THE LONDON MATHEMATICAL SOCIETY NEWSLETTER

No. 234 **January 1996**

FORTHCOMING SOCIETY MEETINGS

Friday-Saturday 16-17 February 1996, Bath University
Differential Equations
H. Brezis, E.B. Davies, E.H. Lieb,
P.H. Rabinowitz, C.A. Stuart, T. Weidl

Friday-Saturday 10-11 May 1996, University of Glasgow
Joint Meeting with the Edinburgh Mathematical Society
Algebra
K. Goodearl, G. Levitt, A. Lubotsky, C. Maclachlan, J. Rickard

Friday 21 June 1996, Linnean Society, London
C.J. Bushnell, R. Taylor

Friday 18 October 1996, Linnean Society, London
Cayley-Sylvester Centenary Meeting on Invariant Theory

Friday 15 November 1996, Linnean Society, London
Annual General Meeting

LMS COUNCIL DIARY

On 17 November we held the last Council meeting of the year, immediately before the Annual General Meeting of the Society where the 1996 Council was elected. Two members of Council were standing down. David Crighton was leaving the Vice-Presidency in order to take up the Presidency of the Institute of Mathematics and its Applications - we have been extraordinarily lucky to have him as a link between the two societies. Don Collins, our retiring Meetings and Membership Secretary, was recently appointed Head of Department at QMW. Don meekly hoped that he might be remembered for having overseen a great increase in the amount of money which the LMS spends on grant schemes and related ways of supporting mathematics. Council expressed warm thanks both to David and to Don.

The 1995 Council twice debated whether to increase the number of prizes awarded by the Society. We finally decided not to introduce any prizes within particular branches of mathematics. But it was remarked that there is no prize designed solely to reward communication skills in mathematics; maybe a future Council will take this up.

We had a long discussion of the meeting between Dr Geoff Richards of EPSRC and the 'Group of Mathematical Presidents', which is reported elsewhere in this Newsletter. Council is anxious that Nigel Hitchin as LMS President should be able to represent the views of the membership, and of mathematicians more widely, when this Group speaks to EPSRC. Feedback is essential - please do read the report!

Professor Hitchin also reported on the celebration of Paul Dirac at Westminster Abbey. With this and the celebration of George Green in 1993, mathematical physics is now well represented at the Abbey, and there is even a mathematical formula set into the floor.

Wilfrid Hodges

TREASURER'S REPORT TO THE ANNUAL GENERAL MEETING 1995

In taking over as Treasurer of the Society it is a great pleasure to acknowledge the work of my predecessors in the position, Professor Ioan James, the late Professor Rolph Schwarzenberger and Professor John Wright. As Professor Wright indicated in his report last year, the size and complexity of the Society's operations has increased considerably over their periods in office. The routines established by them in cooperation with Susan Oakes, the Society's Administrator, have ensured that the Society's financial affairs run efficiently and smoothly and that the Society is now in a strong financial position. I am particularly grateful to Susan Oakes; her knowledge of the affairs of the Society and her personal support have been invaluable in my first year in office.

This year, in order to comply with the requirements of the Charities Act 1993, an Annual Report which gives a full description of the Society's activities, is presented in parallel with the Annual Accounts. The Accounts are also presented in the new format which will be required in due course by this Act. Since the financial sections of the Annual Report are far more detailed than the traditional Treasurer's Report and since a published version will be available to members on request and a version will be deposited in the Society's archives on the World Wide Web, my report will only highlight some essential facts.

- The fixed asset investments of the Society increased from £6,104,589 to £7,011.558; this increase was partly due to the strength of the financial markets.
- The Society's investments outperformed the relevant benchmark for each category of investments.
- The total in the Fixed Interest Fund increased from £1,671,664 to £2,191,733; that in the Ordinary Share Fund from £1,218,215 to £1,872,980 but with cash balances held as Bank and Building Society deposits decreasing from £3,147,247 to £2,846,845.
- Income from investments has grown from £229,587 to £276,431 reflecting a small increase in interest rates.
- The Society signed a new detailed client agreement letter with Credit Suisse Asset Management Limited who provide an advisory management service to the Society. The Society's investment objectives were also reviewed.
- The publishing activities of the Society, which this year were extended to include two new translation journals, Izvestiya Mathematics and Sbornik Mathematics, continue to be the main source of income. This year the excess of income over expenditure was £502,891.
- The financial strength of the Society means that the Society can invest more in its primary aim, namely, the promotion and extension of mathematical knowledge.
- Total expenditure by Conference and Programme Committee increased from £60,322 to £91,702 with a budget of £125,000 for next year.
- The Building and Development Reserve Fund established in 1994 is increased to £800,000.
- Grants and subscriptions increased from £42,072 to £49,181.
- The support costs, including administrative expenses etc., increased from £94,614 to £101,682.

The Society's success financially is due to many individuals, Officers, Editors, Authors, Referees, etc.; it is because these services are given freely that the Society is in such sound financial health.

A.O. Morris
Treasurer

NORTH BRITISH FUNCTIONAL ANALYSIS SEMINAR

A meeting of the North British Functional Analysis Seminar will be held at the University of Sheffield, from 2.30 pm until 5.00 pm on Monday 4th March 1996. The speaker will be Dr C. Le Merdy (Université de Franche-Comte). All interested are most welcome to attend. For further information contact Dr Gordon Blower, Lancaster University.

LONDON MATHEMATICAL SOCIETY
TWO-DAY MEETING

FRIDAY 16 & SATURDAY 17 FEBRUARY 1996

UNIVERSITY OF BATH

Differential Equations

FRIDAY

2.05 Opening Session
2.15 H. Brezis (Paris) *Degree Theory and B.M.O.*
3.15 Tea/Coffee
3.50 C.A. Stuart (Lausanne) *Nonlinear Eigenvalue Problems arising in Optics*
5.00 E.B. Davies (London) *Spectral Properties of Fourth Order Elliptic Operators*

SATURDAY

9.15 P.H. Rabinowitz (Madison) *Multibump Solutions of Differential Equations*
10.15 Tea/Coffee
10.50 T. Weidl (Sussex) *On the Discrete Spectrum of Schrödinger Operators Perturbed by Non-regular Potentials with Compact Support*
12.00 E.H. Lieb (Princeton) *Estimating the Eigenvalues of the Magnetic Schrödinger Operator*

All lectures will be held in Building 3 East, Room 2.1

There will be a buffet supper on the Friday evening in Wessex House, University of Bath, at 6.30 pm. The cost will be £9.00 per person, inclusive of wine. Tickets **must** be purchased in advance, by Monday 5 February, by sending a cheque payable to "University of Bath", to Professor J.F. Toland. As the meeting is in term-time, available campus accommodation is very limited. However, there is a large number of inexpensive B&B establishments near to the University. Lists and campus maps will be sent to all wishing to attend.

For further information contact: Professor J.F. Toland, School of Mathematical Sciences, University of Bath, Bath BA2 7AY, e-mail: jft@maths.bath.ac.uk, fax: 01225-826492; tel: 01225-826188.

1996 LMS PRIZES

The Council proposes to award, in Summer 1996, a Polya Prize, a Senior Berwick Prize, and one or more Junior Whitehead Prizes. Accordingly, it has appointed N.J. Hitchin, J.M. Ball, C.J. Bushnell, A.J. Macintyre and E.G. Rees to the 1996 Prizes Committee.

The Council invites members of the Society to submit their views on possible candidates for the award of these Prizes confidentially in writing to any member of the Prizes Committee by 1 March 1996. In each case, nominations should contain explicit reference to the grounds on which the nomination is based, and should be accompanied by a brief curriculum vitae (including date of birth), a list of publications, and a brief supporting case. The Prizes Committee would particularly welcome suggestions of possible candidates for the award of the Junior Whitehead Prize(s), in view of the age condition (explained below) which applies to these Prizes. Council reserves the right not to make an award in the event that no candidate of sufficient merit is recommended by the Prizes Committee for a particular Prize.

The Polya Prize is to be awarded in recognition of outstanding creativity in, imaginative exposition of, or distinguished contribution to, mathematics within the United Kingdom; it may not be awarded to any person who has previously received the De Morgan Medal.

The Senior Berwick Prize is to be awarded to a mathematician who is a member of the Society on 1 January 1996, in respect of a definite piece of mathematical research work actually published by the Society during the period from 1 January 1988 to 31 December 1995; it may not be awarded to any person who has previously received the De Morgan Medal.

The Junior Whitehead Prizes are to be awarded to mathematicians who on 1 January 1996 are normally resident in the United Kingdom or members of the Society mainly educated in the United Kingdom, who are not already Fellows of the Royal Society, and who are under the age of forty years, except that this age restriction may be relaxed when it appears desirable to do so in order to take fair account of broken career patterns. Grounds for the award may include work in and influence on mathematics.

No person may be awarded a given Prize more than once, and the President of the Society and the members of the Prizes Committee are ineligible for any of the awards. The detailed regulations and procedure for the award of each Prize can be obtained from the Administrator, London Mathematical Society, Burlington House, Piccadilly, London W1V 0NL.

R.Y. Sharp
Council and General Secretary

ANNUAL LMS SUBSCRIPTION

The Society is appreciative of those members who have paid their 1995/96 subscriptions. May we remind those who have not yet paid that subscriptions were due on 1 November 1995. Prompt payment ensures continuity of publications and avoids the need for time-consuming reminders. The Society reserves the right to discontinue the supply of periodicals and Newsletters to members whose subscription remains unpaid by 31 January 1996. The methods of payment are either by a sterling cheque drawn on a UK bank; a US$ cheque drawn on a US bank, Direct Debit, Eurocheque quoting your card number on the reverse or by Giro. If you have misplaced your renewal of subscription form, contact the Assistant Administrator, Harvinder Lotay, at the LMS office, tel: 0171 437 5377, fax: 0171 439 4629, e-mail: lms@kcl.ac.uk.

VICTOR M. ABRAHAM

Dr Victor M. Abraham, who was elected a member of the London Mathematical Society on 17 December 1970, died on 18 October 1995 at the age of 53.

LONDON MATHEMATICAL SOCIETY INVITED LECTURE SERIES 1996
Frederick Almgren, Princeton University
Geometric Measure Theory and the Calculus of Variations

A series of 10 lectures on the application of methods from geometric measure theory to the calculus of variations will be given by Frederick Almgren during the week 15 - 19 April 1996 at the Department of Mathematics, University College London.

The series will present an introduction to new techniques that have recently been developed to answer important questions in the theory of minimal surfaces. The lectures will none-the-less be accessible to research students in nearby fields; preliminary reading on the level of, e.g., F. Morgan's Geometric Measure Theory (Academic Press, Boston, MA, 1988) is highly recommended.

Tentative programme

- The shape of soap bubbles and crystals: Having fun with the calculus of variations and some important problems.
- Basics of geometric measure theory: Hausdorff and integral geometric measure, rectifiable sets, area and co-area formulas, structure theorem for sets of finite Hausdorff measure.
- Existence of energy minimizing surfaces: Currents, the deformation theorem and isoperimetric inequalities, multi-functions and approximation, the compactness theorem, parametric integrals and energy minimizing surfaces.
- Regularity theorems: (F,e,d) minimal sets, Dirichlet energy minimizing multi-functions, mass minimizing integral currents.
- Curvature driven evolutions and dendritic crystal growth - the variational approach.
- Calculus of variations in the large: homotopy groups of the integral cycle groups, integral varifolds and the existence of minimal surfaces on manifolds.
- Calibrations and calculations of minimal surfaces: Holomorphic varieties as mass minimizing integral currents, max flow/ min cut algorithms for computing area minimizing surfaces.

Accommodation Accommodation, under £20 (single) room/night, is reserved in Carr Saunders Hall from 14 to 19 April 1966. If you wish to use this accommodation, please let the organizers know as soon as possible. We will try to handle late requests as well, but success is less likely after the middle of January. Close to the College there is a large number of (more expensive) bed and breakfast hotels where one should be able to find accommodation even on the day of arrival.

Registration Participants are asked to register (by letter or e-mail) by the end of January. There is no registration fee. Late registrations will be accepted, but printed materials may not be available for those who register late.

Contact address David Preiss, Department of Mathematics, University College London, Gower Street, London WC1E 6BT; e-mail: dp@math.ucl.ac.uk

SCHOOL MATHEMATICS

Calculators are used in UK schools more than in almost any other country in the world. Many of us have believed for a long time that this is having an adverse affect on our children's basic mathematical skills. Now the School Curriculum and Assessment Authority (SCAA) has announced that they will be used on only one of the two mathematics papers that 11-year-olds will sit in England and Wales next year. From an analysis of this summer's exams, SCAA have concluded that over-reliance on calculators is indeed damaging and that more thought must be given to exactly how and when they should be used.

According to reports, officials at SCAA are also coming round to the idea of teaching children accurate and effective techniques rather than expecting them to discover all of mathematics for themselves. It may surprise you that anyone ever thought otherwise, for while Alan Turing apparently preferred to derive any results he didn't know, he was a bit exceptional. The world of education is, however, full of surprises for the outsider (as, in this sense, most LMS members are).

SCAA also reported on the results in English and science. We have no special interest in what they said about English (though you may be interested to hear that they found no evidence of a dramatic decline in literacy) but it seems that the problems 14-year-olds had with science were often caused by lack of mathematical ability.

The LMS/IMA/RSS report "Tackling the Mathematics Problem" was published only a month or so before the SCAA announcement, so even though they will have known it was in preparation we can't be sure how much influence we have had. What matters, however, is that there has been some movement in directions that most of us would surely support. There is a long way to go, but it's an encouraging start.

P.T. Saunders
King's College

THIRTEENTH CONFERENCE ON ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS

The Thirteenth Dundee Conference on Ordinary and Partial Differential Equations will be held in Dundee, Scotland from Tuesday 25 to Friday 28 June 1996. The purpose of the Conference is to bring together research workers with a common interest in differential equations and their applications. The theme of the meeting is the study of ODEs and PDEs as models arising in physical and biological systems, including electromagnetics, acoustics, electronics, and fluids. Particular attention will be focused on recent developments in the analysis of wave propagation, inverse problems, and dynamical systems, including non-linear systems.

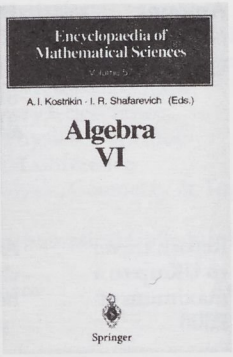
The programme will consist of invited and contributed lectures. Invitations to speak at the Conference have been accepted by: D.S. Broomhead, F.X. Canning, K.P. Hadeler, R.E. Kleinman, M.J. Miksis, D.L. Rod, B.D. Sleeman and J.M.T. Thomson. Contributed talks are invited on any work connected with ordinary and partial differential equations and their applications. Twenty- five minutes will be allocated to each speaker for presentation of results and discussion.

Further information and application forms may be obtained from the Conference WWW page: http://www.mcs.dundee.ac.uk:8080/~deconf/index.html or by contacting the Conference secretary: Conference on Differential Equations, Dr R.J. Jarvis, Department of Mathematics and Computer Science, University of Dundee, Dundee DD1 4HN (e-mail: deconf@mcs.dund.ac.uk).

ROBIN O. GANDY

Dr Robin O. Gandy, who was elected a member of the London Mathematical Society on 16 June 1956, died on 20 November 1995 at the age of 76.

Encyclopedia of Mathematical Sciences



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Algebra IX
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PROGRAMME AND CONFERENCE FUND

The Society's Programme and Conference Fund is used to give financial support to various mathematical activities in the UK. Grants are made under five main headings, which are set out in summary form below.

Type of Grant	General Purpose	Amount	Deadlines
Conference Grant	Support of conferences within the UK. The grant may be either a substantial contribution to a small meeting or a small contribution to a large meeting	Up to £2500	31 January, 31 May and 31 August
Scheme 2	Support for a foreign visitor who will give lectures at three places in the UK	Return travel to UK up to a maximum of £300	At least three months before the visit
Scheme 3	Support of incidental costs for collaborative work by research groups from three (or more) different places	Travel or other costs up to £1000 for one year	31 January, 31 May and 31 August
Scheme 4	Support of travel and subsistence costs incurred by a UK member or their collaborator in carrying out joint research.	Up to £300	31 January, 31 May and 31 August
fSU Scheme	Support of visits to UK by fSU mathematicians and support of visits to fSU by UK mathematicians	Basic travel and living expenses up to £1000	At least three months before the visit

Only Society members are eligible for Scheme 4 grants. Otherwise, any mathematician working in the UK is eligible for a grant; applications from non-members must be countersigned by a Society member. Applications for conference grants must be submitted on the appropriate form, available either from the Society's Office (lms@kcl.ac.uk), or from the Society's ftp archive which can be reached via ftp ftp.qmw.ac.uk. In all other cases, applications should be made by letter, including (as appropriate) the academic case, details of participants and activities, places to be visited, the proposed timetable and a budget of estimated costs. Applications should be sent to the Meetings and Membership Secretary, Dr D.J.H. Garling, Department of Pure Mathematics and Mathematical Statistics, 16 Mill Lane, Cambridge CB2 1SB (telephone: 01223 337978, fax 01223 337920 e-mail d.j.h.garling@pmms.cam.ac.uk). Further information and advice can be obtained from him, from the Society's Office, from the Society's ftp archive or from the Society's home page on the World Wide Web at http:www.qmw.ac.uk/~lms/lms.html.

Recent grants are:

Conference	Awardee	Grant
Workshop on Dynamics and Symmetry	D.R.J. Chillingworth	£2000
Computational Conformal Geometry Conference	D. Singerman	£950
Patrick Parks Memorial Meeting	H. Ockendon	£350

Conference	Awardee	Grant
Scottish Computational Mathematics Symposium 1995	D.B. Duncan	£624
Aspects of Functional Analysis Conference	D.J.H. Garling	£2250
Ali Frohlich's Birthday Meeting	M.J. Taylor	£878
Geometric Issues in the Foundations of Science	S. Huggett	£2500
19th Research Students' Conference in Probability & Statistics	R. Wolfe	£650
Reading Two-Day Combinatorics Colloquium	A.J.W. Hilton	£2000
Robert Rankin 80th Birthday Conference	R.W.K. Odoni	£1600
Mathematics in Victorian Britain	R.J. Wilson	£592
Homotopy Theory Conference	I.M. James	£1000
Geometry and Physics Workshop	J. Gray	£1800
Nonlinearity 96 Conference	R.S. MacKay	£1000
Groupoids, Analysis, Geometry & Topology Conference	K.C.H. Mackenzie	£2500
48th British Mathematical Colloquium	M.J. Taylor	£4500

Scheme 2: Visitor	Awardee	Places to visit	Grant
J-C. Hausmann	A. Ranicki	Edinburgh, Warwick Oxford	£250
N. Fagella	S.M. Rees	Liverpool, Manchester Warwick, London	£221
D. Schleicher	S.M. Rees	Liverpool, Manchester Warwick, London	£300
L. Smith	J.R. Hubbuck	Aberdeen, Edinburgh Glasgow	£300
P. Moussa	S.R. Bullett	QMW, Loughborough Cambridge	£150

Scheme 3: Topic	Applicants	Institution	Award
Computational Number Theory	N.M. Stephens	Goldsmiths	£900
	N. Smart	Kent	
	B.J. Birch	Oxford	
	J.E. Cremona	Exeter	
Topology	W.J. Harvey	KCL	£750
	S.R. Bullett	QMW	
	M.J. Dunwoody	Southampton	
	R. Fenn	Sussex	

Scheme 4	Grant
T.S. Griggs (Central Lancashire) with J. Siran (Bratislavia)	£250
C.J. Budd (Bath) with L.A. Peletier (Leiden)	£300
K. Erdman (Oxford) with N. Shashall(Leicester)	£250

fSU: Visitor	Awardee	Place to visit	Grant
G. Janelidze	R. Brown	Bangor	£1000
V. Guba	S.J. Pride	Glasgow	£1000
P.S. Knopov	I. Kovalenko	North London	£960
L. Shaikhet	X. Mao	Strathclyde	£1000
S.A. Posashkov	V.A. Galatnikov	Bath	£1000
S.M. Nikol'skii	W.D. Evans	Cardiff	£1000
V.B. Priezzhev	T.C. Dorlas	Swansea	£272

Geometric Scattering Theory

R. B. MELROSE

These lecture notes are intended as a non-technical overview of scattering theory. The simple case of the Laplacian on Euclidean space is described in the first two lectures. Various results on Euclidean scattering are then outlined. In the last three lectures these ideas are extended to non-Euclidean settings.

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matics

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Clifford Algebras and the Classical Groups

I. PORTEOUS

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K. TAIRA

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INTERFACE WITH EPSRC

In order to formulate coherent responses to requests for information from various bodies, and to present an interface between the mathematical community and EPSRC, a Group of Mathematical Presidents has been set up consisting of the Presidents (or their delegates) of the London Mathematical Society, the Royal Statistical Society, the Institute for Mathematics and its Applications and the Operational Research Society. On November 10th a meeting of the Group (myself, Adrian Smith, David Crighton and Lyn Thomas) was held with Dr Richards, the EPSRC Programme Manager for Mathematics, which resulted in a little more light being shed on the situation for our subject.

On the face of it, the overall picture for Mathematics is not as bleak as it seemed a year or so ago. Proposed changes such as the MRes or the linking of the allocation of research studentships to grant income have not been applied to Mathematics. There is even now a recommendation that the number of research studentships in Mathematics should increase. On the other hand the question of resources is unsettled, so that extra studentships may well be awarded at the expense of research grants. Furthermore the existence of the MRes in other disciplines has had an adverse impact on Advanced Course Studentships particularly in Statistics and OR.

On one particular issue, the award of studentships in 1995 was rather contentious in certain areas of the community. In the future EPSRC intends to make it clear to us all what the priorities are amongst the various criteria which enter into the decisions on individual studentship applications.

It is clear that of all disciplines under the aegis of EPSRC, Mathematics is the most vociferous in its responses, solicited or otherwise, and the Group of Presidents is one particular means of communication between the two sides. It would be very useful if members of the Society who have points which they wish to make on EPSRC policy could communicate them to me, or one of the Presidents of the other societies if more appropriate, to be discussed at a future meeting. Two issues which may come up, and on which members may have definite views are: the role of MSc training in mathematics (the MMath has altered the current picture somewhat) and the balance of support in the Mathematics Programme, taking into account for example, the symposium activity at the Isaac Newton Institute, the ICMS in Edinburgh, the Warwick Research Centre and the LMS Durham Symposia.

N.J. Hitchin

48th BRITISH MATHEMATICAL COLLOQUIUM

The 48th BMC with principal speakers A. Wiles, A. Casson and E. Zelmanov and with special sessions in Combinatorics and Differential Equations/Mathematical Physics will be held at UMIST on the 9th - 12th April 1996. Application forms were distributed with the December Newsletter but are available from Dr M.D. Coleman, Department of Mathematics, UMIST, PO Box 88, Manchester M60 1QD, or by e-mail: bmc@umist.ac.uk.

VISIT OF PROFESSOR L.V. YAKUSHEVICH

Professor L.V. Yakushevich, of the Institute for Cell Biophysics of the Russian Academy of Sciences (Pushchino) will visit the UK during the whole of the month of February 1996 thanks to a Royal Society visiting fellowship. During this period Professor Yakushevich will be mostly based at Loughborough University of Technology and deliver lectures on "Nonlinear mathematical models of the internal DNA dynamics". People interested in inviting Professor Yakushevich to deliver lectures at their institution should contact the host Dr G. Gaeta on: (01509) 223480 or by e-mail: G.Gaeta@lut.ac.uk. Professor Yakushevich can also be reached directly by e-mail: vakushevich@venus.iteb.sersukhov.su.

ROYAL SOCIETY RESEARCH APPOINTMENTS 1996

Applications are invited for about 30 Royal Society University Research Fellowships, tenable in the first instance for five years from 1 October 1996 (or later in the academic year 1996-97). Renewals of three years and then a further two may be possible. The appointments available embrace all branches of science, including agriculture, medicine, mathematics, engineering and technology. Research Fellows are paid on the academic and academic-related staff (Lecturer A and B) salary scale which currently runs from £15,154 to £26,430 plus three additional discretionary points up to £29,532. Starting salaries will be on this scale, with London Allowance where appropriate, and will rise incrementally each year. A limited number of merit increments will be awarded each year to reward outstanding performance. Annual research expenses (up to about £11,000 for 1996-97) will be available together with travel expenses and a contribution to baggage costs for successful applicants from overseas and their families.

Applicants must have a PhD or equivalent research experience. They should be at least 26 but not have passed their 40th birthday by 1 October 1996 and have between two and seven years postdoctoral experience. Applicants over 40 may be considered under very exceptional circumstances; they should contact the Research Appointments Department at The Royal Society for advice before submitting an application. Fellowships must be held in a university in the United Kingdom. Those already holding substantive posts in a European Union university will not be considered. University Research Fellowships are open only to European Union citizens who are either employed in the UK or who, if not employed, have been resident in the UK for a continuous period of three years other than for the sole purpose of receiving full-time education. Application forms and further information are available from the Research Appointments Department, The Royal Society, 6 Carlton House Terrace, London SWIY 5AG (fax: 0171-930 2170). Closing date is 26 January 1996. Application forms are not available after 12 January 1996 and applications arriving after 4 pm on 26 January will not be considered.

Amongst the recent new appointments were Dr S.J. Chapman, Mathematical Institute, University of Oxford, Dr M.P.F. du Sautoy, DPMMS, University of Cambridge, Dr R.A.W. Gregory, Mathematical Sciences, University of Durham.

GEOMETRIC ISSUES IN THE FOUNDATIONS OF SCIENCE

There will be a symposium entitled 'Geometric Issues in the Foundations of Science" at St. John's College, Oxford, from 25 - 29 June 1996 in honour of the 65th birthday of Professor Sir Roger Penrose. The symposium will be broadly based and draw together recent developments in some of the fields to which Roger Penrose has contributed. The following have provisionally agreed to give lectures in the conference: A. Ashtekar, Sir Michael Atiyah, A. Connes, S.K. Donaldson, A. Ekert, H. Friedrich, S. Hameroff, S. Hawking, N.J. Hitchin, C. LeBrun, A. Shimony, P. Steinhardt, R.S. Ward. The number of participants that we can accommodate will be limited. If you think that you are likely to wish to attend this conference we would be very grateful if you could register your interest as soon as possible. For further information please contact S.Huggett@Plymouth.ac.uk or geom96@maths.ox.ac.uk. Part of the funding for this symposium has been provided by the London Mathematical Society, to whom the organisers are very grateful.

MEMORIAL SERVICE

A memorial service for T. Brooke Benjamin will be held in The University Church of St Mary the Virgin, Oxford on Saturday 27 January 1996 at 3.00 pm. Tea will be served in the Hall of The Queen's College after the Service.

IMU ON THE WORLD WIDE WEB

A new initiative to put the International Mathematical Union on the World Wide Web has been announced. The Konrad-Zuse-Zentrum fuer Informationstechnik in Berlin (ZIB) has been working together with the Executive Committee of the IMU to compose a "home page" for IMU. This home page can be accessed using any of the standard Internet tools, such as Mosaic, Netscape, etc through the URL: http://elib.zib-berlin.de/IMU. Gopher access is possible through the following address: gopher://elib.zib-berlin.de:70/11imu. The IMU server can be accessed via telnet as follows: telnet elib.zib-berlin.de; Login: imu; no password required.

It is hoped that this WWW home page will serve several purposes. The first is to inform all members of the international mathematical community of what the IMU is doing. Secondly, they can find there descriptions of various programs from which they can benefit: the IMU lectures; exchanges with the developing countries; conferences being sponsored, etc. Thirdly, the IMU server is also a collection of data that everyone can use to find the addresses of the main mathematical organizations of the world. It is planned to extend the scope of the IMU server so that it will become a true "home page of the world of mathematics". A number of links can already be found to mathematical and mathematics related information offered around the world: look at the "Links to the Mathematical World" in the IMU server.

Fourthly, the IMU server will give everyone immediate access to the latest information on the next International Congress (ICM98 in Berlin), as well as the ability to preregister for this congress by the WWW server of ICM98 that can be "clicked" in the IMU server or can be directly accessed through the following URL: http://elib.zib-berlin.de/ICM98.

The ICM98 server contains a forms page for "preliminary preregistration". This is not a formal registration yet. Everybody preregistered for ICM98 will be informed in the future automatically about the progress of the organization of the congress by e-mail and will receive the final registration material etc. in this way. Those interested in ICM98 are encouraged to preregister for the congress. Whoever does not have the possibility to use the advanced Internet tools described above can send an e-mail to the following address: icm98@zib-berlin.de and writing PRELIMINARY PREREGISTRATION into the SUBJECT line. In the body of the mail the following information should be contained: Last Name; First and Middle Name; E-mail; Phone Number; Fax Number; Institution; Street; ZIP Code; City; Country.

CONFERENCE AND WORKSHOP ON GEOMETRY AND PHYSICS, 1900-1930

A Conference and Workshop on 'Geometry and Physics, 1900-1930" will be held at the Faculty of Mathematics and Computing, Open University, Milton Keynes MK7 6AA on Friday 15 March 1996. Lectures will be given in St Michael's Church, The Open University, and the programme is: 10:00 Jesper Lutzen (Copenhagen) *On the relation between differential geometry and mechanics;* 11:00 Arthur Miller (London) *Einstein, Poincaré, and the testability of geometry;* 12:00 Scott Walter (Paris) *Special relativity and non-Euclidean geometry;* 1:00 Lunch; 2:00 Leo Corry (Dibner Institute) *Hilbert and physics;* 3:00 David Rowe (Mainz) *The Göttingen school and Emmy Noether's theorem;* 3:45 Tea; 4:15 Erhard Scholz (Wuppertal) *Weyl and the theory of connections.*

The conference is supported by the London Mathematical Society and the Institute of Physics. For further information, please contact J.J. Gray, Faculty of Mathematics and Computing, Open University, Milton Keynes MK7 6AA (e-mail: J.J.Gray@open.ac.uk).

WILLIAM BARRETT

Mr William Barrett, who was elected a member of the London Mathematical Society on 8 February 1940, died on 22 August 1995 at the age of 81.

REPORT ON 1995 MATHEMATICS SURVEY

The Funding Committee of the LMS has carried out a survey of University mathematics departments in the UK annually since 1991; the first survey was conducted in 1988 by the then President of the LMS, Christopher Zeeman. The 1995 survey was carried out jointly with the Committee for the Heads of Mathematics Departments. The results of these surveys have proved useful because they not only provide information that is difficult to obtain otherwise but provide important data that is not published officially until a year or two later. When mathematicians make cases to their own universities or to national organisations it is essential to have up-to-date figures to quote. For the future there are two important factors that could improve the value of these results:

- a higher response rate - although the present response rate does give very useful information. (We would like to reassure respondents that confidentiality of replies is maintained.)
- in modular courses it may be difficult to make a clear distinction between a "mathematics (honours) student" and a "mathematics (service course) student" especially in the early years of a student's career. It would be more useful for respondents to estimate the number of students in these categories rather than not respond.

Some of the main points that arise from the results of the survey conducted in 1995 are:

Student Numbers There had been a significant loss of Honours student FTEs in the 'new' universities but numbers had remained steady at the 'old' universities. There seemed to be a slight drop in first year numbers at some smaller universities. However, the number of non EU students studying mathematics had increased significantly at both undergraduate and postgraduate levels. Overall, there had been a small increase in postgraduate numbers. There were no other significant changes in the relative profiles of 'new' and 'old' universities.

Service course teaching numbers have remained steady except for an increase in the total number of engineering students; however, in this case, the increase was compensated by a decrease in the 'load factor' so that student FTEs from this source had not changed significantly. There had been an upward drift in service course teaching FTE numbers for Social Science at some institutions. Significant changes in the pattern of mathematics service teaching have taken place at several institutions over the last few years and at others there are various changes under consideration; it seems likely that the place and form of service courses will need very careful thought for several years.

Staffing There had been no dramatic changes in staff numbers or in the pattern of permanent/temporary/part-time staff. No conclusive evidence was produced on a net brain drain. The total number of staff expected to retire in each of the next five years in the 51 universities that responded are 31, 26, 20, 23, 21 with almost half of these in Applied Mathematics. To maintain the present staffing levels one would therefore expect that at least 150 new lecturers will be recruited over this period. This number might be much greater if there are more (early) retirements than the returns anticipated.

Funding The total amount of money spent on mathematics departments had increased but dropped per FTE to £2,300 (old), £1,526 (new) and £2,064 (all). There was a slight increase in non-research council support for research in old universities.

Resources Library expenditure had increased and the percentage spent on periodicals had also increased to 70%. There is still considerable concern about the low totals at a number of universities and the average spend per FTE is £67. There seemed to be less concern about the level of computing support than in previous years.

Courses One 'old' university has introduced an HND course in mathematics.

E.G. Rees

TEACHING ANALYSIS

As one of our external examiners used to say, by way of offering comfort, "Analysis is hard to learn and hard to teach". Students meeting the subject for the first time are faced with both a leap in conceptualisation and a conflict of mental images. Old familiar concepts like 'number', 'function', 'continuity' 'limit', 'differentiate', 'integrate', which evoked simple intuitive meanings, are suddenly given sophisticated definitions that are too long to fit easily into the students' short-term focus of attention. The complexity of these definitions and the logic of proof to establish ideas that seem 'obvious' involves a huge effort which seems out of all proportion to the simple results that are achieved.

In a collection of articles, members of the Mathematical Association working group TALUM (Teaching and Learning Undergraduate Mathematics) have each formulated their own picture of what is happening and have tentatively suggested some ideas for improving success.

Johnston Anderson considers why students find analysis difficult and refers to their lack of appropriate mental structures to accommodate the new ideas. With the general aim of leading the student to accept a new definition as being inevitable and 'natural', rather than mysterious and artificial, he considers the topics of limit and continuity, in each case offering a novel approach which may help motivate students to build up the definitions in a meaningful way.

Keith Austin proposes that students' difficulties may lie in the 'faults and weaknesses in analysis'. He counsels against the tendency to omit details in proofs to avoid confusing students, suggesting that the absence of reasoned argument will lead to the declaration that things are true by appealing to a kind of 'mathematical magic'. The dilemma that more detail means more content he counters by suggesting that courses should avoid unnecessary generality and concentrate on limited definitions to cover cases which have genuine interest at the time. He quotes examples of students' comments which show the gulf between what the lecturer thinks is being said and what the students apparently hear, making a plea for a wider range of learning activities, including scope for student discussion.

Janet Jagger suggests that analysis at university should grow out of A-level calculus with similar 'methods based courses' in the first two years of university, supported by computer graphics and intuitive geometric justification - an approach which may be appropriate across a certain range of student ability.

Frank Jellett identifies student difficulties in the loss of proof at A-level so that analysis is the students' first meeting with formal proof, leading to rote-learning and lack of motivation. He suggests that students' attention might be caught by the appeal of something 'patently new', such as metric spaces.

David Tall reports research into students' conceptual difficulties relating to the learning of analysis. On occasion, intuitive imagery clashes with the formalism, and the complexity of ideas in analysis must be compressed into a form that experts use flexibly and easily to manipulate the concepts. Across a spectrum of student experience, ability, and needs, there will be a spectrum of solutions to the content of analysis courses and the manner in which they are taught and learned. His article ends with an appeal for serious research into the thinking processes involved.

The report also includes a short list of references to recent research into the learning of topics in analysis. Copies can be obtained from: Dr Keith Austin, School of Mathematics and Statistics, Hicks Building, University of Sheffield, Sheffield S3 7RH. There is no charge for the report but please send a stamped addressed envelope (postage to cover 85 grams and envelope for unfolded A4 pages).

Tony Barnard
King's College London

LONDON MATHEMATICAL SOCIETY
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Note: Unless otherwise stated, periods of service end on 31 December of the year indicated.

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JOINT MATHEMATICAL COUNCIL: to be appointed. (J.C. Robson, who was the Society's representative on the JMC during 1991-95, has recently been elected as Chair of the JMC.)

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DIARY

The diary lists Society meetings and other events publicized 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.

JANUARY 1996

8-9 Jordan Triples and Related Topics Workshop, University College, Dublin (233)

12 Edinburgh Mathematical Society Meeting, Edinburgh (232)

FEBRUARY 1996

9 Edinburgh Mathematical Society Meeting, Dundee (232)

16-17 Differential Equations, London Mathematical Society Two-Day Meeting, Bath University

MARCH 1996

8 Edinburgh Mathematical Society Meeting, Stirling (232)

13 Ninth Schrödinger Lecture "Form, Colour and Depth: Perception and the Brain", D.H. Hubel, Imperial College, London (233)

15 Science, Engineering and Technology Week (231)

APRIL 1996

9-12 British Mathematical Colloquium, UMIST (231 & 233)

15-19 LMS Invited Lectures - Professor F.J. Almgren, University College London (228)

15-3 May School on Nonlinear Functional Analysis and Applications to Differential Equations, ICTP Trieste (230)

MAY 1996

10-11 Algebra, Joint Two-Day London Mathematical Society Meeting with the Edinburgh Mathematical Society, Glasgow University

31 Edinburgh Mathematical Society Meeting, Aberdeen (232)

JUNE 1996

15-19 Hyperbolic Problems, Theory, Numerics and Applications Conference, Hong Kong (233)

21 London Mathematical Society Meeting, Linnean Society, London

22 Ali Fröhlich's 80th Birthday Meeting, Robinson College, Cambridge (230)

24-4 July Partial Differential Equations and Spectral Theory, LMS Durham Symposium, Durham University (232)

26-28 Homotopy Theory Mini-Conference, Mathematical Institute, Oxford (230)

JULY 1996

1-12 Graph Symmetry: Algebraic Methods and Applications, Université de Montréal, Québec, Canada (233)

8-19 Galois Representations in Arithmetic Algebraic Geometry, LMS Durham Symposium, Durham University (232)

13-20 Edinburgh Mathematical Society's St Andrews Colloquium 1996, University of St Andrews (233)

14-19 Computational Techniques in Spectral Theory and Related Topics Workshop, Gregynog Hall, University of Wales (230)

18-12 Croatian Mathematical Congress, Zagreb, Croatia (233)

18-20 Analytic and Elementary Number Theory Conference, Vienna, Austria (233)

21-25 Affine Geometry of Convex Sets Conference, Dalhousie University, Canada (232)

22-26 2nd European Congress of Mathematics, Budapest, Hungary

21-1 Aug Model Theory of Fields, LMS Durham Symposium, Durham University (232)

30-8 Aug Brazilian Algebra Meeting, Institute of Pure and Applied Mathematics, Rio de Janeiro, Brazil (233)

AUGUST 1996

1-13 Nonstandard Analysis and its Applications Symposium, Edinburgh University (233)

12-30 School on Algebraic Groups & Arithmetic Groups, ICTP Trieste (230)

25-31 International Congress of Theoretical and Applied Mechanics, Kyoto, Japan (226)

SEPTEMBER 1996

9-27 School on Numerical Simulation of Partial Differential Equations: Methods, Algorithms, Applications, ICTP Trieste (230)

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 WIV 0NL, to arrive before the first day of the month prior to publication. Telephone 0171-437 5377, fax 0171-439 4629, e-mail lms@kcl.ac.uk. The London Mathematical Society is registered with the Charity Commissioners.

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