

THE LONDON MATHEMATICAL SOCIETY NEWSLETTER

No. 182

April 1991

FORTHCOMING SOCIETY MEETINGS

Friday, Saturday 17 - 18 May 1991, Oxford
Groups and Logic

Thursday 13 June 1991, Burlington House
F.C. Kirwan, H.B. Lawson

Friday 18 October 1991, Burlington House

Friday 15 November 1991, Burlington House

VISIT OF DR. U. N. BHOSLE

Dr. U. N. Bhosle of the Tata Institute of Fundamental Research, Bombay, will be visiting England for one month from mid-May. She will be based in Liverpool and will also be visiting Durham and Warwick. Dr. Bhosle's recent work has been concerned with generalisations and applications of parabolic bundles.

Talks have been arranged at Warwick 21st May, Durham 31st May and Liverpool 3rd June.

For further information please contact Dr. P. E. Newstead, Department of Pure Mathematics, University of Liverpool, PO Box 147, Liverpool, L69 3BX. Telephone: 051 - 794 4040, E-mail: su23@liv.ibm.

Dr. Bhosle's visit is partially supported by a Scheme 2 grant from the London Mathematical Society.

VISIT OF PROFESSOR E. GHYS

Professor E. Ghys, of the École Normale Supérieure de Lyon will be visiting the UK from 29th April to 3rd May and will give seminars during that week at Queen Mary & Westfield College, Cambridge and Warwick. Further details from Dr S. Bullett at QMW, telephone: 071-975 5474, email: sb@uk.ac.qmw.maths.

Professor Ghys's research interests include dynamical systems, diffeomorphisms, foliations, and hyperbolic groups. The visit is supported by a Scheme 2 travel grant from the London Mathematical Society.

VISIT OF PROFESSOR T. SHIODA

Professor T. Shioda of Rikkyo University, Tokyo, Japan will visit the United Kingdom from April 21st until April 30th, 1991, with the help of a grant from the London Mathematical Society. Professor Shioda is a leading authority on the arithmetic of elliptic curves and diophantine geometry. During

his visit he will be lecturing at Cambridge on April 23rd and 24th, and subsequently at Durham and Oxford.

For further details of the visit, contact John Coates, DPMMS, 16 Mill Lane, Cambridge CB2 1SB. (phone 0223-337978 or 0223-337993).

VISIT OF PROFESSOR D. STOYAN

Professor Dietrich Stoyan of the Bergakademie, Freiberg will be visiting the UK during April and May. Professor Stoyan will give the following seminars: "Marked Point Processes in Spatial Statistics": Warwick 2.30pm Wednesday 24th April (contact: Saul Jacka), Oxford 5pm Thursday 25th April (contact: Brian Ripley), Lancaster 12 noon Monday 29th April (contact: Peter Diggle); Queen

Mary & Westfield College Thursday 2nd May (contact: Charles Goldie); "Some New Results for the Voronoi Tessellation": Bath Monday 22nd April (contact: Alan Thomas); Cambridge Wednesday 1st May (contact: David Kendall).

Professor Stoyan's visit is supported by a Scheme 2 travel grant from the London Mathematical Society.

TOPOLOGICAL METHODS IN THE THEORY OF ORDINARY DIFFERENTIAL EQUATIONS IN FINITE AND INFINITE DIMENSIONS

"Topological Methods in the Theory of Ordinary Differential Equations in Finite and Infinite Dimensions" is the subject of the first 1991 C.I.M.E. Sessions. The courses are Quasilinear Evolution Equations of Parabolic Type given by Professor H. Amann (Universität Zurich); Families of Nonlinear Fredholm Operators given by Professor P. Fitzpatrick (University of Maryland); Continuation Principles and Boundary Problems given by Professor M. Martelli (California State University at Fullerton); Topological Degree and Boundary

Value Problems for Nonlinear Differential Equations given by Professor J. Mawhin (Université Catholique de Louvain) and Some Applications of the Fixed Point Index in Analysis given by Professor R. Nussbaum (Rutgers University).

Those who wish to attend the Session should write, no later than 1 May, to the Director of the Fondazione C.I.M.E. Istituto Matematico U. Dini, V. le Morgagni 67/A, 50134 Firenze, Italy. Telephone: (39) 55 434975; fax: (39) 55 4222695; e-mail: cime@ifidg.bitnet.

MATHEMATICS IN ENGINEERING EDUCATION

The sixth seminar on Mathematics in Engineering Education will be held at the Technical Universities of Budapest and Balatonfüred from 10th to 13th April 1991. The general theme of the seminar is international cooperation in mathematics in engineering mathematics. Specific themes of the seminar are: Opportunities opened through use of the computer; Audio-visual aids for teaching Engineering Mathematics; Mathematics for the Computer Science/Engineering interface; Probability

and Statistics beyond the core curriculum; and An approach to developing countries.

The seminar will include plenary lectures and poster sessions, demonstrations and working group meetings. Information about the seminar can be obtained from Meszner Zolt, Mathematics Department of the Faculty of Chemical Engineering, Technical University of Budapest, H1521 Budapest, Muegyetem rakpart 3-9, Hungary. Telephone (36) 1 181 3379, fax (36) 1 166 6808.

A WORKSHOP ON PROOF THEORY, FRAGMENTS OF ARITHMETIC AND COMPLEXITY

A workshop on Proof Theory, Fragments of Arithmetic and Complexity will be held from 15th June to 15th July 1991 at the Mathematical Institute of the Academy of Sciences, Prague, Czechoslovakia. It is likely that a three day conference will be organized during the first week of July in

conjunction with the workshop. Further information may be obtained from Pavel Pudlak, Mathematical Institute, CSAV Žitná 25, Praha 1, Czechoslovakia or from Jan Krajčevič, Department of Mathematics, University of Illinois, Urbana, IL 61801, U.S.A.

PIERO DE MOTTONI

Professor Piero de Mottoni who was elected a member of the London Mathematical Society on 21

October 1983 died on 25th November 1990.

FORMAL ASPECTS OF COMPUTING SCIENCE

A one-day meeting on "Formal Aspects of Measurement" will be held at the South Bank Polytechnic on Friday 3rd May. Speakers from Austria, Germany, U.S.A. and U.K. have accepted invitations to talk on measurement theory and its important implications for software engineering.

For further details contact Ros Herman, Research Administrator, CSSE, South Bank Polytechnic, Borough Road, London SE1 0AA. Telephone: (071) 928 8989 ext 2513; fax: (071) 928 1284; e-mail: hermanr@uk.ac.sbank.vax.

ARTIFICIAL INTELLIGENCE IN MATHEMATICS

An international conference on Artificial Intelligence in Mathematics will be held from Wednesday 3rd to 5th April 1991 at Strathclyde University and The Turing Institute. Papers from mathematicians, statisticians and computer scientists will address the use of the methods of Artificial Intelligence and related techniques in the development of mathematics and statistics, espe-

cially as these relate to learning, creativity and the future impact of AI on researchers in and users of mathematics.

For information on submissions, bursaries or other details, contact Dr J.H. Johnson, The Open University, Milton Keynes MK7 6AA. Telephone (0908) 652627; fax: (0908) 653744; e-mail jh_johnson@uk.ac.ou.acsvax.

LMS MAY MEETING

Friday - Saturday 17th - 18th May 1991

UNIVERSITY OF OXFORD

Groups and Logic

Friday 17th May

- 2.35 pm Opening Session
- 2.45 pm Dr A. Lubotzky (Jerusalem) 'Discrete subgroups of Lie groups applied to Combinatorics and Computer Science'
- 3.45 pm Tea
- 4.30 pm Professor R.I. Grigorchuk (Moscow) 'Splitting homomorphisms and quadratic equations in groups'
- 5.30 pm Break
- 5.45 pm Professor G. Higman, FRS (Oxford): short contribution
- 6.15 pm Professor E.I. Zel'manov (Novosibirsk & Oxford) 'On the Burnside Problem'

Saturday 18th May

- 9.30 am Professor J. Denev (Leuven) 'On Igusa's local zeta function'
- 10.30 am Coffee
- 11.15 am Professor A.V. Borovik (Omsk & University of California, Irvine) 'Interactions between finite groups and groups of finite Morley rank'
- 12.15 pm Professsor B.H. Neumann, FRS (Canberra): short contribution
- 12.45 pm Meeting closes

The lectures will be held at the Mathematical Institute, 24-29 St Giles, Oxford OX1 3LB.

A dinner will be held at Christ Church on the evening of Friday 17th May at 8.30 pm. The cost of the dinner will be £22 per person, inclusive of sherry and wine. Those wishing to attend should inform Miss Brenda Willoughby, Mathematical Institute, 24-29 St Giles, Oxford OX1 2LB enclosing a cheque payable to "University of Oxford Mathematical Institute", to arrive by 10th May 1991.

GÖDEL'S THEOREM

The first international symposium on Gödel's Theorem will be held from 27th to 31st May 1991 at the Pierre and Marie Curie Université in Paris, France to commemorate the 60th anniversary of K. Gödel's theorem on incompleteness. Contribu-

tions are invited in English, French and German from all fields. For details contact Z.W. Wolkowski, Maître de Conférences, Pierre and Marie Curie Université, B.P. 56, 75623 Paris Cedex 13, France. Telephone: (33) 1 4586 6438; fax: (33) 1 4570 7702.

FUNCTION THEORY MEETING (First announcement)

The annual one day colloquium on Function Theory will be held this year at Lancaster University on Monday, 23rd September. Further information can be obtained from Dr D. Kershaw, Department of Mathematics, Lan-

caster University, Lancaster LA1 4YF. E-mail: D.Kershaw@uk.ac.lancaster. The meeting is supported by the London Mathematical Society, and is open to all members.

OPERATIONS ANALYSIS

Members will recall that recently the Society joined forces with the American Mathematical Society in a joint series of books in the History of Mathematics. This series is intended to include volumes of interest to the practising mathematician at an affordable price.

The first three volumes, published originally by the AMS alone, were "A century of mathematics in America I, II, III", edited by Peter Duren with Richard Askey and Uta Merzbach. They are available (separately or) as a set: ISBN 0-8218-0138-4; AMS ordering code HMATHSET; list price \$212; price to LMS and AMS members \$127.

Volume 4 in the series has just been published:

"Operations Analysis in the United States Army Air Force in World War II", by Charles W. McArthur;

ISBN 0-8218-0158-9, 351 pages (hardcover), November 1990; AMS ordering code HMATH/4NA. The list price is \$81; the cost to AMS or LMS members is \$49.

Operations research grew out of the application of the scientific method to military problems during World War II. This book tells the story of how operations research became an important activity in the Eighth Air Force.

A small group of civilians, which began with four scientists and two lawyers, comprised the Operations Research Section, an advisory body attached to the headquarters of the Eighth Air Force.

During the course of the war in Europe, over forty operations analysts worked with the Eighth Air Force. By the end of 1943, the Section had established itself as the authority on measurement and analysis of bombing accuracy, loss and battle damage, aerial gunnery, and general mission analysis, such as fuel consumption. In their

dealing with visual bombing, radar, radio counter-measures, V-weapons and flak analysis, these experts discovered that the air force could do a much better job with fewer bombs by using bombs of the correct size with the correct fuse settings. In addition, the Section advised the commanding generals on major aspects of the strategic bombing campaign in Europe, including bombardment of German lines and support of Allied ground troops in the Normandy invasion, the isolation of Normandy by aerial destruction, and the demolition of the German synthetic oil industry.

The author emphasises the people involved in these historical events, rather than the technical matters with which they dealt. Focusing on a time of great importance in the history of this century, the book reveals the vital role this group of civilian scientists played in the defeat of Germany.

Ordering information

Customers in Europe should request price information from and direct their orders to: Clarke Associates-Europe Ltd., 13a Small Street, Bristol BS1 1DE, England (Tel: 0272-268864; telex 445591 CALORB G; fax 0272-226437).

LMS individual members can place their orders directly with the AMS as follows. (All orders must be prepaid in US funds.) Books are sent via surface mail (at no additional cost) unless air mail is requested (for an additional \$6.50 per item). Prepaid orders should be sent to: American Mathematical Society, P.O. Box 1571, Annex Station, Providence, Rhode Island 02901-1571, USA; and credit card orders (VISA and MASTERCARD/ACCESS only) to: American Mathematical Society, P.O. Box 6248, Providence, Rhode Island 02940-6248, USA.

A.D. Brannan
Publications Secretary

**LAUREATE****LAUREATE
INSTRUMENTS****101a Blackburn Street
Radcliffe
Manchester
M26 9WQ****Tel. 061-725 9193
Fax. 061-725 9215**

Laureate Instruments bring you news of:

Mathematica by Wolfram Research Inc.

Your colleagues in every field of science and engineering already have the benefit of this amazing package.

"*Mathematica* revolutionizes the teaching and learning of math by focusing on the prose of mathematics, without getting lost in the grammar". Steve Jobs, president of NeXT and founder of Apple Computers.

It is also worth noting the experience of Steve Christensen, developer of a *Mathematica* package for tensor analysis: "With *Mathematica*, I repeated in two days a calculation that had taken me two years to do by other means."

Numbers and symbols are collectively a vehicle for conveying knowledge. Concentrate on your destination not the vehicle! Reach tomorrow's destination today, with "Rocket power" from *Mathematica* instead of the conventional "pedal power" available to mathematicians.

Save time . . . Achieve more . . . Promote inspiration . . . Reduce perspiration
With *Mathematica*

Imagine entering your equations into your computer just as they are on paper, i.e. no complicated rules for inputting! Then imagine the exceptional capability of having the solutions in symbolic and graphic form as well as numeric form, but why imagine? Simply contact Laureate Instruments now.

An extensive list of reviews (available on request) bears witness to this exceptional package which is available now at a much lower price than previously (**Now from only £275!**), for every prominent hardware configuration - from PC 386 and Apple to Supercomputers.

STOP PRESS! *Mathematica* Windows 3 Version NOW AVAILABLE.

MATHEMATICS AND COMPUTING

Over the coming months, we intend to edit (on behalf of the LMS Computer Science Committee) an occasional, perhaps even monthly, column covering a variety of topics in the area linking mathematics and computing, such as:

- a) brief or extended reviews of mathematical research software,
- b) notices about and reports on meetings about mathematics and computing,
- c) support software (e.g. TEX, access to libraries, access to mathematical reviews (e.g. MR & Zentralblatt),
- d) mathematical education for computer scientists (and vice-versa),
- e) computer-assisted mathematics learning,
- f) activities of the LMS Computer Science Committee.

Some of these topics are already well-covered elsewhere, and where appropriate we shall merely summarise or point to such coverage. Comments, articles, indignant letters, requests for coverage, etc., should be sent to one or both of the editors, preferably via e-mail. Occasionally we shall contribute editorials and commission articles. Ordinary text (rather than TEX, LaTeX etc) is preferred, for ease of use by the LMS Newsletter editor. We hope that the column will achieve better interaction between British mathematicians and computer scientists, and increased awareness by mathematicians of computer facilities to help with their research and teaching.

This month, we are launching the column with the survey article below on the use of computers as a research tool in group theory.

Roy Dyckhoff, Mathematical & Computational Sciences Dept, University of St Andrews, rd@uk.ac.st-andrews.cs, 0334-76161 ext 8134.

Derek Holt, Mathematics Institute, University of Warwick, dfh@uk.ac.warwick.maths, 0203-523480.

The Use of Computers as a Research Tool in Group Theory

Anyone who has tried to solve problems, at any level, in group theory will have quickly realized that it is a highly computational branch of mathematics. It is not surprising then that many attempts have been made to enlist the assistance of machines; indeed, attempts to mechanize the process of Todd-Coxeter coset enumeration date back to 1953. However, relatively few mathematicians today will wish to start writing their own programmes for this purpose and for those who do, it is likely to become a full-time occupation. Irrespective of previous experience with computers, it is likely to be more appropriate to try to use some of the existing software that has been developed and, in this article, I shall attempt to provide an overview of what is currently available. The packages described here can

be run on computers that are usually available at British Universities, including workstations and mainframes; UNIX machines are particularly suitable at the moment. Most new users will require some technical assistance in getting them up and running but, once this is achieved, it is really not too difficult to start using them in earnest.

Although it would often be nice to be able to carry out general computations within a class of groups, virtually all of the existing programmes are geared towards computing within one particular group. This means that they will be most useful for gathering evidence for or finding counter examples to conjectures, and occasionally for finishing off the proof of a theorem by settling the last few awkward cases. The group can be defined by a finite presentation or by generating permutations or matrices, and algorithms have been developed for working with groups in any of these three forms, and for transferring from one such representation to another. As a general rule, for structural calculations within a finite group, a permutation representation of as low a degree as possible is likely to be the most efficient, although there are some exceptions to this; soluble groups are often better described by certain types of finite presentation, for example.

The CAYLEY system, administered by John Cannon in Sydney, Australia (e-mail: cayley@maths.su.oz.au), is by far the most extensive and generally useful package available, particularly for the inexperienced user. It has a user-friendly interface providing access to a large number of algorithms for dealing with groups presented in any of the forms described above, and also for convenient transfer between different representations, using homomorphisms. More recently it has been acquiring facilities for calculations in other branches of mathematics, particularly number theory and combinatorial theory. The more experienced user can write programs within CAYLEY that solve the required problem by calling up the appropriate functions. Thus, as a silly example, to print out the character table of the normalizers of all of the Sylow subgroups of the alternating group of degree 7, one need only write:

```
g: alternating (7);
for each p in prime basis (order (g)) do
  print character table (normalizer (g,sylow (g,p)));
end;
```

The chief disadvantage of CAYLEY is that it is rather expensive; about \$2000, I believe. It is designed to be completely self-contained, which is often an advantage, but can occasionally make it difficult to use it in conjunction with other programmes.

For more specialist tasks, a number of systems

have been developed at the RWTH Aachen, Germany, and are administered by Joachim Neubueser at the Lehrstuhl D fuer Mathematik (e-mail: FM@DACTH51.BITNET). They have the advantage that they are provided free of charge, except for postage. The newest of these, named GAP, provides the user with a convenient environment for developing his or her own algorithms and for interfacing with other programmes and packages. (It is sometimes useful, for example, to be able to exchange data with a more general symbolic algebra package, such as MAPLE.) The standard algorithms are provided as functions written within the language itself, and so the user who dares is free to attempt to tinker with them, modify them, or even improve them. It is currently fairly well equipped with functions for permutation groups and soluble groups, and will hopefully soon acquire better facilities for handling finitely presented groups. The CAS system is for interactive and experimental work with character tables, including cases in which it is not practical simply to compute the whole character table in one go. The SPAS system is for finding subgroups of finite index in finitely presented groups, and for finding and simplifying presentations of these subgroups. Finally, the SOGOS system is for detailed computations within finite soluble groups.

CANADIAN NUMBER THEORY ASSOCIATION

The Third Conference of the Canadian Number Theory Association CNTA 91 Kingston will be held at Queen's University from the 18th to 24th, August 1991.

The area of emphasis of CNTA 91 Kingston will be Analytic Number Theory, Arithmetical Algebraic Geometry and Diophantine Approximation. There will be special sessions in these areas.

The conference will be partially dedicated to Paulo Ribenboim on the occasion of his retirement from Queen's University in 1993. There will be a special session in honor of him organized by his former students, and research associates.

Confirmed invited speakers as of January 25th, 1991 are F. Beukers (Utrecht), D. Boyd (UBC), D. Brownawell (Penn St), J. Coates (Cambridge), K. Dilcher (Dalhousie), G. Frey (Essen), J.B. Fried-

I should also like to mention some software that is currently being developed by myself and others at Warwick. This is unusual in that it is attempting to handle certain infinite finitely presented groups, including the recently introduced class of automatic groups. Virtually all of the systems described above are restricted to computations within finite groups or to finding finite epimorphic images of finitely presented groups. The Warwick programmes can, in certain cases, solve the word problem and compute the growth rate for some infinite groups, and they can also attempt to decide whether two finitely presented groups are isomorphic or not.

Of course, many other computer programmes, both small and large, have been written to carry out particular group-theoretical and related computations in particular situations, and I cannot hope to mention them all. Indeed, many of these have been incorporated into CAYLEY and other larger systems. However, for a very specific problem, it can occasionally be worthwhile attempting to acquire a special-purpose programme for that task, since it will often run more efficiently in that form. In the last resort, you can attempt to write it yourself, but remember that your life may never be the same again if you do!

Derek Holt (dth@uk.ac.warwick.maths)

lander (Toronto), A. Granville (IAS & Georgia), R. Heath-Brown (Oxford), U. Jannsen (MPI, Bonn), M. Jutila (Turku), H. Montgomery (Michigan), J. Mueller (Fordham), K. Murty (Toronto), R. Murty (McGill), J. Neukirch (Regensburg), N. Nygaard (Chicago), T. Oda (RIMS, Kyoto), J. Oesterle (Paris VI), L. Szpiro (ENS, Paris), F. Thaine (Campinas), J. Vaaler (Texas), M. Waldschmidt (Paris VI), D. Zagier (MPI, Bonn).

The organizing and scientific committee consists of A. Granville, R. Gupta, E. Kani, H. Kisilevsky, R. Mollin, C. Stewart and N. Yui.

Registration form, application form for accommodation and further information will be obtained from Ms. Cathy Burns, CNTA 91 Queen's University, Kingston, Ontario, Canada K7L 3N6 email cna@qucdn.bitnet

CAMBRIDGE BANACH ALGEBRAS SYMPOSIUM

A small symposium in Banach algebra theory will be held in Cambridge from 1st to 12th July 1991. There will be emphases, within the general field of Banach algebra theory, on questions of automatic continuity and also on Banach homology theory and related areas.

Mathematicians who have already indicated an interest in participating include: E. Albrecht, G.R. Allan, W.G. Bade, P.C. Curtis jnr, H.G. Dales, J. Feinstein, J.E. Galé, F. Ghahramani, F. Gourdeau, S. Grabiner, N. Grønbaek, A.Ya.

Helemskii, K.B. Laursen, R.J. Loy, J.P. McClure, M.M. Neumann, T.J. Ransford, J.F. Rennison, M.P. Thomas, M.C. White, G.A. Willis.

The symposium organisers acknowledge, with gratitude, financial support from the London Mathematical Society. The meeting is open to all members of the Society. Any one who might be interested in participating is invited to write to Dr G.R. Allan at the Department of Pure Mathematics and Mathematical Statistics, 16 Mill Lane, Cambridge CB2 1SB (or by e-mail to gra3@uk.ac.cam.phx).

UNIVERSITY OF WARWICK

Lectureship in Mathematics

Applications are encouraged from mathematicians with research interests in any area of algebra. The Mathematics Department has an active team of algebraists led by Professor J.A.Green FRS who is retiring this year. The position is tenable from 1 October 1991.

Salary will be on the Lecturer Grade A scale : £12,086 - £16,755 pa.

Application forms (returnable by 17 May 1991) and further particulars from the Personnel Office, University of Warwick, Coventry CV4 7AL (telephone: 0203 523627) quoting Ref 32/A/90/95 (please mark clearly on envelope).

An equal opportunities employer

Springer-Verlag publishes many English translations of mathematical works originally written in other languages, mainly Russian, French, German, Japanese, Chinese.

Springer



We frequently need TRANSLATORS. We also need COPYEDITORS, for books written by authors who are not native English speakers.

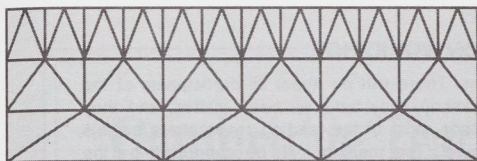
If you are interested in occasional TRANSLATION or COPY-EDITING work, please contact the

Mathematics Editorial
Springer-Verlag
Tiergartenstr. 17
6900 Heidelberg
FRG

Tel. (49) 6221 - 487 250

e-mail (Internet): SV-DUNNE@DCFRZ1.DAS.NET

indicating the language(s) and the field of mathematics you feel competent in.



E.L. Allgower, K. Georg, Colorado State University, Fort Collins, CO

Numerical Continuation Methods

An Introduction

1990. XIV, 388 pp. 37 figs. (Springer Series in Computational Mathematics, Vol. 13)
Hardcover DM 128,- ISBN 3-540-12760-7

Over the past fifteen years two new techniques have yielded extremely important contributions toward the numerical solution of nonlinear systems of equations. This book provides an introduction to and an up-to-date survey of numerical continuation methods (tracing of implicitly defined curves) of both predictor-corrector and piecewise-linear types. It presents and analyzes implementations aimed at applications to the computation of zero points, fixed points, nonlinear eigenvalue problems, bifurcation and turning points, and economic equilibria.

Many algorithms are presented in a pseudo code format. An appendix supplies five sample FORTRAN programs with numerical examples, which readers can adapt to fit their purposes, and a description of the program package SCOUT for analyzing nonlinear problems via piecewise-linear methods. An extensive up-to-date bibliography spanning 46 pages is included. The material in this book has been presented to students of mathematics, engineering and sciences with great success, and will also serve as a valuable tool for researchers in the field.

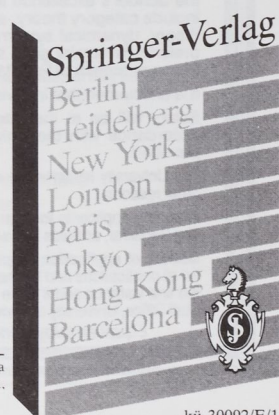
G. Hämmerlin, University of Munich;
K.-H. Hoffmann, University of Augsburg

Numerical Mathematics

Translated from the German
by L.L. Schumaker

1991. XI, 422 pp. 76 figs. 4 tabs.
(Undergraduate Texts in Mathematics/
Readings in Mathematics)
Softcover DM 74,- ISBN 3-540-97494-6

This English translation of the highly successful German textbook **Numerische Mathematik** covers the usual classical topics of numerical analysis, and also includes an up-to-date treatment of both splines and linear optimization methods. The text is designed to be used in a first course in numerical analysis at the upper division undergraduate level or at the beginning graduate level. It features a careful balance between mathematical rigor and numerical insight and includes many worked out numerical examples. Each section concludes with an extensive set of exercises which instructors should find useful in helping students to master the material. Moreover, the authors have also provided carefully researched historical notes which will be of particular interest to experts as well as students.



RADIAL BASIS FUNCTION WORKSHOP

A workshop on Radial Basis Function approximation theory and methods will be held in Cambridge on July 15th - 19th, 1991. Here functions of several variables are approximated by linear combinations of translates of a function that is spherically symmetric about the origin. Excellent orders of convergence can be achieved and the technique is highly useful to many applica-

tions. There will be about 25 participants at the workshop, they have all been invited, and they include most of the leading researchers on this subject. The meeting will be supported by the London Mathematical Society. Further information is available from Professor M.J.D. Powell, DAMTP, Silver Street, Cambridge CB3 9EW.

PHILOSOPHY OF MATHEMATICS EDUCATION

A Philosophy of Mathematics Education special interest group has been formed, with a free (at present) newsletter. Interested persons should

send their names to the group chair: Dr Paul Ernest, University of Exeter, School of Education, Exeter EX1 2LU, UK.

WHO'S WHERE IN COMPUTER SCIENCE 1991/2

Copies of this new publication (on the lines of Mathematical Who's Where) are now available from Professor I.M. James, Mathematical Institute, 24-29 St Giles, Oxford OX1 3LB. The price is £2

plus 27p postage, per copy; five or more copies post free. Cheques should be made out to "I.M. James".

MATHEMATICAL LOGIC

A meeting on mathematical logic will be held under the auspices of the British Logic Colloquium on Saturday 25th and Sunday 26th May at Fairbairn House Conference Centre at the University of Leeds. There will be seven one hour lectures. Professor Wilfrid Hodges (QMWC), Dr Philip Welch (Bristol), Dr Barry Cooper (Leeds), Dr Mar-

tin Hyland (Cambridge), Professor Angus MacIntyre (Oxford) and Dr Roger Hindley (Swansea) are six of the speakers. Meals and accommodation are offered to 40 persons resident in the centre at a cost of £58. Applications for these places should be made to Mrs. P. Boyes, School of Mathematics, The University of Leeds, Leeds LS2 9JT.



The University of Sydney

AUSTRALIA

CHAIR OF PURE MATHEMATICS

Reference No. 05/05

Applications and expressions of interest are invited for appointment to a Chair of Pure Mathematics within the School of Mathematics and Statistics which falls vacant on 1 January, 1991 on the retirement of Professor G. E. Wall, FAA.

The University is seeking applicants with a capacity for leadership who can make a major contribution to the School's excellence in research and teaching. Established areas of research in Pure Mathematics include category theory, algebraic groups and their representations, computational algebra and number theory, dynamical systems, singularity theory, group theory, number theory and combinatorics. While preference may be given to applicants with expertise in one of the above areas, suitably qualified persons from any branch of Pure Mathematics are invited to apply.

It is anticipated that interviews for the Chair will be held three months after the closing date.

Salary will be at the rate of \$A67,812 p.a. Provision is also made for limited private consulting in accordance with the University's regulations. Assistance with relocation expenses to Sydney will be provided.

The University reserves the right to appoint by invitation and not to proceed with any appointment for financial or other reasons.

Intending applicants for chair positions should obtain a detailed statement of information concerning the chair from The Registrar, address below.

Method of application: Applications (in triplicate for chairs) quoting Reference No., and including curriculum vitae, list of publications and the names, addresses and fax. nos., of three referees (only three referees will be contacted in the first instance and if more referees are nominated they should be ranked in order of preference) to the Registrar, Staff Office, University of Sydney, NSW 2006 Australia (Fax 612 692 2058) by 25 April, 1991.

Equal employment opportunity and no smoking in the workplace are University policy.

Cambridge Tracts in Mathematics

Now in paperback

Heat Kernels and Spectral Theory

E. B. DAVIES

This advanced monograph on a central topic in the theory of differential equations investigates the theory of second order elliptic operators. While the study of the heat equation is a classical subject, this book sets a precedent in that it is the first account of recent dramatic improvements made in our quantitative understanding of the subject area.

£13.50 net PB 0 521 40997 7 208 pp. 1991

Cambridge Tracts in Mathematics 92

Nonlinear Superposition Operators

J. APPELL and P.P. ZABREJKO

This book is an account of the present state of knowledge of the theory of the nonlinear superposition operators. Much of the work has only appeared before in research literature.

£35.00 net HB 0 521 36102 8 320 pp. 1990

Cambridge Tracts in Mathematics 95

Algebraic Curves Over Finite Fields

Error-Correcting Codes and Exponential Sums

CARLOS MORENO

In this Tract Professor Moreno develops the theory of algebraic curves over finite fields, their zeta and L-functions, and, for the first time, the theory of algebraic geometric Goppa codes on algebraic curves. Electrical engineers who need to understand the modern developments in the theory of error-correcting codes will also benefit from studying this work.

£30.00 net HB 0 521 34252 X 272 pp. 1991

Cambridge Tracts in Mathematics 97

Entropy, Compactness and the Approximation of Operators

BERND CARL and IRMTRAUD STEPHANI

This Tract studies the relations between compactness and other analytical properties, e.g. approximability and eigenvalue sequences, of such operators. The authors present many new and generalized results, some of which have not appeared in the literature before.

£35.00 net HB 0 521 33011 4 287 pp. 1990

Cambridge Tracts in Mathematics 98

Some Applications of Modular Forms

PETER SARNAK

The theory of modular forms and especially the so-called 'Ramanujan Conjectures' have recently been applied to resolve problems in combinatorics, computer science, analysis and number theory. This tract describes many of these applications.

£17.50 net HB 0 521 40245 X 128 pp. 1990

Cambridge Tracts in Mathematics 99

For further information write to Susan Chadwick at the address below.

Phone 0223-325970 to order books on your credit card.



**Cambridge
University Press**

The Edinburgh Building, Cambridge CB2 2RU, UK.

FIRST DEGREE COURSES IN MATHEMATICS, I

The North of England Mathematics and Statistics Forum (NEMAS Forum) is a consortium of the Departments of Pure Mathematics, Applied Mathematics, and Statistics in the 12 universities of the north of England. It was formed to provide a locus for discussion of matters of common concern about research and teaching in mathematics and statistics (but not computer science) in our universities. A reason for the formation of the Forum was our regret that there appears to be no active national body that can speak for the whole range of mathematics and statistics in the U.K. on such matters, or on such issues as the "guide price" for undergraduate teaching. The first Chairman of the Forum was Professor B.E. Johnson (Newcastle), and the present Chairman is Professor F.H.J. Cornish (York); the Secretary is Professor H.G.Dales (Leeds).

A meeting of the Forum in May, 1990, was devoted to the topic of present and likely future changes in the mathematical background of students entering our departments in the next few years: speakers addressed the meeting, and a lengthy discussion took place. Some of the same themes as those mentioned in the article *The Changing Face of A-Level Mathematics*, (LMS Newsletter, No. 174, July 1990) emerged. The Forum was sufficiently concerned to set up a working party, and this group produced a discussion document, *The future for first degree courses in mathematics*, which is available on request from the Secretary.

Briefly, the document suggests that the mathematical background of students entering our universities to study mathematics will be very different in the future from that expected quite recently - the differences will be in knowledge, skills, and approach. It states "...it is essential that we should begin now to carry out a fundamental review of the structure and content of our courses." The group also doubted that our present first degrees are of equal standard to some of those of our neighbours in the EC, which are awarded at the end of longer courses. It is clearly in the national interest that U.K. universities should produce mathematicians comparable in ability and training to those produced by our trading partners.

The group was convinced that existing three-year Honours degrees must change, and that they will not be able to cover some of the material included in present degree courses. It concluded that it is important for the future of mathematics in this country that some students should have a longer period of training: "What is needed is a new course structure which will satisfy the needs both of those students for whom a broad training in mathematics is adequate and of those who have the ability and desire to pursue careers as mathematicians in some professional sense". The lat-

ter group would include future research mathematicians, statisticians, those wishing to work as mathematicians in industry or in research establishments, and some of those intending to be teachers.

Various possible new course structures were considered. These included a "3 + 1" scheme, recommended by the Institute of Physics to Departments of Physics in the U.K. In this scheme, all students take a three-year B.Sc (Honours), and some students continue to take an "M.Phys" in their fourth year. It is not clear how this fourth year would be funded.

However the group preferred a "3/4 year course structure". In this structure, students would initially be registered for a 3/4-year degree. At the end of their second year they would all take an examination, temporarily called "Part I". When the Part I results were known, students would apply for entry into either the final year of a three-year course leading to an Honours B.Sc. (or B.A.) degree, or to the final two years of a four-year course leading to a (classified) M.Math. degree.

The group felt that the above scheme was attractive in educational terms. However it was also conscious of a need to be realistic about likely future financial resources: a very significant advantage of the proposed scheme is that it appears to satisfy present rules for students to obtain mandatory LEA support for the full duration of their course. A university merely notifies the LEA that the student is taking a four-year course.

For individual Departments of Mathematics the full resource implications remain to be determined. However what is known is that each University at present receives UFC financial support for the number of FTE students it has, and this is regardless of the distribution of students over the years of their course or whether they are on a three- or four-year course. Naturally, to teach the same number of students in two different schemes requires some extra classes. Such reorganizations will be easier for larger departments.

Of course, the group was aware that to study for four years rather than three also has resource implications for students.

A meeting of the Forum in January 1991 discussed the working party's document. Much of this document was accepted: the desirability of changes was manifest, but there was concern over resource implications. There was a clear wish that any new scheme should be implemented nationally. In conclusion, the following motion was unanimously supported by all the represented Universities:

We accept the need to recast the existing three-years Honours Degree in Mathematics at our Universities, and the desirability of introducing a four-year first degree for some

students. We intend to cooperate with each other in seeking further information, in undertaking the necessary preparatory work, and in discussions about the implementation of the new degree structure. We expect to participate in discussions at a national level concerning the introduction of a 3/4-year degree scheme.

It is clear that much information is required. The Forum decided to set up two subcommittees; the first, under the Chairmanship of Dr. T. Bridgeman

(Liverpool), is to consider likely future changes in entrance qualifications and their implications for our teaching, and the second, under the Chairmanship of Professor P. Chatwin (Sheffield), is to seek to determine the likely response of future students and employers to the proposed changes, and in particular to estimate how many students would choose the four-year option at the end of the second year.

H.G. Dales

FIRST DEGREE COURSES IN MATHEMATICS, II

At its meetings in November and January Council noted the Institute of Physics report on degree course structure in Physics and the NEMAS Forum initiatives reported by Garth Dales in the article above. Council instructed me to set up a body known as the Working Group on the Structure of University Degree Courses in Mathematics. Its remit is

- (1) To review the structure of university first degree courses in mathematics in the light of
 - (a) changing patterns of secondary education, and
 - (b) the national need to produce graduate mathematicians comparable with those of other countries in Europe and those of our trade competitors throughout the world.and having regard to national employment needs;
- (2) to extend the NEMAS Forum deliberations to

discussions in universities nationwide, to evaluate resource implications and to seek mechanisms for the implementation of any national consensus;

(3) if possible, to seek such a national consensus by the end of the current academic year. The following are the members of the group: Professor S. Barnett (Essex), Dr A.F. Beardon (Cambridge), Dr A. Camina (East Anglia), Professor F.H.J. Cornish (York), Professor H.G. Dales (Leeds), Dr P.M. Neumann (Oxford), Professor R.L.E. Schwarzenberger (Warwick), Professor B.D. Sleeman (Dundee), Professor T.M.F. Smith (Southampton), Professor J. Walsh (Manchester), Professor H.P. Wynn (City).

Members of the Society who wish to communicate views to the group are invited to write to me, Dr Peter M. Neumann, The Queen's College, Oxford OX1 4AW.

P.M. Neumann

EUROMECH COLLOQUIUM ON MATHEMATICAL MODELS FOR LIQUID CRYSTALS

Euromech Colloquium 283: 'Mathematical Models for Liquid Crystals and Allied Systems' is to be held at Strathclyde University this summer during the period from Tuesday, July 16th, to Friday July 19th. The London Mathematical Society has awarded funds to support this conference, and the conference chairman,

Professor Frank Leslie, will be pleased to hear from any members of the Society interested in participating since participation is limited by invitation. Further details may be obtained from Professor Leslie at the Mathematics Department, Strathclyde University, Livingstone Tower, Richmond Street, Glasgow G1 1XH.

HODGE THEORY

A European Summer School on "Hodge Theory" under the auspices of the European Mathematical Society will be held from 25th June to 6th July at Nice Sophia-Antipolis. The objective is primarily to provide participants with a working knowledge of Hodge theory, applicable to their own research, with an emphasis on applications in projective geometry. A broader objective is to strengthen relations between European researchers, both junior and senior, interested in this field. The Scientific Committee and lecturers are A. Beauville, J. Carlson (Utah, U.S.A.), C. Peters (Leiden, Netherlands), C. Simpson (Princeton, U.S.A.) C. Voisin (Paris-Sud, France).

Full room and board accommodation is avail-

able for 2400FF for the duration of the school; there is an additional registration fee of 1000 FF. The Scientific Committee will grant financial support covering travel and/or living expenses, and the registration fee, to participants who show evidence that they cannot obtain support from other sources.

Prospective participants should send a curriculum vitae with reference to scientific works and current interests, and a description of financial arrangements before 30th April 1991 to CIMPA, 1 Avenue Edith-Cavell, F-06000 Nice, France. Telephone: (33) 93 53 18 43; fax: (33) 93 81 73 48; e-mail: cimpat@frnice51.bitnet.



Walter de Gruyter Berlin · New York

New Series

de Gruyter Expositions in Mathematics

Edited by **Otto H. Kegel**, *Freiburg, FRG*

Viktor P. Maslov, *Moscow, USSR*

Walter D. Neumann, *Columbus, Ohio, USA*

Raymond O. Wells, Jr., *Houston, Texas, USA*

An international series of monographs covering all areas of mathematics. Each volume will give an in-depth look at specific topics in mathematics. Specialists will provide a comprehensive survey of important developments in both classic and new subjects, especially in recently formulated areas where the need for exposition has emerged. The volumes will explain both the ideas and methods of the subject and give complete, up-to-date bibliographic references. These books will be of interest to mathematics specialists and to advanced students who would like a convenient source of information on the particular topic covered. The publications in this series will provide a solid basis for further research in their respective areas.

Now available —————

Volume 1

The Analytical and Topological Theory of Semigroups Trends and Developments

Edited by **Karl H. Hofmann**, **Jimmie D. Lawson**, and **John S. Pym**

1990. xi, 398 pages. 17 x 24 cm. Cloth DM 138,- ISBN 3-11-012489-0

Volume 2

Hans Joachim Baues

Combinatorial Homotopy and 4-Dimensional Complexes

1991. xvii, 380 pages. 17 x 24 cm. Cloth DM 158,- ISBN 3-11-012488-2

In preparation —————

Volume 3

Anvarbek M. Meirmanov

The Stefan Problem

Translated from the Russian by **Marek Niezgódka** and **Anna Crowley**

1991. Approx. 300 pages. 17 x 24 cm. Price not set. ISBN 3-11-011479-8

Volume 4

Klaus Doerk and **Trevor O. Hawkes**

Finite Soluble Groups

1991. Approx. 1000 pages. 17 x 24 cm. Price not set. ISBN 3-11-012892-6



George Barker Jeffery (1891 - 1957) was raised in a Quaker family in London and educated at University College, London. He was imprisoned as a conscientious objector in 1916 and directed away from teaching at University College, but eventually became Astor Professor there in 1924. He worked on hydrodynamics, viscous liquids, and elasticity, and is remembered as a gifted administrator and a devoted teacher; he died when Director of the Institute of Education. Elected an FRS in 1926, he was the Society's 37th President, from 1935 - 1937.

DIARY

The diary lists Society meetings and other events publicised in previous issues of the Newsletter. For further information, refer to the figure in brackets, which is a cross reference to the LMS Newsletter Number.

1991

APRIL

- 8-12 Stochastic Analysis and Related Topics, Warwick (179)
- 9-12 British Applied Mathematics Colloquium, Oxford (177)
- 15-19 J.E. Marsden, LMS Invited Lectures, Southampton (177)(180)
- 23-26 Mathematical and Numerical Aspects of Wave Propagation Phenomena, France (172)

MAY

- 3 Edinburgh Mathematical Society Meeting, Stirling (176)
- 7-14 Number Theory Workshop, Singapore (177)
- 9 Schrodinger Lecture, London (178)
- 17-18 2-day LMS Meeting, Oxford
- 27-29 Computing and Information Conference, Canada (177)

JUNE

- 1 Edinburgh Mathematical Society Meeting, St Andrews (176)
- 9-14 Fixed Point Theory and Applications Conference, Canada (177)
- 13 LMS Meeting, London
- 17 London Mathematical Society Popular Lectures, Sheffield
- 23-30 Category Theory Meeting, Canada (179)
- 28 London Mathematical Society Popular Lectures, Imperial College, London
- 29-8 Jul Probabilistic Methods in Combinatorics, Durham (178)

JULY

- 1-5 The Mathematics of Nonlinear Systems, Bath (168)(175)(177)
- 1-19 Geometric Group Theory Symposium, Sussex (179)
- 7-12 Gregynog Symposium on Differential Equations, Gregynog (176)
- 8-12 British Combinatorial Conference, Surrey (165)(180)
- 8-12 Australian Mathematical Society Annual Conference, Australia (177)
- 8-14 Radicals, Hungary (172)
- 9-19 Conformal Field Theory, Durham (178)
- 13-16 British Congress of Mathematics Education, Loughborough (170)
- 20-30 Application of Categories in Computer Science, Durham (178)
- 22-26 Computational and Applied Mathematics Congress, Ireland (167)(180)
- 23-4 Aug Logic and Algebra of Specification, Germany (181)
- 29-9 Aug Algebras and Orders, Canada (179)

AUGUST

- 18-24 Number Theory Association Conference, Canada (177)

SEPTEMBER

- 16-20 Minimal Models, Lie Groups and Differential Geometry, Spain (179)
- 25-27 Numerical Methods in Fluid Mechanics, Switzerland (174)
- 27-28 Symposium on Arithmetic in Honour of Bryan Birch, Oxford (178)

OCTOBER

- 18 LMS Meeting, London

NOVEMBER

- 15 LMS Meeting, London

DECEMBER

- 9-13 European Women in Mathematics, France (180)

1992

JUNE

- 29-1 July Joint AMS/LMS Meeting, Cambridge (155)

JULY

- 4-14 Evolutionary Problems, Durham (178)

The Newsletter is published monthly except in August. Items and advertisements for inclusion in the Newsletter should be sent to the Editor, Susan Oakes, London Mathematical Society, Burlington House, Piccadilly, London W1V 0NL, to arrive before the first day of the month prior to publication. Telephone 071- 437 5377, Fax 071-439 4629, E-mail lms@uk.ac.kcl.cc.oak.