

THE LONDON MATHEMATICAL SOCIETY NEWSLETTER

No. 281

April 2000

FORTHCOMING SOCIETY MEETINGS

Friday 19 May-Saturday 20 May 2000 - Oxford

Hilbert's Problems: Past and Future

Joint meeting with the

British Society for the History of Mathematics

Friday 23 June 2000 - London

M. Buhmann, M.J.D. Powell

OPERATOR FUNCTION THEORY AND SEMIGROUPS AT AMBLESIDE

A meeting will be held from 3 - 9 September 2000 at St. Martin's College, Ambleside in Cumbria, with the support of the London Mathematical Society. The main speakers are (i) Professor W. Arveson (Berkeley) and (ii) Professor N. Nikolski (Bordeaux), who will give a series of lectures on (i) model theory for n -tuples of operators and analytic functions, and (ii) resolvents and controllability of operators. The other main theme of the meeting is functional calculus of semigroups. Those interested in participating should contact Dr G. Blower (e-mail: g.blower@lancaster.ac.uk) for further information.

VISIT OF PROFESSOR C.-L. BEJAN

Professor C.-L. Bejan is visiting the University of Leeds from 27 March to 21 April 2000. She is interested in harmonic maps and morphisms. Her visit is supported by an LMS grant under the International Short Visits Scheme. For further information contact Professor J.C. Wood (j.c.wood@leeds.ac.uk).

SCOTTISH ALGEBRA DAY

The 2000 Scottish Algebra Day will be held in Lecture Theatre 2, Appleton Tower, University of Edinburgh on Friday 26 May, with support from the London Mathematical Society. The speakers are: R.J. Marsh (Leicester) "Cone combinatorics of quantum groups", T.W. Müller (QMW) "Parity patterns in Hecke groups and Fermat primes", P. Papasoglu (Paris) "Quasi-isometry invariance of group splittings" and D. Popescu (Bucharest) "Betti numbers and the regularity of some monomial ideals". More details of the programme can be obtained from the Scottish Algebra Day website (<http://www.ma.hw.ac.uk/~jim/sad.html>) or from the organisers: Ken Brown, Glasgow: kab@maths.gla.ac.uk, (0141) 330 5180; Jim Howie, Heriot-Watt: J.Howie@ma.hw.ac.uk, (0131) 451 3240; Tom Lenagan, Edinburgh: tom@maths.ed.ac.uk, (0131) 650 5078.

EARL OF HALSBURY

Lord Halsbury, who was elected a member of the London Mathematical Society on 20 October 1995, died on 14 January 2000, aged 91.

FORESIGHT

Following the publication in 1993 of the Government's White Paper on Science Engineering and Technology "Realising Our Potential" the Office of Science and Technology in 1994 launched the first round of the Foresight programme to put science, innovation, technology and design at the heart of the government thinking and action. A number of Foresight Sectoral Panels were set up to consider how this might be achieved. The Foresight Panels published their first reports in 1995 aiming to identify the likely social, economic and market trends in each sector for the next decade and the developments in science, engineering, technology and infra-structure required to address future needs in the UK. Post 1995 the Panels developed their findings and helped to stimulate action on their recommendations.

In March 1999 the OST issued a consultative document for the second round of Foresight, "seeking to produce a new set of visions and a fresh agenda for action". In particular views were sought concerning the choice of themes, the basis on which sectors should be defined, the number and focus of Sectoral Panels, and how best to involve interests not explicitly covered by a sectoral panel. This part is very relevant, in that mathematics is rather all pervasive across Foresight, but is not referred to explicitly anywhere in the documentation. Following the consultation exercise the titles and remits of the panels were determined.

The mode of operation of Foresight this time will be via Thematic Panels, Sectoral Panels and Underpinning themes. These are:

Thematic Panels

- Ageing population
- Crime prevention
- Manufacturing 2020

Sectoral Panels

- Built Environment & Transport
- Chemicals
- Defence, Aerospace & Systems
- Energy & Natural Environment
- Financial Services

- Food Chain & Crops for Industry
 - Healthcare
 - Information, Communications & Media
 - Materials
 - Retail & Consumer Services
- Underpinning Themes
- Education, Skills & Training
 - Sustainable Development

Associate Programmes are being set up by learned societies and professional organisations to give input to the Panels and Underpinning Themes. For more information see the web site (<http://www.foresight.gov.uk>).

In order to try to make the management and panels of Foresight aware of the role and importance of mathematics, the Institute of Mathematics and Its Applications (IMA) approached the Foresight management to discuss how the IMA could input views of mathematicians to the Foresight exercise and panels. The IMA Council decided that the Institute should set up Shadows for the panels to monitor their activity, to interact with the panels, to seek views from the mathematics community and to input these to the Foresight Knowledge Pool and hence to the panels; this will be a "mathematics associate programme". The intention is that the IMA will be granted "trusted organisation" status and that the shadows will be "trusted persons" with access to the knowledge pool. Details of this can be found on the IMA web site (<http://www.ima.org.uk/news/foresight>). Since the original decision was taken, the IMA and the London Mathematical Society have agreed that the Shadowing exercise will be widened to become a joint activity.

We now need to set up a system of Shadows, and are actively seeking volunteers to act as Shadows in their areas of interest. John Whiteman (john.whiteman@brunel.ac.uk) has agreed to act as co-ordinator for this exercise. If you are interested in working as a Shadow, you are warmly invited to contact him as soon as possible. If you wish to discuss the possibilities, you can also telephone John on 01895-203270.

LONDON MATHEMATICAL SOCIETY BRITISH SOCIETY FOR THE HISTORY OF MATHEMATICS

JOINT TWO-DAY MEETING HILBERT'S PROBLEMS: PAST AND FUTURE

Friday 19 - Saturday 20 May 2000
Mathematical Institute, Oxford

Friday

- 2.30 - 3.30 Jeremy Gray (Open) *Hilbert, Göttingen, and the Reputation of the Problems*
3.30 - 4.00 Tea
4.00 - 5.00 David Rowe (Mainz) *Geometry, Axiomatisation and Foundations (The first 6 problems)*
5.15 - 6.15 Hugh Woodin (Berkeley) *The Continuum Hypothesis*

Saturday

- 9.15 - 10.15 Simon Donaldson FRS (Imperial College, London) *Geometry*
10.15 - 10.45 Coffee
10.45 - 11.45 Norbert Schappacher (Strasbourg) *Hilbert on Number Theory and Modern Algebra*
12.00 - 1.00 Don Zagier (Bonn) *Number Theory*
1.00 - 2.00 Buffet lunch
2.00 - 3.00 Craig Frazer (Toronto) *Hilbert and Analysis (Problems 19 to 23)*
3.00 - 3.30 Tea
3.30 - 4.30 John Ball FRS (Oxford) *Analysis (Calculus of Variations)*

Organisers: Jeremy Gray and Peter Neumann

A reception and dinner on the Friday evening will be held at St Cross College. Those wishing to attend should contact Miss Susan M. Oakes, London Mathematical Society, De Morgan House, 57-58 Russell Square, London WC1B 4HP (oakes@lms.ac.uk).

Some funds are available to contribute in part to the expenses of members of the London Mathematical Society or research students who wish to attend the meeting. Requests for support should be addressed to the Meetings and Membership Secretary, London Mathematical Society, De Morgan House, 57-58 Russell Square, London WC1B 4HP (requests should include an estimate of expenses and a very brief *curriculum vitae*; research students should include brief letters of endorsement from their supervisors).

GREGYNOG MATHEMATICS COLLOQUIUM

The colloquium will take place at Gregynog Hall (near Newtown, Powys), beginning at teatime (4 pm) on the 22nd May, and ending after lunch (1:30 pm) on the 24th. The meeting is organised jointly by the mathematics departments of the University of Wales. Most of the participants will be from those departments. Anyone who would like to attend from outside the University of Wales will be very welcome, and should contact V.C. Mavron at Aberystwyth (vcm@aber.ac.uk) by 1 May. Unfortunately we are

unable to give financial support to outside participants. The cost of 2 days full board at the Hall is about £90. Owing to limited accommodation, places will be allocated on a first come, first served basis. The organisers would like to thank the London Mathematical Society for its support of this meeting. The main speakers are T.W. Körner (Cambridge) and J.F. Toland (Bath). Other speakers will include, T. Hagen (Munich TU), P. Hanlon (Michigan), A. Kerber (Beyreuth) and D. Vassiliev (Bath).

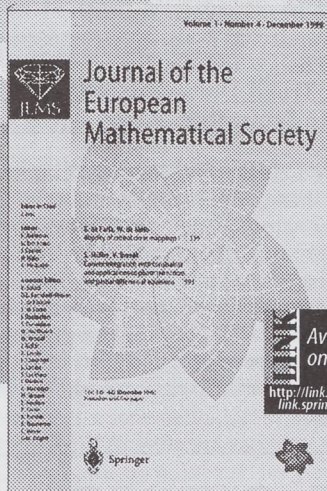
EPSRC

The EPSRC would like to receive expressions of interest from any organisation or individual interested in being invited to tender to co-ordinate activities in the Mathematics for IT (MathFIT) Initiative. The MathFIT Initiative was begun in 1996 as a joint initiative between the EPSRC and the London Mathematical Society, in order to promote links between the two disciplines of mathematics and computer science. Within EPSRC, the initiative is seen by Council as a strategically important mechanism for enabling connections across the two disciplines. Further details of the initiative can be found at: http://www.epsrc.ac.uk/Documents/support_for_researchers/calls_for_proposals/maths/mathfit1.htm

The Co-ordinator will be responsible for:

- Raising awareness of the MathFIT Initiative and its objectives
- Promoting networking between the maths and computer science communities
- Increasing the numbers of high-quality collaborative proposals to the MathFIT Initiative

In the first instance, potential applicants should register their interest in writing, (including a CV and details of relevant experience of work in the field) by **25th April 2000**, and posted to Head of Procurement, EPSRC, Polaris House, North Star Avenue, Swindon, Wilts SN2 1ET, quoting reference EF/BCD/23/C4. This information will form the basis for the selection of a shortlist to be invited to tender. Contractual enquiries should be directed to Lisa Wilson, Procurement Group (tel: (01793) 444156, fax: (01793) 444012, e-mail: lisa.wilson@epsrc.ac.uk). Technical enquiries should be directed to Anne Farrow, Associate Programme Manager, Mathematics Programme (tel: (01793) 444110, fax: (01793) 444007, e-mail: anne.farrow@epsrc.ac.uk).



Journal of the European Mathematical Society

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It publishes research articles in all active areas of pure and applied mathematics: these are selected by a distinguished, international board of editors and associate editors, for their outstanding quality and interest, according to the highest international standards. Occasionally, substantial survey papers on topics of exceptional impact are also published. The preferred language of publication is English.

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SHORT INSTRUCTIONAL COURSES

Short Instructional Course for research students have been organised by the Society since 1993, with the support of EPSRC until 1999 and subsequently under a contract with EPSRC. Recent courses have been:

- 1996 Aspects of Analysis
(D.J.H. Garling)
- 1997 Wavelets (T.N.T. Goodman)
- 1997 Integrable Systems
(N.M.J. Woodhouse)
- 1998 Fuchsian Groups
(P.M. Neumann)
- 1999 Homological Algebra
(K.W. Gruenberg)
- 1999 Topology (J.D.S. Jones)
- 2000 Stochastic Analysis
(A.M. Etheridge).

Future Courses in 2000 will be:

- Mathematical Biology
(H.M. Byrne) University of Nottingham, 4 - 8 September
- Partial Differential Equations
(G.R. Burton, G.C. Smith)
University of Bath, 4 - 8 September
- Set Theory and Analysis
(J.K. Truss) University of Leeds,
11 -16 September.

The LMS Research Meetings Committee, which has responsibility for the Short Courses programme, will welcome proposals for 2001 and 2002. 'Notes for Organisers' appeared in Issue 279 (February 2000) of the Newsletter. Dr A.R. Pears, Facilitator for the programme, will be pleased to discuss ideas with potential organisers (alan@lowfld.u-net.com).

MERTON COLLEGE, OXFORD

RESEARCH FELLOWSHIP IN PURE MATHEMATICS

Applications are invited for this Fellowship, tenable for 3 years from 1 January 2001, for research in Pure Mathematics including its applications in Computing. Although this is primarily a Research Fellowship, the Fellow will be expected to give 16 lectures a year at the Mathematical Institute and a limited amount of undergraduate teaching. The scale of stipends is from £17,238 at age 26 or under, to £20,811 at age 30 or above. In addition, the Fellow will hold a part-time consultancy at GCHQ, Cheltenham, for two months each summer, with a supplementary stipend of £3,000 a year. Funding will also be available from GCHQ, up to £2,000 per year for travel expenses. Appointment is restricted to British Nationals (and is open to both men and women).

Further details, and application forms can be obtained from the Warden's Secretary, Merton College, Oxford OX1 4JD. (tel: 01865 276352, fax: 01865 276282 or e-mail: moira.wise@merton.ox.ac.uk). The closing date for applications is **5 May 2000**.

Princeton = Mathematics

The Action Principle and Partial Differential Equations

Demetrios Christodoulou

This book introduces new methods in the theory of partial differential equations derivable from a Lagrangian. A distinguishing characteristic of this approach is that one considers, at once, entire families of solutions of the Euler-Lagrange equations. The second part of the book develops a general theory of integral identities and the third part introduces a new definition of hyperbolicity associated with the Lagrangian.

Annals of Mathematics Studies, 146

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The sixtieth birthday of C. T. C. Wall, one of the leaders of the founding generation of surgery theory, provided an opportunity to produce a comprehensive book on the subject. Experts have written state-of-the-art reports that will be of broad interest to all those interested in topology.

Annals of Mathematics Studies, 145

Paper £21.95 ISBN 0-691-04938-6

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Princeton Landmarks in Mathematics

Homological Algebra

Henri Cartan and Samuel Eilenberg

When this book was written, methods of algebraic topology had caused revolutions in the world of pure algebra. To clarify the advances that had been made, Cartan and Eilenberg tried to unify the fields and to construct the framework of a fully fledged theory. This mathematical masterpiece will appeal to all mathematicians working in algebraic topology.

Princeton Landmarks in Mathematics

Paper £12.50 ISBN 0-691-04991-2

Theory of Lie Groups

Claude Chevalley

This famous book was the first treatise on Lie groups in which a modern point of view was adopted systematically; namely, that a continuous group can be regarded as a global object.

The continued importance of Lie groups in mathematics and theoretical physics make this an indispensable volume for researchers in both fields.

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ADAMS PRIZE

The Chairman of the Adjudicators for the Adams Prize invites applications. The Prize will be awarded this year for research achievement in the general field of quantum information.

The prize is open to any person who, on 1 January 2001, will hold an appointment in the UK, either in a university or some other institution; and who is under 40 (in exceptional circumstances the Adjudicators may relax this age limit). The value of the prize is expected to be approximately £13,000; of which one third is awarded to the prize-winner on announcement of the prize, one third is provided to the prize-winner's institution (for research expenses of the prize-winner) and one third is awarded to the prize-winner on acceptance for publication in an internationally recognised journal of a substantial (normally at least 25 printed pages) original article, of which the prize-winner is an author, surveying the field of quantum information.

Applications (six copies), comprising a CV, a publications list and the work or works (published or unpublished) to be considered, should be sent to:

**The Secretary of the Adams Prize Adjudicators,
Faculty Office, Centre for Mathematical Sciences,
Wilberforce Road, Cambridge, CB3 0WA**

(enquiries may be emailed to: aet20@damtp.cam.ac.uk).

The deadline for receipt of applications is 31 October 2000.

LMS CONFERENCE GRANTS

Programme Committee has recently awarded grants to support the following conferences and meetings. These are open to members. If you wish to attend, or would like more information, please contact the organiser.

Date/Venue	Title	Organizer
10-12 Apr 2000 Mid Wales	Inverse Problems and Emerging Techniques in Materials Characterization	A.R. Davies (ard@aber.ac.uk)
10-14 Apr 2000 Sheffield	37th European Study Group with Industry	A.S.I. Zinober (a.zinober@sheffield.ac.uk)
25-27 Apr 2000 QMW	Postgraduate Combinatorial Conference 20000	C.G. Rutherford (c.g.rutherford@qmw.ac.uk)
17 May 2000 Reading	Reading One-Day Combinatorics Colloquium	A.J.W. Hilton (a.j.w.hilton@reading.ac.uk)
19 May 2000 Surrey	Qualitative Properties of Dissipative PDEs	M.V. Bartucelli (m.bartucelli@ee.surrey.ac.uk)
26 May 2000 Edinburgh	Scottish Algebra Day	J. Howie (j.howie@hw.ac.uk)
1 Jun 2000 Skye	Scottish Conference in Algebraic Topology	R. Levi (r.levi@maths.abdn.ac.uk)
21-28 Jun 2000 Southampton	Topology Meeting and Workshop on Dessins d'enfants and Geometric Aspects of Group Theory	G.A. Jones (gaj@maths.soton.ac.uk)
24 Jun 2000 Cambridge	History of Cryptography	J.V. Field (jv.field@hist-art.bbk.ac.uk)
3-5 July 2000 Leeds	Statistics of Directions, Shapes and Images	J.T. Kent (sta6jk@leeds.ac.uk)
10-14 Jul 2000 ICMS Edinburgh	Dynamical Systems 2000	K. Khanin (k.khanin@newton.cam.ac.uk)
24 Jul-2 Aug 2000 ICMS Edinburgh	New Analytic and Geometric Methods in Inverse Problems	Y.V. Kurylev (y.v.kurylev@lboro.ac.uk)
3-5 Aug 2000 ICMS Edinburgh	EMS Euro Summer School	Y.V. Kurylev (y.v.kurylev@lboro.ac.uk)
7-10 Aug 2000 St Andrews	Recent Developments in Wave Fields Euro Conference	M.D. Atkinson (mda@dcs.st-and.ac.uk)
1 Sep 2000 Surrey	Symbolic Algebraic Computation Symposium	S. Gourley (s.gourley@ee.surrey.ac.uk)
10-17 Sep 2000 Sussex	Travelling Fronts and Patterns Workshop	K. Erdmann (erdmann@maths.ox.ac.uk)
11-15 Sep 2000 Bath	Geometry of Quiver Representations and Projective Algebras	I.G. Graham (i.g.graham@maths.bath.ac.uk)
18-19 Sep 2000 Sussex	Summer School	J.W.P. Hirschfeld (jwph@sussex.ac.uk)
20-23 Oct 2000 Warwick	Boundary Integral Methods	R. Mackay (mackay@maths.warwick.ac.uk)
19-12 Apr 2001 Glasgow	2nd International Conference	D.R. Fearn (d.fearn@maths.gla.ac.uk)
	Finite Geometries Advanced Research Workshop	
	Singularities in Classical Quantum and Magnetic Fluids	
	53rd British Mathematical Colloquium	

GRANTS FOR ATTENDING THE THIRD EUROPEAN CONGRESS OF MATHEMATICS

Council has set aside a sum of money to be used for making grants to Members of the Society who wish to attend the Third European Congress of Mathematics. Members of the Society who are eligible are expected to make an application to the Royal Society in the first instance. Royal Society grants are made to applicants presenting their own paper or poster or chairing a session. The deadlines for applications to the Royal Society are 1 March 2000 and 1 June 2000. Information and application forms can be found on the website (<http://www.royalsoc.ac.uk>).

Members who apply to the Royal Society and also wish to apply to the London Mathematical Society for a grant may simply submit copies of their Royal Society applications to the LMS at the address below. Members who are not eligible for a Royal Society grant may apply on forms obtainable from the address below.

Applications should be sent to Miss S.M. Oakes, The Administrator, London Mathematical Society, De Morgan House, 57-58 Russell Square, London WC1B 4HP, to arrive before **14 April 2000**. They will be considered by a Council Committee and the outcome (if necessary conditional on the outcome of an application to the Royal Society) will be made known to the applicant by 12 May 2000.

J.S. Pym
Council and General Secretary

ONE-DAY COMBINATORICS COLLOQUIUM

A one-day Combinatorics Colloquium will be held in the Mathematics Department at Reading University on Wednesday 17 May, starting at 10.30 am and finishing at 5.30 pm approximately. Everyone is welcome. The following talks have been arranged:

- S. Blackburn (Royal Holloway) *Perfect hash families: recent results*
- G. Brightwell (LSE) *Correlation inequalities in partially ordered sets*
- P. Cameron (QMW) *Codes, matroids and trellises*
- K. Edwards (Dundee) *Planarization of bounded degree graphs*
- G. Gutin (Brunel) *Orientation of digraphs*
- J. Jedwab (Hewlett-Packard) *Combinatorics and digital communication*
- D.G. Larman (UCL) *Blocking numbers for convex bodies*
- K. Quinn (Open) *Directed designs*
- A.J. Radcliffe (Cambridge) *The Bollobas inequality and its relatives*

For further information contact Professor A.J.W. Hilton (a.j.w.hilton@reading.ac.uk).

ARAKELOV GEOMETRY

The Mediterranean Seminar of Algebra and Topology of Montpellier 2000 "Introduction to Arakelov Geometry" will be held from 26 - 27 May 2000 at the Université Montpellier II. The seminar will consist of a series of introductory lectures to Arakelov geometry. The invited speakers are H. Gillet (University of Illinois at Chicago) and C. Soulé (CNRS and IHES).

For more details contact the organisers Ph. Elbaz-Vincent (pev@pev.math.univ-montp2.fr) and C. Cibils (cibils@math.univ-montp2.fr). An abstract and further information are available on the MAT seminar web page (<http://www.math.univ-montp2.fr/MAT/impl00-eng.html>). For registration and accommodation e-mail Miss Lacan (lacon@math.univ-montp2.fr) or fax: +33 4.67.14.35.58. The registration deadline is 15 May 2000. There are no fees, but registration is necessary in order to provide enough resources for the participants. The prices of the rooms will range from 30 to 45 euros per night.

University of Cambridge

**NM Rothschild and Sons
Professorship of Mathematical Sciences
and
Directorship of the Isaac Newton Institute
for Mathematical Sciences**

Applications are invited for the NM Rothschild and Sons Professorship of Mathematical Sciences which will be held concurrently with the Directorship of the Isaac Newton Institute for Mathematical Sciences.

The successful candidate, who will take up appointment on 1 October 2001, will be a senior academic with distinguished work in some branch of the mathematical sciences who has appropriate administrative experience. The appointment will be for a fixed term of 5 years.

The Isaac Newton Institute is a national institute which aims to promote research of the highest international quality in the mathematical sciences for the benefit of the UK community, through the running of major visitor programmes in selected, often interdisciplinary, fields. Sir Michael Atiyah OM FRS, the first Director when the Institute was opened in 1992, was succeeded in 1996 by Professor Keith Moffatt FRS who is the current holder of the post.

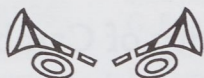
Candidates should send one copy of their application, marked **confidential**, together with the names of two referees, to the Secretary General of the Faculties, from whom further information regarding the Directorship is available, at the General Board Division, The University Offices, The Old Schools, Trinity Lane, Cambridge CB2 1TT so as to reach him not later than **Friday 28 April 2000**.

Informal enquiries may be made to Professor Adrian Smith (Chair of the National Advisory Board of the Institute), tel. +44 (0)171 975 5001, e-mail afms@qmw.ac.uk, or Professor Frank Kelly (Chair of the Management Committee of the Institute), tel. +44 (0)1223 337963, e-mail f.p.kelly@stat.slab.cam.ac.uk. Suggestions for names of suitably qualified potential candidates are also welcomed.

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BOOK REVIEW

Pioneers of Representation Theory: Frobenius, Burnside, Schur and Brauer
Charles W. Curtis, 287pp, US\$49.00,
ISBN 0-8218-9002-6 (AMS/LMS History
of Mathematics Series, Vol 15) 1999.

This book is likely to be of interest to any mathematician who has had occasion in any of his/her own work to use group representation theory in any of its many contemporary guises.

It begins by explaining some results of 19th century algebra and number theory in terms of characters of (finite) Abelian groups. This includes some discussion of Dirichlet L -series and work of Gauss on the classification of binary quadratic forms (with integer coefficients).

The main subject matter of the book begins with a discussion of the life and (some of) the work of Frobenius. Here and elsewhere, the author's commentary is interspersed with carefully compiled background information, from documentation and letters of the day, and interesting quotations from present day experts in representation theory.

The reader may wonder at the wealth of mathematics that evolved in a few short years, starting with Frobenius' factorization of the group determinant into irreducible factors in response to questions of Dedekind. With the hindsight of a modern perspective of representation theory, this seems like an almost routine exercise. It is difficult, though to put one's self in the frame of mind of trying to invent representation theory from that starting point. One can only marvel at the way Frobenius did this, and the author does an excellent job of laying out some of the major steps in the process. Some of the mystery of how Frobenius achieved what he did (almost inevitably) remains.

Even after the foundations were laid, achievements such as an algorithm to obtain the irreducible character values for the symmetric groups still impress, and are outlined in some detail by the author.

The discussion of Burnside's work

includes the well-known results on the structure of finite groups (such as the $p^a q^b$ -theorem), but also some lesser known material, such as results on finiteness of certain periodic linear groups. Also, Burnside's re-working of some of the foundations of the subject using Hermitian forms is discussed.

It is really during the discussion of Schur's work that representation theory, as the modern reader might recognise it, begins to emerge. The author explains Schur's perspective in some detail. Discussion of the Frobenius-Schur indicator, then the Schur index, follow.

Another fundamental contribution of Schur was the definition of *projective* representations, that is (in current terminology) homomorphisms from a group G to the projective general linear group $PGL(V)$ for some vector space V . This involved discussion of representation groups, the Schur *multiplicator* (now usually known as the *multiplier*), consideration of factor sets, and may be viewed as a starting point for the cohomology of groups, among other things.

There is also a mention of the influence of Schur's work on the work of H. Weyl on representations of the (complex) classical groups, and a digression on the work on invariant theory of Jacques Deruyts and its relationship to representation theory from a modern perspective, as recently explained by J.A. Green. The author then returns to a discussion of Schur's work on polynomial representations of GL_n .

In Chapter 6, the author discusses some work of R. Brauer and E. Noether (some joint, some in parallel). It is here that we see the modern perspective of studying the representations of a finite group by studying the structure of its group algebra, pioneered by Noether. There is discussion of the Brauer group, which may be viewed as a starting point for Galois cohomology.

Chapter 7 discusses Brauer's founda-

tional work on the modular representation theory of finite groups. This is group representation theory in finite characteristic, and it diverges significantly from the complex theory when the characteristic divides the group order. In that case, it was necessary to consider the structure of non-semi-simple group algebras. There is some discussion of the work of Brauer, Nakayama and Nesbitt on symmetric algebras and (the larger class of) Frobenius algebras.

Some uses by Brauer of modular representation theory in "characterization theorems" relevant to the classification of simple groups are then discussed. Finally, the author discusses Brauer's induction theorem, and some of its number-theoretic applications.

This is a beautiful and carefully written book, which succeeds at many levels. The mathematics discussed is powerful, and influences many areas of modern mathematics (and other sciences). The story of its evolution and its various diversifications has its own fascination, and serves to remind us how a single mathematical question can lead to the creation of vital new areas. The mathematical contribution of the main characters inspires admiration, while we also gain some insight into their lives at a human level. In short, the book fascinates both as mathematics and as history.

G.R. Robinson
Birmingham University

ICMP 2000

The European Union is providing special funding to support the attendance by women at the XIII International Congress on Mathematical Physics (17 - 22 July 2000, London). This is the latest in a triennial series of key conferences in this field. Application for this funding (which is for women from EU and associated countries) may be made by going to <http://icmp2000.ma.ic.ac.uk/>. This page also links to more general information about the congress and the registration process.

VISIT OF PROFESSOR J. DUNCAN

Professor John Duncan (Fayetteville) will be visiting Glasgow and Leeds between 17 April and 24 May. His visit is partly supported by an LMS Scheme 2 grant. He will give the following lectures:

- Circle packings in the plane (Glasgow) 25 April.
- Circle packings in the plane (Edinburgh) 1 May.
- Extremal algebras for hermitians (Leeds - Yorkshire Functional Analysis Seminar) 9 May
- Extremal algebras for hermitians (Glasgow) 23 May.

For further information contact Dr Colin McGregor (cmm@maths.gla.ac.uk).

MR LOOKUP A Reference Tool for Linking

Authors can now access the Mathematical Reviews (MR) database to verify and create references that can link to reviews and original sources. Authors input basic reference data in the form at www.ams.org/mrlookup and MR delivers electronic publication-ready references with live links to reviews in MathSciNet and to original articles.

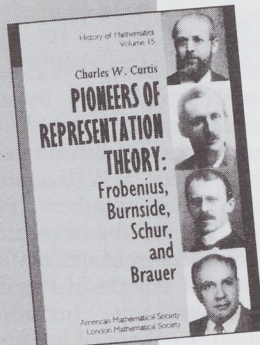
The MR Lookup tool enables authors and publishers of source articles to build links in a simpler, single, consistent format-free of charge. Readers are therefore able to navigate from any reference in two clicks, first to the MathSciNet entry and then to the original paper (when it is accessible electronically). The older literature from the past 60 years becomes part of the web immediately through reviews of the papers. And, as those older articles become available online on JSTOR or other publisher sites, new links will be added automatically from the review on MathSciNet to original articles, without any action by those source publishers.

Visit: www.ams.org/mrlookup for more information about MR Lookup and to use this free tool.

History of Mathematics Series

These titles offer interesting historical perspectives on the people, communities, and events that have profoundly influenced the development of mathematics. Beginning with Volume 4, the History of Mathematics series is co-published with the London Mathematical Society. The LMS is registered with the Charity Commissioners.

Recommended Text



Pioneers of Representation Theory: Frobenius, Burnside, Schur, and Brauer

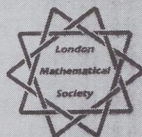
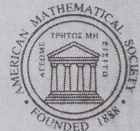
Charles W. Curtis, *University of Oregon, Eugene*

The year 1897 was marked by two important mathematical events: the publication of the first paper on representations of finite groups by Ferdinand Georg Frobenius (1849–1917) and the appearance of the first treatise in English on the theory of finite groups by William Burnside (1852–1927). Burnside soon developed his own approach to representations of finite groups. In the next few years, working independently, Frobenius and Burnside explored the new subject and its applications to finite group theory.

They were soon joined in this enterprise by Issai Schur (1875–1941) and some years later, by Richard Brauer (1901–1977). These mathematicians' pioneering research is the subject of this book. It presents an account of the early history of representation theory through an analysis of the published work of the principals and others with whom the principals' work was interwoven. Also included are biographical sketches and enough mathematics to enable readers to follow the development of the subject. An introductory chapter contains some of the results involving characters of finite abelian groups by Lagrange, Gauss, and Dirichlet, which were part of the mathematical tradition from which Frobenius drew his inspiration.

This book presents the early history of an active branch of mathematics. It includes enough detail to enable readers to learn the mathematics along with the history. The volume would be a suitable text for a course on representations of finite groups, particularly one emphasizing an historical point of view.

Volume 15; 1999; approximately 319 pages; Hardcover; ISBN 0-8218-9002-6; List \$49; All AMS members \$39; Order code HMATH/15LMS



All prices subject to change. AMS and LMS members may order directly from the AMS at the AMS member price. Charges for delivery are \$3.00 per order. For optional air delivery outside of the continental U. S., please include \$6.50 per item. Prepayment required. Order from: **American Mathematical Society**, P. O. Box 5904, Boston, MA 02206-5904, USA. For credit card orders, fax 1-401-455-4046 or call toll free 1-800-321-4AMS (4267) in the U. S. and Canada, 1-401-455-4000 worldwide. Or place your order through the AMS bookstore at www.ams.org/bookstore/. Residents of Canada, please include 7% GST.

AMS and LMS members may order through Oxford University Press and receive their member discounts off of the UK pound price: fax +44 (0) 1865 267782 or email at science.books@oup.co.uk. Or go to www.oup.co.uk/ for more information.

LARGE RINGS, MODULES AND REPRESENTATIONS

At the Ovidius University in Constanta, Romania, a workshop and conference will take place from 2 - 18 August 2000. The programme consists of a workshop "Algebra Representation Theory" (NATO Advanced Study Institute) and a conference "Rings, Modules and Representations" from 14 - 18 August. The speakers include: Henning Andersen (University of Aarhus, Denmark), Michel van den Bergh (University of Limburg, Belgium), Jon Carlson (University of Georgia, USA), Alexander Kemer (Moscow State University, Russia), Susan Montgomery (University of Southern California, USA), Claudio Procesi (University of Rome, Italy), Idun Reiten (University of Trondheim Norway), Jeremy Rickard (University of Bristol, UK), Wolfgang Soergel (University of Freiburg, Germany) and Efim Zelmanov (Yale University, USA).

Organizing committee of the workshop: K. Roggenkamp (University of Stuttgart, Germany) Coordinator: M. Stefanescu (University of Constanta, Romania) Local Organizer. Scientific Committee of the workshop: L. Márki (Academy of Sciences, Budapest, Hungary) and F. van Oystaeyen (University of Antwerp, Belgium).

Organizing and Scientific Committee of the conference: L. Márki (Academy of Sciences, Budapest, Hungary), F. van Oystaeyen (University of Antwerp, Belgium), K. Roggenkamp (University of Stuttgart, Germany) Coordinator M. Stefanescu (University of Constanta, Romania) Local Organizer.

The registration for the workshop is \$50 and for the conference \$50 (\$40 each if payment is made by 31 May 2000). There is a special rate for students and residents of former Eastern countries of \$25 for the conference and \$25 for the workshop, \$20 each if payment is made by 31 May 2000. This registration fee includes coffee as well as a conference dinner. A pre-registration form can be

found on the web site or write to the e-mail address mentioned below to receive the Second Announcement.

For further information visit the web site (<http://web.mathematik.uni-stuttgart.de/~ovid>), e-mail (buro@poolb.mathematik.uni-stuttgart.de) or fax to University of Stuttgart, Mathematisches Institut B/3, Pfaffenwaldring 57, 70550 Stuttgart, Germany (fax: +49-(0)711-685-5322).

FLEXIBLE LEARNING IN MATHEMATICS (FLIM2000)

A one day conference, hosted by the Mathwise User Group, will be held on Tuesday 19 September at Birmingham University. The cost for MWUG members is £15 and for non-members, £45. The conference, which will be of particular relevance to lecturers in Mathematics, will address a range of aspects of Flexible Learning in Mathematics, including assessment, computer-enhanced learning, Mathwise, Web resources, distance learning.

Papers are invited under any of the above headings. Expressions of interest should be forwarded to Dr Neil Pitcher, Department of Mathematics & Statistics, University of Paisley, High Street, Paisley PA1 2BE (tel: 0141 848 3504, e-mail: neil.pitcher@paisley.ac.uk).

Mathwise is a set of software programs available on a CD. It covers undergraduate service Mathematics for Science and Engineering students, mainly at first and second year levels. Its coverage of topics is extensive, comprising 30 or so modules, and it contains computer-based materials both for learning and for assessment. The Mathwise system will be one example of interest, but other software systems, technologies and approaches will also be addressed. The Mathwise User Group (<http://www.bham.ac.uk/ctimath/mwug>) consists of academics who are either using Mathwise in their teaching, or are considering it. The aim is to promote Mathwise within the wider context of learning environments for university Mathematics.

ESGI2000

The 37th European Study Group with Industry will be held at The University of Sheffield from 10th to 14th April 2000. You are cordially invited to attend. University accommodation will be available in en-suite and basic rooms at a university residence. Hotel accommodation can be requested. The website <http://www.shef.ac.uk/~esgi2000/> has up-to-date information. It is anticipated that the subsistence of UK academics, postdocs and students will be subsidised. Student sponsorship is provided by the London Mathematical Society. For further information: Professor Alan S.I. Zinober, ESGI2000 Chairman, Department of Applied Mathematics, University of Sheffield, Sheffield S10 2TN (tel: 0114 222 3888, fax: 0114 222 3739, e-mail: a.zinober@shef.ac.uk, web: <http://www.shef.ac.uk/~esgi2000/>).

QUALITATIVE PROPERTIES OF DISSIPATIVE PDEs

A one-day meeting on Qualitative Properties of Dissipative PDEs will be held at the University of Surrey on Friday 19 May, organised by Stephen Gourley and Michele Bartuccelli. The meeting will begin after lunch and the speakers are John Elgin (ICL), Des Evans (Cardiff), Victor Galaktionov (Bath), John Gibbon (ICL), Brian Straughan (Glasgow) and John Shebalin (NASA). All interested participants are welcome. For PhD students some funds are available to help with travel costs. Contact Stephen Gourley (s.gourley@ee.surrey.ac.uk) or Michele Bartuccelli (m.bartuccelli@ee.surrey.ac.uk) to register (registration is free). Updated information will be e-mailed to registered participants nearer the day.

University of Wales Aberystwyth Department of Mathematics

MathEngine Lectures on Computational Rheology

30 May - 1 June 2000

MathEngine plc is sponsoring a series of lectures on Computational Rheology in the Department of Mathematics, University of Wales Aberystwyth. The lectures will be given by Professor R. Keunings (Université Catholique de Louvain, Belgium) and Professor H.-C. Öttinger (ETH Zurich, Switzerland), who are leading authorities in the modelling and simulation of complex flows. Further details may be obtained from Dr T.N. Phillips (Department of Mathematics, University of Wales Aberystwyth) or from the world wide web pages of the Department (<http://www.aber.ac.uk/~matwww/>).



FORTHCOMING CONFERENCES

THIRD MATHEMATICAL EDUCATION OF ENGINEERS

Loughborough University 26 – 28 April 2000

MILLENNIUM EVENT IN CONJUNCTION WITH WORLD MATHEMATICS YEAR

UCL, London May 2000

COMPUTATIONAL CHALLENGES FOR THE MILLENNIUM

Cambridge 13-14 July 2000

NINTH MATHEMATICS OF SURFACES

Cambridge 4 – 6 September 2000

THIRD QUANTITATIVE MODELLING IN THE MANAGEMENT OF HEALTH CARE

University of Salford, 5 – 7 September 2000

SECOND INTERNATIONAL BOUNDARY INTEGRAL METHODS: THEORY AND APPLICATIONS

University of Bath 12 – 16 September 2000

AN INTERDISCIPLINARY WORKSHOP ON INNOVATIVE BOUNDARY ELEMENT TECHNIQUES IN COMPUTATIONAL ACOUSTICS AND ELECTROMAGNETICS

University of Bath 14 – 15 September 2000

SHORT COURSE AND THIRD IMAGING AND DIGITAL IMAGE PROCESSING: MATHEMATICAL METHODS, ALGORITHMS AND APPLICATIONS

De Montfort University, Leicester 12-15 September 2000

SHORT COURSE AND FIRST FRACTAL GEOMETRY: MATHEMATICAL TECHNIQUES, ALGORITHMS AND APPLICATIONS

De Montfort University, Leicester 19-22 September 2000

FIFTH MATHEMATICS IN SIGNAL PROCESSING

University of Warwick 18 - 20 December 2000

THIRD SPATIAL PATTERNS IN PERMEABLE ROCKS

Churchill College, Cambridge 27 - 29 March 2000

FOURTH MODELLING IN INDUSTRIAL MAINTENANCE AND RELIABILITY

University of Salford 9-11 April 2001

ADVANCED SIMULATION AND CONTROL FOR AUTOMOTIVE APPLICATIONS

Keble College, Oxford 24 - 26 September 2001

FURTHER DETAILS FROM:

Pamela Bye, Conference Officer
The Institute of Mathematics and its Applications
Catherine Richards House
16 Nelson Street
Southend-on-Sea
Essex, SS1 1EF.

Tel: (01702) 354020
Email: conferences@ima.org.uk

Fax: (01702) 354111
Web: www.ima.org.uk



N. JACOBSON
HONORARY MEMBER 1972

DIARY

The diary lists Society meetings and other events publicized in the *Newsletter*. Further information can be obtained from the appropriate LMS Newsletter whose number is given in brackets. A fuller list of meetings and events is given in the Society's web site (<http://www.lms.ac.uk/meetings/diary.html>).

APRIL 2000

- 3-7 Workshop on Ergodic Theory of Z^d -actions, Warwick University (277)(279).
- 5-14 Operator Algebras and Operator Spaces Instructional Conference, ICMS, Edinburgh (276)
- 8-15 Topology, Geometry & Physics Workshop, Warwick University (277)
- 10-14 Algebraic and Co-algebraic Methods in the Mathematics of Program Construction Summer School and Workshop, Oxford (278)
- 10-20 New Theoretical Approaches to Strongly Correlated Systems NATO/EC Summer School, Isaac Newton Institute, Cambridge (276)
- 11-14 Differential Geometry Workshop, Leeds University (274)
- 11-14 Probability and Statistics Research Students' Conference, University of Wales (277)
- 12-15 Mathematical Methods of Regular Dynamics Workshop, Leeds University (279)
- 17-20 British Mathematical Colloquium, Leeds University (274)(279)
- 25-27 Postgraduate Group Theory and Postgraduate Combinatorics Conferences, Queen Mary & Westfield College, London (279)
- 25-29 British Applied Mathematical Colloquium, UMIST (277)

MAY 2000

- 5 Edinburgh Mathematical Society Meeting, Stirling University (275)
- 19-20 Hilbert's Problems: Past and Future, 2-day BSHM-LMS Meeting, Oxford (278)
- 22 Gregynog Mathematics Colloquium, Gregynog (281)
- 26 Scottish Algebra Day, Edinburgh University (281)
- 26-27 Arakelov Geometry Seminar, Montpellier University II (281)
- 26-27 Groups in Galway 2000 Conference, National University of Ireland, Galway (279)
- 28-3 Jun Combinatorics 2000 Conference, Gaeta, Italy (278)
- 31-1 June MathEngine Lectures on Computational Rheology, University of Wales Aberystwyth (281)

JUNE 2000

- 2 Edinburgh Mathematical Society Meeting, St Andrews University (275)
- 3-7 Association for Symbolic Logic Annual Meeting, Illinois, USA (278)
- 13-16 AMS Scand 2000 Meeting, Odense, Denmark (278)
- 23 LMS Meeting, London
- 24-30 Numerical Methods for Evolution Partial Differential Equations Euroconference, Crete, Greece (280)
- 25-29 Twentieth European Dynamics Days, Surrey University (280)

JULY 2000

- 3-7 Functional Analysis Meeting, Technical University, Valencia, Spain (265)
- 3-7 Alhambra 2000 Joint Mathematical European-Arabic Conference, Granada, Spain (280)
- 3-14 Approximation, Complex Analysis & Potential Theory Seminar, Montreal University (276)
- 9-22 Geometry & Topology Workshop, Warwick University (277)
- 10-14 3rd European Congress of Mathematics, Barcelona, Spain (272)(279)

- 10-14 Free Surface Flows IUTAM Symposium, Birmingham University (272)
- 10-14 Disordered and Complex Systems Conference, King's College, London (278)
- 10-14 Dynamical Systems ICMS Workshop, Edinburgh (279)
- 17-21 Integrable Systems in Differential Geometry, Tokyo, Japan (275)
- 17-22 International Congress on Mathematical Physics, Imperial College, London (257) (278)
- 22-28 New Mathematical Methods in Continuum Mechanics Euroconference, Crete, Greece (280)
- 23-31 Association for Symbolic Logic European Summer Meeting, Paris, France (278)
- 24-2 Aug New Analytic and Geometric Methods in Inverse Problems, EMS Euro Summer School, ICMS Edinburgh (279)
- 29 - 4 Aug Curves and Abelian Varieties over Finite Fields and their Applications Euroconference, Crete, Greece (280)

AUGUST 2000

- 2-18 Large Rings, Modules and Representations, Constanta, Romania (281)
- 3-5 Recent Development in the Wave Field and Diffuse Tomographic Inverse Problems EuroConference, ICMS Edinburgh (279)
- 19-25 Discrete and Algorithmic Geometry Euroconference, Crete, Greece (280)

SEPTEMBER 2000

- 1-4 Constantin Caratheodory Congress, Evros, Greece (279)
- 3-9 Operator Function Theory and Semigroups, Ambleside (281)
- 4-8 Current Environmental Issues: Quantitative Methods Meeting, TIES/SPRUCE 2000, Sheffield University (280)
- 4-15 Spatial Structures in Biology Summer School, Taranto, Italy (279)
- 10-17 Geometry of Quiver-Representations and Preprojective Algebras Summer School, Isle of Thorns, Sussex University (275)
- 13-15 Royal Statistical Society International Conference, Reading University (277)
- 15-18 Physical Interpretations of Relativity Theory Meeting, Imperial College London (277)
- 18-23 Differential Geometry International Congress, Bilbao, Spain (275)
- 19 Flexible Learning in Mathematics, Birmingham University (281)

NOVEMBER 2000

- 18-22 Mathematics for Living Conference, Jordan (280)

DECEMBER 2000

- 18-20 Mathematics in Signal Processing, Warwick University (279)

APRIL 2001

- 9-12 British Mathematical Colloquium, Glasgow University

JULY 2001

- 1-6 British Combinatorial Conference, Sussex University (276)
- 9-13 Stochastic Processes and their Applications Conference, Cambridge (275)

AUGUST 2001

- 12-19 Homological Conjectures for Finite-Dimensional Algebras Summer School, Nordfjordeid, Norway (275)

AUGUST 2002

- 20-28 ICM2002, Beijing, China (272)

The Newsletter is published monthly except in August. Items and advertisements for inclusion in the Newsletter should be sent to the Editor, Susan Oakes, by e-mail, fax or post to the LMS office (addresses below), to arrive before the first day of the month prior to publication.

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