Roberts – are of a different nature to the rest of the book. The second part of the book consists of 29 short papers, covering themes as colouring, trees, planar embeddings, matching, hamiltonian cycles and random graphs. To my taste the best of these is Welsh's article on the complexity of knots, which is the first survey connecting the geometrical and purely abstract knot theory to theoretical computer science issues (via graph theoretical approach). It is surprising that though Bollobás lists the very recent Robertson-Seymour theory of graph minors as one of the two major achievements in the last two decades, there is no contribution by Robertson or Seymour in the book, and very little space is devoted to graph minors. (jakr)

Ch.D.Sogge: Fourier Integrals in Classical Analysis, Cambridge Tracts in Mathematics, vol.105, Cambridge University Press, Cambridge, 1993, x+236 pp., $ 39.95, ISBN 0-521-43464-5

The book shows how ideas from the theory of Fourier integral operators can be used in classical analysis. After presenting basic material on Fourier analysis and stationary phase, properties of non-homogeneous oscillatory

integrals are studied in chapter 2. The L^2 restriction theorem, estimates for Riesz means and Bourgain's circular maximal theorem are described. An extension of these results from Fourier analysis in R^n to compact manifolds is described in the rest of the book. It includes the sharp Weyl formula, local smoothing estimates for Fourier integral operators, coefficient versions of the Stein spherical maximal theorem and Bourgain's circular maximal theorem. The book is selfcontained, carefully organized and very useful for readers interested in the field. (vs)

G.Harel, E.Dubinsky (Eds.): The Concept of Function. Aspects of Epistemology and Pedagogy, MAA Notes and Reports Series Number 25, The Mathematical Association of America, Washington, D.C., 1992, xi+333 pp., GBP 17.00, ISBN 0-88385-081-8

This book is a collection of research papers concerning the concept of function and difficulties students have learning and understanding this concept. Authors of all the papers provide not only a wide theoretical analysis of the problem but also give resources for mathematics teachers that could help them in their instructional approaches (including the use of pedagogical software). Some of the papers, especially in the first two chapters, discuss very general questions concerning teaching and learning. Mathematicians might find this part somewhat difficult to read since the emphasis is put much more on the pedagogical aspects than on the mathematics itself. (vk)

E.Engeler: Foundations of Mathematics. Questions of Analysis, Geometry & Algorithmics, Springer-Verlag, Berlin, 1993, v+100 pp., 29 fig., DM 78.00, ISBN 0-387-56422-5, ISBN 3-540-56422-5

The book, especially the first two chapters, is nice vacation reading for a mathematician who wants, for a time, to have a rest from solving special problems and to read something concerning the roots of mathematics. He learns, what the elementary theory of real numbers is, why every problem expressible in this theory is decidable. He also learns the difference from elementary analysis, where decidability does not hold. The proof of decidability and hence completeness of the elementary theory of real numbers is adapted to the proof of decidability of the theory of real closed fields and as an application a nice proof of fixed point theorem for real closed fields is given. Due to the decidability and hence the completeness of the theory, it suffices to prove this theorem for real numbers (and there the theorem holds). Some methods of nonstandard analysis are mentioned and used and some matters connected with the axiom of choice and the continuum hypothesis are mentioned, too. The decidability of elementary geometry is transferred to the decidability of elementary theory of real numbers. (Hence e.g. the trisection problem is a provable assertion, but it is not solvable by limited means - a ruler and a compass.) Some facts concerning geometrical constructions by limited means are mentioned, too. The third chapter devoted to algorithms seems to me to be a special one. It is a little surprising that the author does not describe recursive functions and (or) Turing machines etc., but he has chosen combinatory algebras and λ-calculus. The book is written in a very nice intelligible style and there are many references to further reading. (čuk)

L.Atanassova, J.Herzberger (Eds.): Computer Arithmetic and Enclosure Methods. Proc. of the 3. International IMACS-GAMM Symp. on Comp.Arithm. and Scient.Comp., Oldenburg, Germany, 1-4 Oct.1991, North-Holland, Amsterdam, 1992, x+504 pp., $ 148.50, ISBN 0-444-89834-4

The Proceedings consist of 49 papers presented at the symposium, including 6 invited lectures: Rationale for Guaranteed ODE Defect Control (R.M.Corless and G.F.Corliss), Inclusion Methods for Integral Equations (H.-J.Dobner and E.Kaucher), Spectral Portraits of Matrices and Criteria of Spectrum Dichotomy (S.K.Godunov), On Standards for Numerical Software (P.Linz), Enclosures for Eigenvalues and Eigenvectors (G.Mayer), and The Programming Toolbox of the Numerical Analyst (Ch.P.Ullrich). The other contributions are divided into four sections devoted to: computer arithmetic and programming tools, (parallel) numerical programming in PASCAL-XSC, ACRITH-XSC and FORTRAN 90, controlling arithmetic reliability, accurate vector and matrix computations), interval methods for enclosure algorithms (enclosure methods for linear systems, inverse interval matrices, global and vector optimization, elliptic integrals, zeros of polynomials and analytic functions), applications in differential equations (interval methods for ODE's and PDE's, numerical verification, inclusions of eigenvalues and eigenfunctions, uncertainties in dynamic systems), and related topics (automatic differentiation, errors in solutions of algebraic or nonlinear equations, numerical oscillation, numerical geometry, pole assignment). The variety of themes touched upon gives a good overview of the recent developments in the area of computer arithmetic and scientific computation. (jr)