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NEWSLETTER

OF THE

NEW ZEALAND MATHEMATICAL SOCIETY (INC.)

Contents

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PUBLISHER'S NOTICE

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The homepage of the New Zealand Mathematical Society with URL address:
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The newsletter is available at: http://IFS.massey.ac.nz/mathnews/NZMSnews.html
Editorial enquiries and items for submission to this journal should be submitted as text or LaTeX files to
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EDITORIAL

MORE IS LESS

We all know that, under the current funding regime, universities are essentially operating as businesses whose income is proportional to the number of students they enroll. An obvious consequence of this is that each university is aiming to enroll as many students as possible. There is a less well-known consequence of the business model which can be found by considering expenditure. Since a university spends much of its money on teaching, not only are universities trying to enroll as many students as possible, they are also trying to teach these students as little as possible.

When you consider the work you put into teaching you might balk at the idea that your university is trying to teach as little as possible. I am not suggesting that any university does not care about teaching its students. However, by enrolling large numbers of weak students, the amount of teaching each studentreceives has been reduced. The bottom line is that universities are forced to operate as businesses and, as businesses, the only way to prosper is to teach more students less.

The impact of teaching more students less has been particularly harsh on mathematics. This is because it is very difficult to extend a mathematics student beyond the standard of the course or the standard of his or her peers. Furthermore, the body of mathematical knowledge is vast so that, regardless of enthusiasm and ability, mathematical research is impossible without the right education. This education requires small classes with only strong and motivated students. These classes are simply not economic under the current funding regime.

At present there are some very positive signs that the government has realised that the present system of funding universities must be changed. I think that the time is right for mathematicians to try and influence this change. It is important to realise that, as a consequence of government policy, universities are dominated by self-interest. No university will promote policies that are beneficial to New Zealand if these policies are detrimental to the university's own interest. For this reason it is essential that we lobby the government directly as a group.

This is what I think we should we be asking the government to do. Firstly, we want the government to implement any changes slowly and cautiously. It is important that the present system, while flawed, is allowed to evolve rather than be radically reshaped. Furthermore, a return to the previous system is impossible and undesirable. Secondly, we need the government to provide extra funding to teach the motivated and mathematically strong students. Not all students are equal and not all students should be funded equally. Thirdly, we need the government to fund a centre of mathematical excellence. This centre must be established under a cooperative model and in an evolutionary way. The centre should serve the interests of New Zealand ahead of the interests of any university. The aim of this centre should be to provide a world-class postgraduate mathematical education for students from New Zealand, Australia and Asia.

None of these ideas are radical, in fact they are used by almost every other first world country. For this reason alone I do not see why we cannot convince the government to adopt them.

Mike Meylan
Massey University

PRESIDENT'S COLUMN

I am writing this from the London Mathematical Society Symposium site at the University of Durham where I am part of their Symposium on "Mathematics in Combustion". As we all find in these occasions, the atmosphere is exciting, friendly, and conducive to getting on with the mathematical tasks presented in the midst of the (70) leading figures in this subject from around the world.

By the time you read this the Forder Lecturer Tom Korner will have left us. I was privileged to meet him as he arrived in the country at the end of June en route to the New Zealand Association of Mathematics Teachers conference in Wellington, where he was a featured speaker, before embarking on his tour around New Zealand. Thank you to all who assisted in making this visit a success, especially to Dr Peter Fenton, a NZMS Councillor from the University of Otago who coordinated the visit nationally. Speaking of the Forder Lecturer, Council are pleased to announce that the Forder Lecturer for 2003 is Professor Caroline Series, University of Warwick. Caroline works in dynamical systems, among other things. More details are forthcoming later.

I am meeting with the President of the LMS later this year to present our pleasure on the way the Forder Lecturer is operating and will be asking Council for any thoughts on improvements.

We were fortunate in obtaining British Council support for this year's visit but we are not necessarily assured of their funding for the future.

Below I have included a letter from Professor Peter Hilton from the US, who visited in May/June as an Erskine Fellow at my University. He kindly agreed to set out his views of our mathematical strengths and weaknesses as he has seen it during his frequent visits to our shores over the last 15 years. It is self-explanatory and helpful. I hope you will bring his comments to the attention of relevant people.

The mid-year Council meeting (by e-mail) was a routine affair and looked at better investments for our funds. More details will be included in the minutes of this meeting. The incoming Vice-President (Rod Downey) and myself attended a special meeting of the Member Bodies groups of the Royal Society of New Zealand on 19th July. I had been concerned that the disciplinary input, and ownership thereof, might be weakened. However, the meeting reaffirmed the need to have strong discipline input to the Royal Society and the electoral colleges will remain and may be strengthened.

We are rapidly approaching the Annual Meeting for 2001, which will be held be held in conjunction with the 2001 New Zealand Mathematics Colloquium at Massey University, Palmerston North in early December. We encourage you to attend and especially ask you to seek support for students and staff (where appropriate) to attend what should be the major event in our mathematical year. Nominations are required for new Councillors, and Rod Downey will take up the role as new President from that time. Details are elsewhere in this newsletter.

Those of you within the University system will be aware of the enormous financial pressure the Government is putting on us to cut costs. A more hidden agenda is the pressure for the system to internally reorganize itself and be "more responsive" to community and national needs. We need to listen to these concerns as leaders in our own areas. But the bottom line has to be the maintenance of agreed levels of excellence and attainment. There are enormous pressures to change, however. Being immersed in the UK system at this very moment I cannot help but be envious at the resources they have compared to ours. But that said, I believe we can take some pride in what has been achieved considering the size of the country and what limited resources we have got, as Peter Hilton says in his letter. It is thanks to the vision of many earlier thinkers that pointed the way.

Graeme Wake
President

LOCAL NEWS

AGRESEARCH

Glenn Fulford has left us to return to Canberra. He made a significant contribution to the possum/Tb programme at Wallaceville, and his expertise will be missed. Your correspondent gave two invited talks at the Infectious Disease Modelling Workshop held in Canberra in April, in conjunction with the Communicable Diseases Control Conference 2001. I then presented a seminar to the mathematics department at the Australian Defence Forces Academy. More recently I have presented papers at the Wellington--Manawatu Applied Mathematics Conference on June 12, and the Dynamical Systems Workshop at the University of Auckland on July 13.

On the statistical front, David Baird has been invited to speak at the European GenStat conference in September 2001. Roger Littlejohn presented a paper on "periodogram analysis of censored time series from a designed experiment" at the Vere-Jones Symposium in Wellington, Zaneta Park-Ng and Harold Henderson also participated. A two-day meeting of the statistics and bioinformatics group was held at Ruakura in April. One day was devoted to a very successful Bayesian workshop run by Bill Bolstad, James Curran and Martin Upsdell. A similar one-day workshop will be run at the Biometrics/NZSA conference in Christchurch in December. Ken Dodds visited North Carolina State University in June to help teach in the Summer Institute of Statistical Genetics, and attended the Interface '01 conference in Los Angeles. Some of the Institute modules will be run during the "Southern" Summer Institute of Statistical Genetics which will be held in conjunction with the Biometrics/NZSA conference in Christchurch in December. Peter Johnstone was also at the Interface '01 and then visited Bryan Manly in Wyoming.

Mick Roberts

UNIVERSITY OF AUCKLAND

Department of Engineering Science

The bad news is that Margot Gerritsen has left us to take up a position at Stanford University. We will miss her greatly. She made a huge impact within our department during the four and a half years that she has been with us.

The good news is that Mike O'Sullivan now has a personal chair. Mike will be taking over as Head of Department in November when David Ryan concludes his term and disappears for some well earned leave.

Don Nield

The Departments of Computer Science, of Mathematics and of Statistics now expect to get in 2003 some extra space which they desperately need. The Mathematics/Physics Block has begun a major project of extension and reconstruction---some students were disturbed during recent examinations by noises from drills and hammers. Some staff, some graduate students and some computing laboratories are shifting temporarily, with some of them going into rented accommodation off-campus. At the end of this year the Science Library will move to the General Library (where major construction work is under way), and that space will then be occupied (initially, at least) by the Computer Science Department. The Forder Cabinet, with its valuable collection of mathematical books, will be displayed appropriately in the General Library.

Department of Computer Science

Dr Robert W. Amor, Dr Andrew Brooks, Dr Gillian Dobbey and Dr Ian Watson have been appointed, as Senior Lecturers. Dr Georgy Gimel'farb, Dr John Grundy and Dr Bakh Khoussainov have each been promoted to Associate Professor.

Seminars

Aaron Nagel, "ITG services".

Werner Gitt, "Laws of nature about information, a fundamental quantity in science and engineering".

Hans W. Guesgen & Ian Watson, "Artificial intelligence".

Robert Aish, "Custom Objects: a model-oriented end-user programming environment".

Hal Berghel, "An inside look at electronic commerce".

Andrew Brooks, "The SUTI Project, the project for the 21st century?".

Luminita Simona Vita, "Apartness spaces---a constructive approach".

Alistair Knott, "Active perception and linguistic structure".

Charles J. Colbourn, "Quality control in manufacturing Oligo arrays".

Lawrence Lau, (University of Queensland), "Virtual reality at UQ (aka the MultiMillion Dollar Fish Tank)".

Department of Mathematics

Wayne Walker tripped in our car park on May 2, and suffered a severe fracture of his upper right arm. A week later he underwent surgery at Middlemore Hospital, with a metal plate joining the broken humerus. On May 10 Wayne suffered a severe stroke. He returned home after seven weeks in a Rehabilitation Centre, and he continues to attend an Outpatient Clinic.

In April, Gaven Martin was awarded a James Cook Fellowship which enables him to devote himself to research for two years, and also he won an award from the Royal Swedish Academy of Sciences to work at the Mittag-Leffler Institute. Gaven accordingly resigned as Head of the Department of Mathematics.

David Gauld was Head of Department from 1981 June 1 to 1990 January 31, and again from 1993 February 1 to 1994 August 15. He has now accepted the post of Head of Department for the third time, commencing on 2001 May 21.

David Alcorn is the Deputy Head of Department.

Marston Conder is about to complete his term as Deputy Vice-Chancellor (Research) and will be returning full-time to the Department after a period of research and study leave.

Barbara Miller-Reilly was presented on May 28 with a Distinguished Teacher Award, one of

12 awards for the year 2000.

The Registry has begun a campaign to recruit a Professor of Industrial Mathematics, a Professor of Applied Mathematics, an Associate Professor, and a Lecturer.

Dr Tom Korner (University of Cambridge) visited as the 2001 Forder Lecturer. Andy Begg (University of Waikato) is a visiting lecturer for most of this semester, teaching MATHS 702. Dr Tom Sallee (UC Davis) and Dr Chris Breen (University of Cape Town) are also teaching parts of our Masters papers in Mathematics Education.

The celebrated young Irish mathematician Sarah Flannery (now a first-year student at the University of Cambridge) visited on July 31, and gave a lecture to our 320 class. Recent visitors include Professor Gerhard Hiss (RWTH Aachen), Dr Mike Eaton (Birmingham University), and Anna Torstensson, a PhD student from Lund University.

Geoff Nicholls spent two weeks in Aalborg in April attending a workshop on statistical methods for treating classical physical inverse problems. In July he spent a week with the mathematical genetics group in the statistics department at Oxford, and attended a Stochastic processes meeting in Cambridge. Philip Sharp attended the annual Division of Dynamical Astronomy (DDA) conference, held in Houston, Texas, April 22--25. Alona Ben-Tal and Vivien Kirk attended the Sixth SIAM Conference on Applications of Dynamical Systems, May 20--24, 2001, Snowbird, Utah. Bruce Calvert went to and spoke at a conference on fixed points in Haifa, 13--19 May. Norm Levenberg visited Indiana University and the University of Michigan during the between-semester break (mid-June to mid-July). Dr Shayne Waldron has returned from a semester of sabbatical leave. He was based mainly at the University of Calgary (with Len Bos) and at his alma mater the University of Wisconsin-Madison. A visit to Yuan Xu at the University of Oregon in the first week led to a proof of a result about tight frames of Jacobi polynomials on a simplex which was two years in the making (and very satisfying). He attended the 10th International Conference in St Louis, and made shorter visits to Galway, Leicester, Dundee, Giessen, Sofia, Padua and Israel. During our examination period and break between semesters, Boris Pavlov visited Ben-Gurion University (Israel) for the conference on "Operator Theory, System Theory and Scattering Theory: Multidimensional Generalizations". That was organized by Professor Daniel Alpay (Chairman of Mathematics, Ben-Gurion University) and Professor Victor Vinnikov, with whom Boris and Sergey Fedorov have long collaborated. Boris gave lectures on "Hybrid differential operators and modelling of nano-electric devices", and on "Turing halting problems and quantum computing". In particular, the second lecture

gave the proof (due to Boris Pavlov and Cris Calude) of the important result that the classical Turing halting problem can be solved by a quantum computer, although it cannot be solved by a Turing machine. Another lecture (after that conference) was dedicated to operator extensions theory. Boris's visit to Ben-Gurion University was supported by a grant awarded to him by the Dozor foundation. He spent the period from June 25 to July 12 in St Petersburg, working with his colleagues at St Petersburg University, on mathematical modelling and technical implementation of a quantum switch which was invented by him in Auckland and patented by the University of Auckland. Boris will continue this work during the Summer vacation 2002.

Colin Fox has recently returned from a year's sabbatical leave. During 2000 he made research visits to Clarkson University (Potsdam, up-state New York), and to the University of Alaska Fairbanks. In June 2000 he attended the International Glaciological Society's symposium on "Sea Ice and Its Interactions with the Ocean, Atmosphere and Biosphere in the year 2000" held under the midnight sun at the University of Alaska Fairbanks, Fairbanks, Alaska, USA, 19--23 June, 2000. he presented three papers: "Ocean Wave Speed in the Antarctic MIZ", "Direct Measurement of Sea-Ice Characteristic Length" and "Calculation of Wave-Ice Interaction". Colin also made it (in picture form) to the front page of the local rag Fairbanks Daily News-Miner, two days in a row. He was an invited participant at the International Union of Theoretical and Applied Mechanics (IUTAM) Symposium on "Scaling Laws in Ice Mechanics and Ice Dynamics" also in Fairbanks, Alaska, USA, 13--16 June, 2000, presenting the paper "Scaling Laws for Flexural Waves in Floating Ice". Not satisfied with just talking about ice, Colin then spent October 2000 in McMurdo Sound, Antarctica, making measurements of strain waves in shore-fast sea ice using newly-acquired tiltmeters that were designed as a consequence of the Mt. St. Helens eruption. In February 2001, he gave a public lecture at The University of Auckland on "Ice, Ozone, and Rocks: Physical Science around the Seventh Continent", as the second lecture in the Vice-Chancellor's special lecture series on Antarctica. That lecture series was well attended, with around 350 people attending each talk. Later in 2001, he made a research visit to Simon Fraser University in Vancouver, and attended the Pacific Institute for Mathematical Studies (PIMS-MITACS) Workshop on Inverse Problems and Imaging, June 9--10, 2001 at the University of British Columbia, presenting the talk "Statistical Estimation of the Parameters of a PDE". He also made a brief trip to London, attending the London Mathematical Society (LMS) talk given by Persi Diaconis (Stanford University and their current Hardy Fellow) on "G.H. Hardy and Probability???", in which Colin learned that Hardy was significantly hampered by his blindness to probability.

Paul Bonnington, Marston Conder, David McIntyre, Eamonn O'Brien and Mike Thomas are on leave.

Andrei Korobeinikov has completed his PhD with a thesis on "Stability and bifurcation of deterministic infectious disease models", and Alona Ben-Tal has completed her PhD with a thesis on "A study of symmetric forced oscillators". Shih-chang Huang has just received word that he has won a Top Achiever Doctoral Scholarship (from the Ministry of Education). He is doing a PhD project in modular representation theory, supervized by Jianbei An and Eamonn O'Brien. He joins Will Wright and Nicoleen Cloete as Top Achiever Doctoral Scholars in this Department.

Two of our former students now at Ann Arbor, Rachel Weir and Elliot Lawes, were co-recipients of the 2001 Best Teaching Assistant Award at the University of Michigan Mathematics Department. Rachel had just finished her PhD under the direction of Professor Peter Duren, and she is heading to the University of Virginia on a post-doctoral fellowship. Elliot expects to finish his PhD next year, working with Professor T. Hales.

Seminars

Professor Paul Fong, (University of Illinois at Chicago), "Shintani descent and Broue's conjecture".

Dr John Holt, (Harvard University), "A rigidity result for limits of hyperbolic 3-manifolds".

Dr L. G. Kovacs, (ANU), "Symmetries of Lie algebras".

Dr Frederic Mynard, (Université de Bourgogne), "Sequentiality of the upper Kuratowski convergence", "Strongly sequential spaces", "Convergence-theoretic approach to quotient quest (mainly from S. Dolecki)", "Convergence-theoretic approach to product theorems", an "Closure spaces as an appropriate context for generalized closed sets. Links with state property systems and physics".

Dr Steve Wilson, (University of Arizona, Flagstaff), "The Capuzzi dichotomies".

Dr A. Rybkin, (University of Alaska, Fairbanks), "Titchmarsh-Weyl m-function on the interval".

Professor Boris Pavlov , "Abstract version of Titchmarsh-Weyl function: Krein formula".

Dr Shayne Waldron, (with Irine Peng), "Signed frames and Hadamard products of Gram matrices".

Professor Mike Hirschhorn, (UNSW), "Ramanujan's most beautiful identity".

Professor Tom Bagby, (Indiana University), "Sobolev spaces and applications to approximation theory".

Dr Bettina Eick, (University of Kassel), "Computing with infinite polycyclic groups".

Professor Vladimir Oleinik, (St. Petersburg State University), "Carleson measures and uniformly perfect sets", and "Jacobi series, lemniscates and the spectrum of perturbed shift".

Professor M. F. Newman, (ANU), "The Erdos-Straus conjecture

and other questions related to unit fractions", and "Classification and enumeration of p-groups".

Professor Marilyn Frankenstein, (SUNY), "Critical mathematical literacy: teaching through real real-life mathematics applications", and "Making adult numeracy intellectually challenging".

Dr Matthew Perlmutter, (Caltech/Massey University), "Symplectic and conformal reduction".

Dr Paul Hafner, "Petersen, Hoffman-Singleton, ...".

Dr Alan Graham, (Open University), "Target-ing---a strategy going in the wrong direction?".

Dr Sina Greenwood & Professor Ivan Reilly, "A unified view of generalised closed sets in topological spaces".

Dr Philip Sharp, "The billion year Jovian problem".

Dr Sina Greenwood, "w_1-compact type I manifolds".

Dr Colin Maclachlan, (Aberdeen University), "Hyperbolic Coxeter groups, Gram matrices and arithmetic groups".

Dr Frederic Mynard & Dr Aurelie Petesch, (Universite de Bourgogne), "The French education system and, in particular, mathematics in highschool and university".

Professor Marston Conder, "Centres of Hurwitz groups".

Dr Trine Nielsen, "The Danish education system with emphasis on technology".

Professor David Gauld, "Metrisability of manifolds: more conditions".

Irine Peng, "Tight frames of Jacobi polynomials on a simplex".

Scott Houston, (SGI Regional Manager), "The future of high-performance computing".

Dr Bruce Calvert, "Using degree to find multiple solutions for a three-point boundary-value problem", and "A *K*-winner-takes-all network".

Professor David Smith, (Duke University, North Carolina), "Technology in university calculus".

Professor Gerhard Hiss, (RWTH Aachen), "Representations of finite groups: objectives and some open problems".

Dr Richard Hamilton, (School of Education), "Self-efficacy: Implications for teaching and learning".

Greg Oates, "Technology and the curriculum".

Dr Peter Donelan, (Victoria University of Wellington), "Manipulator Geometry from a Singular Perspective".

Professor Maurice H M van Putten, (MIT) (joint seminar with Physics Department), "Gamma ray bursts".

Elaine Mayo, (Christchurch College of Education), "Evaluating the effectiveness of teaching---some considerations for the critically reflective practitioner".

Dr David Yost, (King Saud University, Saudi Arabia), "Projections on big Banach spaces".

Dr Tom Korner, (University of Cambridge, Forder Lecturer 2001), "Brownian motion: from pollen to the stock market", and "Why are we not all called Smith?".

Sanka Liyanage, "Analysis of informal assessment questions of secondary school mathematics teachers by using the framework for informal assessment questions (FIAQ)".

Dr Douglas Rogers, (University of Hawaii), "Derangements and (0,1)-matrices with line sum two".

Professor Tom Sallee, (University of California, Davis), "Math Wars in America: an insider's view".

Dr Allan Rodrigo, (School of Biological Sciences), "The mathematics of evolution".

Department of Statistics

Professor Richard Tweedie (University of Minnesota) visited as the NZSA Visiting Lecturer. A few weeks after he returned to Minnesota, he suddenly died.

Dr John Pearson has resigned, to transfer to the genetics research unit in the Faculty of Medical and Health Sciences. Dr Constance Brown has resigned after ten years, to concentrate on civil celebrant duties.

Arier Lee has been awarded a Bright Futures Scholarship for her graduate studies, supervised by Chris Triggs and Alastair Scott.

Seminars

Professor Partha Lahiri, (University of Nebraska), "Jack-knifing in small area estimation".

Professor Richard Tweedie, (University of Minnesota), "Meta-analysis---potentials, problems and pitfalls".

Brian Phillips, (Swinburne Institute of Technology), "The International Association for Statistical Education, IASE".

Dr James Curran, (University of Waikato), "Interpretation of DNA evidence".

Dr Moshe Haviv, (University of Sydney & Hebrew University), "On herd behaviour in queues".

Professor Neville Davies, (RSS Centre for Statistical Education), "The work of The Royal Statistical Society Centre for Statistical Education".

Applied Probability & Applied Mathematics Joint Seminars

Dr Geoffrey Pritchard, (Department of Statistics), "Offering hydro-electricity in a stochastic price environment".

Dr Catherine Hobbs, (Oxford Brookes University), "Singularity theory and applications".

Dr Paul Cowpertwait, (Massey University, Albany), "A space-time Neyman-Scott model of rainfall and a scaling law for the extreme values".

Dr Mike Meylan, (Massey University, Albany), "Wave scattering in the marginal ice zone".

Dr Murray Jorgensen, (University of Waikato), "Using multinomial mixture models to cluster Internet traffic".

Dr Hamish Spencer, (Department of Zoology, University of Otago), "Some difference-equation models in the population genetics of genomic imprinting".

Dr Geoff Nicholls, (Department of Mathematics), "Bayesian population-genetic inference".

Dr Mark McGuinness, (Victoria University of Wellington), "Sun on sea-ice".

Emeritus Professor David Vere-Jones, (Victoria University of Wellington), "Likelihoods, entropy, and the scoring of probability forecasts".

Dr Andrew Lawson, (Aberdeen University), "Hierarchical probability models and Bayesian analysis of mine locations".

Dr Rua Murray, (University of Waikato), "What is left to study in the logistic family?".

Dr Alastair McNaughton, (Department of Mathematics), "Optimising forest harvesting subject to area-restricted adjacency constraints".

Garry J. Tee

UNIVERSITY OF CANTERBURY

Department of Mathematics and Statistics

The department is delighted to announce the appointment of Dr.~Charles Semple as a Lecturer in Applied Mathematics. Charles formerly held a post-doctoral position at Canterbury, and is undertaking joint research with Associate Professor Mike Steel.

Professor Graeme Wake was a plenary speaker/workshop leader at the London Mathematical Society Symposium on the Mathematics of Combustion at the University of Durham: 4--14 July. In mid May, he was visiting a hotter place as Advisor/Examiner to the Department of Mathematics and Statistics at Sultan Qaboos University, Oman. This is the second year he has been there. Once again the temperature reached 50 degrees Centigrade.

Professor Douglas Bridges, Dr. Luminita Vita, and Gabi Popa all gave talks at the DMTCS 01 conference in Constanta, Romania, and at the third panhellenic Logic Symposium in Anogia, Crete, in July.

Professors Peter Hilton and Jean Pedersen also visited the department in May, and gave two talks on cryptography during the Second World War two general audiences in addition to a number of specialist talks to the department. The two general talks on cryptography during the Second World War were extremely well received, and the second gathered a record audience of over 600 people.

Seminars

Dr Mark Nelson, (Australian Defence Force Academy), "Multiplicity behaviour for an oxidation reaction in an adiabatic continuously stirred tank reactor."

Professor Greg Reid, (University of Western Ontario), "Computer algebraic--numeric methods for differential equations."

Professor David Carlson, (San Diego State University), "Extremal patterns of distinct entries in vectors in the range of a matrix."

Professor John L. Casti, (Technical University of Vienna), "The borderline: in search of the limits to scientific knowledge."

Dr Charles Semple, "Subtrees and supertrees."

Dr Michael Small, "Cardiac chaos: evidence if period doubling route and chaos in human ECG."

Dr Mark Nelson, (Australian Defence Force Academy), "Bifurcation phenomena for an oxidation reaction in a continuously stirred tank reactor."

Dr Simon Watt, (University of Melbourne), "A theoritical explanation of the influence of the char formation on the ignition of polymers."

Dr Alex McNabb, (CSIRO, Canberra), "Modelling the drying of pasta."

Professor Richard Tweedie, (University of Minnesota), "Meta-analysis potentials, problems, and pitfalls."

Raylene Maberley, (Texas A & M University), "Mathematics as a second language: looking for a bridge between mathematical language and the language of thought."

Peter Hilton and Jean Pedersen, (University of Central Florida and Santa Clara University), "Geometry in practice and numbers in theory part I."

Peter Hilton and Jean Pedersen, (University of Central Florida and Santa Clara University), "Geometry in practice and numbers in theory part II."

Peter Hilton, (University of Central Florida), "Non--cancellation."

Jean Thompson, (JAD Consultants), "Real world statistical data and the role of the consultant."

Professor David Smith, "What have we learned about learning?"

Professor Carlos Kenig, (University of Chicago), "Harmonic measure of locally flat domains."

Peter Hilton and Jean Pedersen, (University of Central Florida and Santa Clara University), "Catalan numbers: their uses and generalizations."

Professor Eligius Hendrix, (University of Wageningen), "Why would someone be hanging upside down for three months?"

Professor Goeff Whittle, (Victoria University of Wellington), "Well--quasi--orderings, graphs and matroids."

Professor Carlos Kenig, (University of Chicago), "Oscillatory integrals and nonlinear dispersive equations."

Professor Sarah Zeisler, (Dominican University, USA), "Reisz means associated with convex domains in the plane."

Professor James Oxley, (Louisiana State University), "The interplay between graphs and matroids."

Dr Chris Hann, "Recognising two planar objects under a projective transformation."

Professor Richard Laugesen, (University of Illinois), "Completeness of orthonormal wavelet systems."

Dr Peter Smith, "Random matrices in communications engineering."

Professor James Hirschfeld, (University of Sussex), "How many points does an algebraic curve over a finite field have?"

Robin Havea, "Constructive spectral and numerical range theory."

Chris Price

INDUSTRIAL RESEARCH\\ LIMITED

Applied Mathematics Team

In conjunction with Victoria University of Wellington, IRL Applied Maths hosted the Wellington-Manawatu Applied Mathematics meeting on the 12th of June. The meeting was held in the newly refurnished MacDiarmid Conference center (named in honour of New Zealand's recent Nobel prize-winner who has close connections with IRL) and was well attended again this year with an interesting programme arranged by Mark McGuinness of Victoria University of Wellington. Shaun Hendy gave a talk at the meeting on "Light Scattering in Glass Ceramics".

Steven White attended the First National Conference on CO_{2} Sequestration in Washington D.C. earlier in May. Steve also made another visit to Lihir, Papua New Guinea and, together with Warwick Kissling, attended the New Zealand Geothermal Meeting in Taupo on April the 27th. John Burnell attended a Particle Technology Interest Group meeting in Melbourne in April.

We were visited in June by Professor Fernando Muzzio from Rutgers University, New Jersey. Professor Muzzio gave a series of five lectures at IRL over two days on the mixing of solids and liquids. The talks were attended by both mathematicians and engineers, and Professor Muzzio did an excellent job of reaching both audiences.

Seminars

Wellington-Manawatu Applied Mathematics Conference (12 June 2001)

John Harper, (Victoria), "Mechanics of a bubble rising in an ionic solution".

John Butcher, (Auckland), "The *A*-stability of numerical methods with Pade and generalised Pade stability functions."

Nicolette Moir, (Auckland), "A new type of method for solving non-stiff differential equations."

Mike Meylan, (Massey), "Wave scattering in the MIZ and floating airports."

Shaun Hendy, "Light scattering and crystallisation in glass ceramics."

Robert McKibbin, (Massey), "Dispersal of solid particles by fluid streams."

Mick Roberts, (AgResearch), "BSE: Mathematical modelling meets Brussels bureaucracy."

Graeme Wake, (Canterbury), "Thermal explosions may not be catastrophic."

Aroon Parshotam, (Landcare), "Field measurement of nitrous oxide fluxes."

Lutz Grosz, (Massey), "Solution of partial differential equations using VECFEM."

Robert McLachlan, (Massey), "Nonholonomic mechanics."

Jonathan Lermit, (Transpower), "Biofuel and how it affects our lives."

Shaun Hendy

MASSEY UNIVERSITY

Institute of Fundamental Sciences

Mathematics

In March Robert McLachlan went to the International Workshop on Structure-Preserving Algorithms at the Chinese Academy of Sciences in Beijing. He reports: "These are great years for the Academy of Sciences. It has about 130 institutes and all of them are expanding and building furiously. Is this the only place in the world where new physics buildings are going up? There were about 20 westerners and 100 Chinese at the conference and an atmosphere of great excitement. This field was largely founded by the late Feng Kang and continues as a research strength there. I was pleasantly surprised to find Beijing a relaxed, friendly city with absolutely incredible food."

Igor Boglaev attended and gave a talk at the International Conference "Numerical Methods for Singular Perturbation Problems", 8--14 April 2001, Oberwolfach, Germany. The weather must also have been perturbed as it snowed for days!

Tammy Smith has successfully defended her thesis titled "Mathematical Modelling of Underground Flow Processes in Hydrothermal Eruptions". Congratulations Tammy!

Graduation took place in May. Congratulations to all our graduates. Our youngest graduates in increasing order were Shona Yu and Yao-ban Chan.

Fourteen year-old Shona graduated Bachelor of Sciences in Mathematics at the Palmerston North graduation ceremonies, the University's youngest ever graduate. She started full-time study at Massey in the Institute of Fundamental Sciences at the age of 11, completed her BSc last year and is doing honours this year. Shona says the next step will be a PhD and eventually she hopes to lecture in mathematics. However she is still considering her PhD topic, and notes an interest in chemistry, in which she has also completed two papers. Shona Yu has already won awards from both Massey and the University of Sydney. She was awarded an alumni scholarship by Massey and was invited to spend eight weeks in Sydney doing research at the University of Sydney. She has also earned prizes---and travel---as a musician. Four years ago her excellence as a pianist won her the McDonalds Young Achievers Award and a trip to Disneyland and Hollywood. All Shona's school mathematics work was done through the New Zealand Correspondence School. Her mother, Unna, tutored her. Shona also attended some classes at Palmerston North's Winchester School, but went to Freyberg High School from the age of seven. She stayed there three years, then came to Massey at age 11. Outside study, Shona says she manages to fit in some social life, including "hanging out with my friends, going to movies, now and then a basketball game at weekends, and getting out on my scooter."

Yao-ban Chan started at Massey in 1995 at the age of 10 years and finished last year at 16, studying the entire course extramurally from Hawke's Bay. He graduated with a Bachelor of Information Sciences majoring in Mathematics with an exemplary academic record. He was a Massey Scholar and was also on the Pro Vice-Chancellor's Merit List for 2000. In 1997, Yao-ban was awarded the Kee Teo Prize for the best 2nd year extramural Mathematics student. Currently he is doing his Honours year on a scholarship at the University of Melbourne, majoring in Algebra and Operations Research. He moved there last year with his family and his dog (called Bilbo). Yao-ban was home-schooled right from the age of five years. Besides studying at Massey, he has also studied piano performance (passed LTCL last year) and is a regular accompanist and singer with his church choir. At home, Yao-ban enjoys playing computer games and table tennis. He also reads extensively and writes fantasy stories. He is also very keen on origami and has put up two exhibitions and conducted a demonstration class.

Professor Vyawahare, from the Department of Mathematics at M. Mohota Science College attached to Nagpur University, Nagpur, India, visited us during May. Professor Vyawahare came here on a Rotary Scholarship. He gave two seminars and did some teaching.

On a cold and frosty morning Bruce, Marijcke, Robert, Tammy, Barbara, David, Deborah, Jonathan, Kathir, Patrick and Paul set off to attend the `Wellington-Manawatu Applied Mathematics Conference' held on the 12th of June at Industrial Research Ltd, Gracefield, Hutt Valley. It was nice to meet up with fellow mathematicians, catch up on the news and listen to some very interesting talks. The conference concluded with `Recovery Drinks' and smorgasbord. We like to thank Mark McGuiness and Graham Weir for having organized this event.

Matt Perlmutter has left us for a postdoc at the Center for Mathematical Analysis, Geometry and Dynamical Systems at the Instituto Superior Tecnico in Lisbon, Portugal (applying the antipodal map $x \mapsto -x$). Matt has been here since September 1999. A student of Jerry Marsden appointed on a Marsden postdoc, he was rather surprised to see the Marsden Lecture Theatre on arrival at Massey. He loves New Zealand and is just wishing he'd swapped his high-tech shares for some Coromandel real estate when he had the chance.

Barbara Holland has been very busy travelling. In June she took the chance to escape Palmerston North's winter frosts and headed to Mid Sweden University-Sundsvall where she had been invited by Vince Moulton to come and spend three weeks finishing off a couple of joint projects. Her stay in Sundsvall overlapped with a one week visit by Mike Steel (Canterbury) and a two day visit from Anthony Poole (IMBS, Massey) so at one stage the Kiwi population of Sundsvall reached three, presumably an all time high. Vince organized a one-day mini-symposium on "Midsummer phylogenetics". Two talks that stood out for her were: Mike Steel on how any fully-resolved

phylogenetic tree can be uniquely defined by just five multi-state characters, and Niklas Eriksen on his software Yggdrasil that computes trees based on gene order data. Barbara finished her trip with a two-day stop-off in Bochum, Germany to visit Professor Wagele, who has offered Barbara a postdoc within his group. The Ruhr-Universitat-Bochum (the RUB for short) is a massive institution with over 35,000 staff and students. Despite its daunting concrete exterior the people within seemed very pleasant. Barbara has accepted the postdoc position, which is within the `Lehrstuhl fur Spezielle Zoologie', and all going to plan she will be starting there in October.

Paul Gardner has gone to the European summer. Paul will be visiting the Theoretical Biochemistry Group at the Institute for Theoretical Chemistry, University of Vienna for a week. Then he will be going north to the Institute of Physics and Mathematics (FMI) at Mid Sweden University -- Sundsvall. Like Barbara, Paul will be doing some work with Vincent Moulton and Sverker Edvardsson.

Charles Little has attended the 26th Australasian Conference on Combinatorial Mathematics and Combinatorial Computing held on July 9--13 at the Curtis University of Technology in Perth. The weather was unseasonably cool and on the morning of the 13th it was apparently only 0.7°C! Anything to do with Black Friday? In mid August Charles will be off to the Georgia Institute of Technology in Atlanta for four months to do research and some teaching.

Dr Dietmar Cieslik, from the Institute of Mathematics and Computer Science, University of Greifswald, Germany, has accepted a Visiting Senior Lectureship with us, for the period September 10 until December 31, 2001. He will assist in our teaching programme (partly replacing the contribution of Charles Little) and to work with our research group in bioinformatics. Dietmar has a PhD and Habilitation (higher doctorate) from Greifswald. His original research field was in geometry. He is a world expert on the Steiner problem (from geometry, now generalised into many metric spaces) and his second monograph in this area is about to be published. More recently he has been involved in the new undergraduate biomathematics degree course at Greifswald, being the Student Adviser and Director of the BioInformatics Lab. He also teaches in Computer Science.

Mike Hendy is soon to head back to Europe, to attend WABI in Aarhus, Denmark, in August, and later to a research workshop at the German Mathematical Society's Research Institute at Oberwolfach in the Black Forest, in October, "Theoretische und Mathematische Biologie". WABI 2001 (University of Aarhus, Denmark, August 28--31, 2001) is the first workshop on Algorithms in Bioinformatics, and is sponsored by EATCS (the European Association for Theoretical Computer Science) and jointly organized and co-located with WAE 2001 and ESA 2001. For updated information, see the web site {`http://www.brics.dk/wabi2001/BRICS`}. The workshop covers research in all aspects of algorithmic work in bioinformatics. The emphasis is on discrete algorithms that address important problems in molecular biology, that are founded on sound models, that are computationally efficient, and that have been implemented and tested in simulations and on real data sets. The goal is to present recent research results, including significant work-in-progress, and to identify and explore directions of future research. Mike was a member of the programme committee, and his joint paper with David Penny (Massey) and Benny Chor (Technion, Israel) is one of the papers selected for presentation.

It was a great pleasure to have the Forder Lecturer Professor Tom Korner visiting us for a few days. We thoroughly enjoyed his company and his seminars. At least now we know why we are not all called Smith. We hope that Tom enjoyed his visit at Massey and his stay in New Zealand.

We welcome Professor Douglas Rogers of the University of Bergen, Norway. Douglas will be presenting three interesting seminars. We wish you a happy stay in New Zealand and thank you for coming to visit us.

Seminars

Professor Vyawahare, (Nagpur University), "Vedic Mathematics" and "Balancing Numbers".

Professor Tom Korner, (University of Cambridge), "Does Order Matter?", "From Waves to wavelets", and "Why are we not all called Smith?"

Serguei Norine, (University of St. Petersberg), "On Permutations with Limited Dependence".

Mick Roberts, (AgResearch), "Models of Infectious Diseases: Plagues, Ancient and Modern".

Professor Douglas Rogers, (University of Ber-gen), "Picture counting with generating functions", Derangements and (0,1)-matrices with line sum two", and "Permutation problems".

Graduate Seminar Series

Shona Yu, "Coxeter groups".

Brett Ryland, "Dynamical systems".

Patrick Rynhart, "Mathematical modelling of granulation".

Robert McLachlan, "The KAM theorem and stability of motion".

Jonathan Marshall, "Functional differential equations: natural boundaries and eigenvalue >problems".

David Pidgeon, "An interesting set of integrable equations".

Padmanathan Kathirgamanathan, "Source term estimation of pollution from an instantaneous point source".

Donna Giltrap, "Modelling downdraft gasification of biomass".

Dean Halford, "Newtonian cosmology".

Barbara Holland, "Trees and beyond: A sampler in biomathematics".

Marijcke Vlieg-Hulstman

Institute of Information and Mathematical Sciences

Mathematics

Heung Yeung (Frederick) Lam completed his MInfSc thesis in mathematics. Frederick was supervised by Shaun Cooper and James Sneyd. The title of the thesis is "The Development of Elliptic Functions According to Ramanujan". Synthia Darsono also completed her Masters and has enrolled for a PhD under Mike Meylan.

James Sneyd gave a plenary talk at the SIAM Snowbird meeting on the Applications of Dynamical Systems. He also joined the editorial board for the Journal of Nonlinear Science, published by Springer. Contributions to this journal are welcomed from New Zealand applied mathematicians.

A center for parallel computing has been established with Lutz Grosz as director. The center has developed a 16 processor beowulf cluster. Lutz also visited the Department of Mathematics at University of Malaysia in Kuala Lumpur (July 2001)

Mike Meylan visited ENSTA in Paris for two weeks in April and attended the 16th International Workshop on Water waves and Floating Bodies. Robert McKibbin has been promoted to acting head of the institute.

Seminars

Professor John Casti, (Santa Fe Institute, USA; Technical University of Vienna, Austria), "Would-be worlds. The Science and the Surprise of Artificial Worlds".

Dr Mike Hirschhorn, (University of New South Wales), "Ramanujan's most beautiful identity".

Dr Mike Meylan, "Wave Scattering in the MIZ and Floating Airports".

Martin Gutknecht, (ETH, Zurich, Switzerland), "Preconditioning by similarity transformations: another valid option?"

Richard Tweedie (New Zealand Statistical Association visiting lecturer for 2001), "Perfect simulation for MCMC and Markov chains".

Dr Bruce Mills, "Back of the envelope quantum computing".

Dr Tom Korner, (University of Cambridge; NZ Mathematical Society Forder Lecturer), "Why are we not all called Smith?"

Mike Meylan

UNIVERSITY OF OTAGO

Department of Mathematics and Statistics

We are pleased to welcome Boris Baeumer, our new applied mathematics lecturer, who arrived on 15 April. Boris has spent the first few months of 2001 settling in before he started teaching Mathematical Methods and Applications of Mathematics in Semester 2. He was, however, soon called upon to help out with marking exams and checking NBJMC papers! (See New Colleagues section, this issue.)

In April we also welcomed Gareth Hegarty who is working with Vernon Squire on his Marsden Project, as was mentioned in the April issue of the Newsletter. Tim Williams completes the team at Otago supported on this grant. Some progress has already been made; Tim has generalized an earlier result obtained by Vernon and his then

postdoctoral fellow, Tony Dixon. Vernon has been enjoying working with Gareth and Tim---trying to keep up with their progress, while also running the Department, teaching, participating in several University committees, and supervising Josh Downer. Josh's PhD on a granular model of the marginal ice zone, is nearing completion.

Peter Fenton visited W. K. Hayman, Imperial College, London, and attended the four-yearly Computational Methods and Function Theory conference, held previously at Valparaiso (1989), Penang (1994) and Nicosia (1997), and this year at Aveiro, Portugal, June 25--29. The subject area is complex analysis with an emphasis (not strictly adhered to) on computation and numerical methods. One of the aims of the conferences is to create contacts between mathematicians from diverse cultures. The exotic locations, combined with generally inexpensive living and accommodation costs, encourage a wide attendance.

In April, David Fletcher spent ten days doing fieldwork on Putauhinu, one of the Muttonbird Islands. This involved banding and measuring titi (sooty shearwaters). As usual, collecting data was a great way for this statistician to get a feel for the research. In June he visited Jean-Dominique Lebreton at Centre d'Ecologie Fonctionnelle et Evolutive in Montpellier, France. The combination of enjoyable collaboration and Mediterranean culture was splendid! Before heading back to winter, David also visited Anthony Davison at the Swiss Federal Institute of Technology in Lausanne, where he gave a seminar.

TIMSS 2003: The initials TIMSS now stand for Trends in International Mathematics and Science Study, with exams held every four years at Years 4 and 8. The next Study is scheduled for 2003. Derek Holton is on the Maths Expert Panel, which met in Amsterdam on 2--4 May. Basically the Panel's task is to produce the `curriculum' for the Study and to provide input into related issues.

One of the hot issues that were discussed was the use of calculators. Some countries do not expect their students to use calculators in class while others do. Hence the use or non-use of calculators for the TIMSS items is important as it is going to be inequitable either way. It was decided not to use calculators in the main Study this time round but to have some extra items that would be `calculator neutral'. These items are to be used on an experimental basis in 2003.

As a side issue to the meeting, Derek arrived in Amsterdam a day or so early on the Queen's Birthday. This is a public holiday and a million Netherlanders converge on Amsterdam for a 24-hour party that shuts down the inner city. There are street markets and one big street party that seemed to go on all night. The congestion was so great by the time he arrived in late afternoon that the taxi couldn't get him to his hotel. Next day Amsterdam's streets and canals were full of rubbish, with a particular green can being prominent.

SEAMO 2001: The 10 South East Asian countries held their second Olympiad (South East Asian Mathematical Olympiad) from 18 to 22 June this year in Penang and Derek chaired the Jury for the second time. The rules for this Olympiad are slightly different from the IMO so it might be interesting to mention the differences. First, each team consists of four students instead of the IMO's six. Then there are three types of exams. The first is a 90 minute 'quiz' consisting of 20 short questions. The answers to these are either right or wrong and are worth one mark each. The second is closer to the IMO system but here the students have to tackle seven questions in 3 hours. Each of these questions is worth seven marks. Finally there is a team exam in which all four students work together to complete six questions in an hour and a half. At the end of the day, the first two scores are added together to decide the individual medal winners. Then all of the team's scores are added along with four times the score they get on the team questions, and the team prizes are allocated. This year a Singaporean topped the list and the Singapore team won the team's Gold medal, Thailand won Silver, and Indonesia Bronze.

Delta '01: This was the third in a series of Southern Hemisphereconferences on the teaching of undergraduate mathematics. The conferences have now taken on the status of international conferences, as there are now a significant number of delegates from North America. There were excellent plenary sessions by Alan Schoenfeld, John Mason and Matthias Kawski. If you are interested in the use of technology in your teaching you should try to see what Matthias has been doing (his email address is kawski@asu.edu).

Generally it was a good conference but it should be pointed out that seeing a hippo during one of the contributed talks did tend to take one's mind off the topic. The conference was held in one of the camps in the Kruger National Park, so animals were a little distracting at times. But it did give participants a chance to check off the Big Five in early morning and late afternoon safari drives.

The next conference in the Delta series is to be in Queenstown in November 2003. For more information see Derek Holton or Ivan Reilly. There is a web site (www.maths.otago.ac.nz/delta03) that will have progressively more information.

26 ACCMCC: Derek also attended the annual Australasian Combinatorial meeting in Perth from 9 to 13 July 2001. As is usual, graph theory and design theory were the two main threads. The attendance was a little disappointing but this can partly be explained by the fact that other international conferences were being held about the same time. For the first time this year a prize was awarded for the best student talk. It was won by Dillon Mayhew from Victoria University of Wellington, who gave a very good presentation on research on matroids. The next conference will be

in Newcastle, NSW in late 2002.

Seminars

A new series has been initiated. StatChat is to be a regular series of informal presentations on key ideas in statistics aimed specifically at graduate students from other Departments (and interested staff) as well as from the Department of Mathematics and Statistics. The intention is for the StatChat to be led by a statistician, with the participants (including other statisticians) contributing to the discussion.

Richard Barker, "Are you a Pseudo-Repli-cator?".

Murray Mackinnon, (Chartered Statistician, Vancouver), "Harold Silverstone---was Cramer-Rao a New Zealander?"

Markus Neuhaeuser, (Byk Gulden Pharmaceuticals, Department of Biometry, Germany), "Adaptive Interim Analyses with Application to a Weighted Location-Scale."

Shirley Pledger, (School of Mathematical and Computing Sciences Victoria University of Wellington), "Mixtures models, with applications to capture-recapture."

David Fletcher, "Bonferroni's legacy: Why multiple comparison tests are a big red herring."

David Smith, (Duke University), "What have we learned about learning?"

Ruben Roa, "Fisheries Stock Assessment: Overview and Applications."

John Kittelson, "Designing studies for conclusive results."

Rick Boebel, (Affiliation), "Data mining in the finance pits."

Lyle Noakes, (Department of Mathematics & Statistics, University of Western Australia), "Corner-Cutting Algorithms and Variational Problems."

Dr Tom Korner, (University of Cambridge, Forder Lecturer 2001), "Brownian motion: from pollen to the stock market."

Richard Barker, "Assessing Brushtail Possum Densities Using a Trapping Web."

Jonathan Dawes, (DAMTP, University of Cambridge), "Rayleigh-Bénard convection, patterns and nonlinear dynamics."

Professor Dingjun Lou, (Department of Computer Science, Zhongshan University, People's Republic of China), "An Introduction to n-Extendability of Graphs."

Lenette Grant

UNIVERSITY OF WAIKATO

Department of Mathematics

We welcome our newest lecturer, Dr Sean Oughton, who has just joined our department from University College London. More details about Sean appear elsewhere in this issue.

The 2001 Forder Lecturer, Dr Tom Korner, has just completed his two thought-provoking and informative talks. Some of us are now a bit worried about the voting systems used in elections.

Kevin Broughan attended a conference at the University of New South Wales to celebrate the 90th birthday of mathematician George~Szekeres. While there, he met up with your local correspondent who was there on a six week visit as part of his study leave. Your local correspondent has now finished his period of study leave and has resumed normal duties.

Ernie Kalnins is now on study leave. He left around the middle of June and is not expected back until nearly Christmas. He is currently visiting collaborators at the Joint Institute for Nuclear Research in Dubna, Russia and will be there until the middle of September. He has already made a two week side trip to Armenia where he was able to enjoy the 30+ degree temperatures each day. While Ernie is away, his post-doc, Jonathan Kress, has gone to the University of New South Wales as an Associate Lecturer for six months.

Farhad Ali has recently successfully passed the oral for his PhD thesis titled `Current sheet formation in uniformly

twisted magnetic flux tubes'. Another PhD student, Jacob Heerikhuisen, will soon have his oral examination.

An upgrade of our senior computer laboratory (jointly shared with the Department of Statistics) has recently been completed. The ten slowest PC's have been replaced with new ones. This is expected to be a boon for the serious number crunchers among us.

Seminars

T. Korner, (University of Cambridge), "Brownian motion: from pollen to the stock market".

T. Korner, (University of Cambridge), "Marrying, voting, choosing".

M. Wheatland, (Macquarie University), "Rates of flaring in individual active regions".

F. Ali, "Current sheet formation in uniformly twisted magnetic flux tubes".

J. Heerikhuisen, "Particle acceleration in reconnecting current sheets".

S. Joe, "Construction of lattice rules achieving strong tractability when the number of points is a composite number".

Stephen Joe

VICTORIA UNIVERSITY OF WELLINGTON

School of Mathematical and Computing\\ Sciences

Congratulations to two of Geoff Whittle's graduate students. Dillon Mayhew, currently doing an MSc with Geoff, was awarded the prize for the best talk by a graduate student at the Australasian Combinatorial Society Conference in Perth (July).

Rhiannon Hall, who has recently obtained her MSc degree under Geoff's supervision, is about to head off to Oxford on a Commonwealth Scholarship to start a PhD with Dominic Welsh.

The School has apparently managed to convince administration that mathematics group cannot afford further position cuts. (We in maths are presently 11.5 as against 13.5 back in early 1992 when the two latest permanent staff appointments had been made.) Chris Grigson is taking early retirement at the end of the year, and we were allowed to replace him at the Lecturer level. The position has been already advertised. Colin Bailey will take leave without pay in order to spend the year 2002 on a visiting position at Pacific Northwest National Laboratory, Richland, Western Australia, and a fixed term replacement position has been advertised as well.

Mark McGuinness is on study leave from July until February 2002, visiting Southampton, Nottingham, Oxford, Queensland University of Technology, and Melbourne. He will be working on coal volatilisation, cardioventilatory coupling, cancer, thermal properties of sea ice, and anything else that looks interesting. He will also be presenting talks at the Ross Sea Oceanography Symposium that is to be held in Naples in October, and in a variety of academic institutions in Germany en route back to the UK. Mark's entire family is going along to provide logistical support and encouragement.

We have a Marsden postdoc Evan Griffith working with Rod Downey till next March. Rod and his PhD student, Catherine McCartin, are travelling to Dagstuhl for the Parameterized Complexity conference, and then to Logic Colloquium 2001 in Vienna, where Rod is a Plenary Speaker. Rod's other PhD student, Wu Guohua, will be speaking at COCOON'01 in Guilin, China in August.

Another Marsden postdoc, Finlay Thompson, has finished his term with us of almost 21 months spent in Vladimir Pestov's project on supergeometry. Presently Finlay devotes most of his energy to his other passion, apart from modern geometry: fiscal policy. (See for instance: http://www.scoop.co.nz/mason/stories/BU01002/S00065.htm) Later in the year Finlay will switch on to mathematics again and visit El Centro de Investigacion en Matematicas (Guanajuato, Mexico) and SISSA (Trieste, Italy), spending a month in each.

Aleksandar Stojmirovic has started work on his PhD thesis, supported by a Bright Future Enterprise Scholarship and the Dairy Research Institute and co-supervised by Bill Jordan of the School of Biological Sciences and by Vladimir Pestov.

Vladimir has spent five weeks in April--May at the University of Geneva, and in particular was one of the invited speakers at the *Seminaire Borel 2001: An mm-Space Odyssey Espaces avec metrique et mesure, d'apres M. Gromov*, held in Bern on Wednesdays. He also visited the University of Metz.

The Statistics group has welcomed the arrival of Stefanka Chukova from Kettering University in the US to join our OR team. Stefanka's speciality is stochastic modelling and warranty analysis in particular.

Yu Hayakawa is on leave for the rest of the year. Professor Tony Vignaux has recently been consulting for PA consultants in Argentina (but does not appear to have learnt to tango!). Megan Clark has taken over from Lesley Jones of Goldsmiths College, UK as Editor of the Newsletter of the International Association of Women in Mathematics Education(IOWME).

Ross Renner is supervising the PhD thesis of Nuovella Williams, our Commonwealth scholar who has joined us from Montserrat.

Dong Wang was congratulated on the "1" ranking that his University Research Fund application gained from the Science Faculty in the so-called `seed' category. It was one of two applications from SMCS with one from Neil Leslie (Computer Science), Ed Mares (Philosophy), and Rob Goldblatt receiving a `1' ranking in the `open' category.

Ross Renner will step down as Head of School at the end of the year, and the appointment process for the next HOS is already under way.

Seminars

Thomas Forster, (University of Cambridge), "Better quasi-orderings and coinduction".

Richard Tweedie, (University of Minnesota), "Perfect simulation for MCMC and Markov chains".

Hal Berghel, (University of Nevada), "Information customization---dealing effectively with information overload".

Tapas Sarkar, "Early operational research and implications for management today".

Ewan Tempero, "Towards operational traceable design".

Andrew Lawson, (University of Aberdeen), "Hierarchical probability models and Bayesian analysis of mine locations".

Young-Dae Yoon, (Korean National Statistical Office), "The 53rd session of the International Statistical Institute (ISI)".

Neil Leslie, "Characterising the difference between NK and NJ in a connective-free manner".

Sue Paul, "Operational research techniques in the fishing industry. A case study".

Nigel Perry, (Massey University), "Mondrian, an experimental functional language for OO environments".

J. Scott Armstrong, (Department of Marketing at The Wharton School), "Expert systems for forecasting".

Tom Korner, (University of Cambridge), "Marrying, Voting, Choosing" and "Brownian motion: from pollen to the stock market".

Martin Henson, (University of Essex), "Refinement gently revisited".

Mark McGuinness

FEATURES

NEW COLLEAGUES...


Dr Boris Baumer


Dr Stefanka Chukova


Dr Sean Oughton

Boris Baeumer. Hi everybody! I joined the Department of Mathematics & Statistics at the University of Otago in April this year as a Lecturer. I spent the last eight years in the USA, extending what was supposed to be a one-year exchange visit from the University of Tuebingen in Germany. But Cajun food and the great music kept me there and

so I received a MS degree in 1994 and my PhD in 1997 from Louisiana State University. My dissertation was on generalized functions and abstract Cauchy problems. In 1998, I accepted a visiting assistant professorship at the University of Nevada, Reno. There it just so happened that hydrologists could use my expertise in transform theory to model solute transport in porous media using fractional derivatives, resulting in fractal sample paths and heavy tailed solution densities; things that are actually observable in the field. I quickly succumbed to the excitement of being able to apply the theoretical maths and so I am still working on fractional differential equations, stochastic solutions and applications thereof.

Dr Stefanka Chukova has joined the School of Mathematical and Computing Sciences of the Victoria University of Wellington in July as a Senior Lecturer in Operations Research. She was born and raised in Bulgaria and has her BSc and PhD in Mathematics earned from Sofia State University in the area of Probability and Statistics. In 1993 Stefanka moved to the States and worked for Kettering University, Flint, Michigan for eight years. While in Bulgaria, Canada and the States she has taught a wide variety of maths and stats courses. Stefanka's PhD thesis is on Warranty analysis and her research interests are in Reliability, Warranty Analysis, Characterization of Probability distributions, in which areas she has published over 50 research articles. Stefanka has four children she is very proud of, and is a qualified aerobics instructor. More can be found on her US home page at:
http://www.kettering.edu/~schukova

Dr Sean Oughton joined the Department of Mathematics at the University of Waikato on 1 August, 2001. Sean is returning to NZ after almost 14 years in the US and the UK. He attended high school at Mana College, Porirua and did his undergraduate degree, in physics, at Victoria, graduating in 1986. After a short stint working for the computer company Digital Equipment Corporation, he left NZ in 1988 for the physics PhD programme at the Bartol Research Institute, University of Delaware, DE, USA. There he completed his doctorate on turbulence in electrically conducting fluids with applications in the solar wind. In 1993 he took up a post-doc with the Solar Physics group in the mathematics department at the University of St Andrews, Scotland. Eighteen months later he accepted a lectureship in the mathematics department at University College London (UCL). He has remained at UCL throughout this period, being promoted to Reader in 2000.

Sean's current research interests centre on understanding turbulent flows, particularly in electrically conducting fluids. Physical systems where these ideas are relevant include the sun's interior and atmosphere (including the extension of its atmosphere out into the solar system, known as the solar wind), the magnetospheres surrounding many of the planets, and laboratory plasma machines.

A LETTER FROM EMERITUS PROFESSOR PETE HILTON,
UNIVERSITY OF BINGHAMTON, NEW YORK

In May and June 2001, Professor Peter Hilton was an Erskine visitor to the University of Canterbury. I took the opportunity of asking him to record his impressions of mathematics in New Zealand, as he is both a frequent visitor to our country (now for 15 years) and, of course one of the leading figures in our subject. He is widely known for his code-breaking activities during World War II and his work with Jean Pedersen in the popularisation of mathematics.

I have reproduced his letter below and will, of course, be using it myself in other relevant forums in which I participate. Can I encourage you to do the same?

Graeme Wake

Dear Colleagues,

I write to fulfil my undertaking to you (Graeme Wake) to set on record my impressions of the evolution of mathematics in New Zealand over the past 15 years, i.e., since the first visit paid by Jean Pedersen and myself to New Zealand. Let me add that Jean has contributed to this statement and shares its conclusions.

First let us speak of research in New Zealand. Originally we felt that, while research was strong in certain areas, especially the more traditional areas of classical real-variable analysis, probability theory and applied mathematics, there seemed to be only sporadic and scattered attempts to move into more modern areas of mathematics such as abstract algebra, topology and more modern applications. It seemed to us that this reluctance reflected the strong effect of the physical isolation of New Zealand mathematicians and their consequent preference for working in areas in which New Zealand mathematics had always been strong.

Today our impression is very different. No doubt due to the enlightened policy of encouraging active cooperation between New Zealand mathematicians and mathematicians in other parts of the world, especially the United States and Europe, largely by the provision of resources to support travel in both directions, there is now a far greater willingness on the part of New Zealand mathematicians to take adventurous steps in new directions. Of course, these steps are strengthened greatly by the use of modern technology (e-mail, FAX, inexpensive international phone calls ...) to facilitate the continued collaboration of mathematicians in New Zealand and abroad after the groundwork for effective joint work has been laid by actual contact.

However, as we survey the entire academic scene, we realised it would be a mistake to be too sanguine. For clearly

the *financial difficulties* which New Zealand universities are encountering---and especially the *wholly non-competitive academic salaries*---are beginning to take a serious toll of the talent available to those universities, and to decrease, perhaps decisively, the ability of New Zealand universities to recruit and to retain outstanding faculty. It would be tragic if a parsimonious approach to this crucial problem---and to the related problem of providing adequate finance for university libraries---were to negate the progress to which we have referred.

As to the teaching of mathematics, we have been alarmed, but not surprised, to find the same problems appearing in New Zealand as in other advanced societies, namely, the shortage of good teachers, defective preparation in mathematics of entering freshman at the universities, and a decline in the number of students choosing to "major in mathematics". Plainly, New Zealanders are now tending strongly to choose their careers, and their university programmes, on the basis of income expectation rather than intellectual challenge. This tendency is adversely affecting the flow of bright young people into the teaching profession, the depth of understanding of mathematics sought---and attained---by pre-university and university students, and the vigour of that intellectual curiosity on which the development of mathematical talent depends. Moreover, the degenerative process caused by these purely materialistic impulses certainly accelerates in the absence of determined efforts to reverse them. We would be greatly saddened if a society once remarkable for its universal high regard for the values of good education should find itself, largely due to the consequences of an imprudent pursuit of higher living standards, losing both those values and the living standards themselves. It has happened elsewhere.

I hope these remarks may be useful to you.

With all good wishes,

Peter Hilton

TERTIARY FUNDING IN THE MATHEMATICAL SCIENCES

The Tertiary Education Advisory Committee
PO Box 10 906
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Submission to Tertiary Education Advisory Committee from the Royal Society of New Zealand Committee on Mathematics and Information Sciences

TERTIARY FUNDING IN THE MATHEMATICAL SCIENCES

Key Points

- Currently significant underfunding of the mathematical sciences
- Funding of the mathematical sciences needs to be benchmarked with the computing sciences
- Low level funding of taught postgraduate mathematical science programmes is inappropriate
- "Service" teaching funding required to sustain mathematical sciences programmes
- University internal funding distributions negatively impacting on the mathematical disciplines

Introduction

In 1998, a report entitled *Mathematics in New Zealand: Past, Present and Future* was prepared for the Ministry of Research Science and Technology by a review team appointed by the Royal Society of New Zealand Committee on Mathematics and Information Sciences.("Mathematics in New Zealand: Past, Present and Future", prepared for Ministry of Research, Science and Technology by a review team appointed by the Royal Society of New Zealand Standing Committee on Mathematical and Information Sciences under the chairmanship of Professor Jeffrey Hunter. Report No 77, ISSN 1171-0101, July 1998, MoRST, Wellington, New Zealand. The report can be downloaded from the internet at http://www.mcs.vuw.ac.nz/~edith/front.html)

The review painted a bleak scenario about the future state of mathematical sciences within New Zealand. It highlighted, amongst other concerns, inadequate resourcing and too few graduates in mathematical sciences at tertiary level. Current trends in these disciplines see the strengthening of the computing component in undergraduate and graduate courses, closer links with computer science groups and quantitative groups in commerce as well as collaboration with user groups.

A very bleak outlook was painted for the country's performance in the mathematical sciences -- low numbers of graduates (0.8\% of total graduates in Mathematics and Computer Sciences versus an average of 3.5\% for the OECD countries in 1996), poor performance in our schools (as evidenced in the Third International Mathematics and Science study in 1997), a severe shortage of qualified Mathematics teachers, a diminished research capacity in our Crown Research Institutes, generally undervalued and under-utilised in New Zealand business and government yet Mathematics directly underpins a significant proportion (often over 50 per cent) of total business and government activity. More recent information to hand\footnote{See page 99, Appendix Table 4B, TEI Students enrolled by Field of Study, 1995 and 1999 in "1999 New Zealand's Tertiary Education Sector Profile and Trends", Ministry of Education, October 2000, ISSN 1175-4060, downloadable at http://www.minedu.govt.nz

/web/downloadable/dl5243_v1/tertiary.pdf.) points to a worsening of these already disturbing trends with only 207 tertiary students identifying mathematics as their field of study in 1999 versus 515 in 1995. In the same report{See page 52, Table 5.2, op. cit.) only 0.1\% of the postgraduate and degree qualifications in New Zealand in 1998 were in Mathematics and Statistics in contrast to the OECD average of 1.2\%.

Not withstanding the above comments TEAC should be reassured that there are some examples of some outstanding achievements by mathematical scientists who have either received part of their education within the tertiary sector of this country and/or are still carrying out their research in this country. Professor Vaughan Jones, Professor of Mathematics at the University of California at Berkeley and New Zealand's only recipient of the Fields Medal (the mathematical equivalent of a Nobel Prize) and the first recipient of the New Zealand Science and Technology Gold Medal, continues to maintain strong links with his alma mater, the University of Auckland, and regularly visits to assist with research workshops. Other outstanding examples can be found in the article by Davis Lillis ("Speaking of Mathematics..." by David Lillis, to appear in Science Review, 2001.) lamenting the declining capability in applied mathematics within New Zealand. As they have done in the past, many of New Zealand's top performers, including many postgraduate students, are leaving or have left the country to pursue opportunities in environments that are much more conducive to the pursuit of excellence. The tragedy currently emerging however is that may never return as they do not perceive appropriate opportunities to continue their careers in this country.

Over the past few years submissions have been made to the Ministry of Education, the Ministry of Research Science and Technology, the New Zealand Vice-Chancellors Committee as well as Ministers of the Crown, and parliamentary party spokespersons on education regarding the chronic underfunding of the mathematical sciences (basically mathematics and statistics) at tertiary level.

The Royal Society of New Zealand Committee on Mathematics and Information Sciences is conscious that the fourth report of TEAC will concern itself with funding issues. We are also conscious that the committee intends to explore a variety of funding mechanisms and that the category focused EFTS model currently in operation may not necessarily be retained.

We wish to bring to your attention some glaring anomalies that need to be taken into consideration in any new funding model, so that the learning outcomes expected from a study of the mathematical sciences at university levels are achieved. We see it as essential to restore funding levels to the position to ensure the sustainability of a vibrant mathematical science community. While we wish to present reasons to justify our considered view that mathematical science funding needs to be moved from category A to category B to achieve a realignment with the funding traditionally allocated to the computing disciplines, we are not so naive to believe that such a funding system will persist. The key argument is, however, that by a variety of measures the mathematical sciences are chronically underfunded at university level.

Currently significant underfunding of the mathematical sciences
International comparisons substantiate our request for an increase in the level of funding for the mathematical sciences. In the UK a 1996 study (See http://www.niss.ac.uk/education/hefce/pub96/c21_96.html.) by the Higher Education Funding Council for England, based upon actual expenditure levels (excluding central administration or academic services) showed that if a traditional humanitiesprogramme has a base funding of 1 unit, then for the mathematical sciences the ratio should be1.28, while for Information Technology and Systems Sciences the ratio should be 1.78. Nearer to home, the Australian Relative Funding Model used by DETYA (See page 32, "Overview of Student Costs and Government Funding in Post-compulsory Education and Training", by Sally Borthwick, Research Evaluations Branch, DETYA, October 1999 downloadable from http://www.detya.gov.au/iae/research/studentcosts.htm) assigns Humanities (in Band 1) unit funding, Mathematics (in Band 2) with a ratio of 1.3 unitsand Computing (in Band 3) a ratio of 1.6 units. In Israel, a country to which we have recentlybeen benchmarked, the teaching component of the funding model at Bachelor's levels sees mathematics, statistics and the computer sciences funded at a level 1.38 times that assigned toArts and Humanities, 2.75 times that assigned to Business studies (and 0.95 times thatassigned to Medicine!) (Tariffs in the teaching component of the Block Grant forUniversities, 1999/2000. Data from the Israel Council for Higher Education.} The simple reason is that they realised mathematics was crucial to development of high-tech industries and the knowledge economy.

Funding of the mathematical sciences needs to be benchmarked with the computing sciences
For some time the disciplines of mathematics and statistics have been presenting arguments for a tertiary funding reclassification so that these disciplines should be funded the same as the computing disciplines. Modern mathematics and statistics have for many years centred on theintensive use of computers for both numerical and symbolic computations and this is reflected in the now computer-intensive instruction and research activities in the mathematical disciplines within our Universities, which are much more akin to that expected in the computing disciplines. These arguments are elaborated further in our recent report "*Mathematics in New Zealand: Past, Present and Future*" to the Ministry of Research Science and Technology.

The disparity between the funding categories for mathematical and computing disciplines is an anomaly that needs to be addressed with urgency. The distinction between the two areas is becoming completely blurred. For example research in computer graphics, data compression, data communications, computer vision, image processing and artificial intelligence are all substantially underpinned and linked with mathematics to the extent that mathematical techniques are used in computer applications and that computer techniques are often very efficient at solving mathematical problems. In this information age we must bring our top students to appropriate international levels.

We must not put funding constraints in place to hinder that opportunity. Further if the students are exposed to some of these topics in a technology or engineering programme the funding levels are a quantum jump higher with a clear dislocation between the resources required and the funding available to deliver such instruction to students in science programmes.

Low level funding of taught postgraduate mathematical science programmes is inappropriate
The reclassified tertiary funding rates for 2000 and 2001, by separating taught and research based activities at postgraduate level, further undermined the instructional programmes in the Mathematical Sciences and have exacerbated the difficulties being experienced by these disciplines.

The government's continuing tendency to favour funding at the beginning levels of a university programme, at the expense of postgraduate work, has had severe impacts. The relatively low level of funding of "taught post-graduate degree" programmes especially for the Mathematical Sciences sees these funded at a lower level than non-degree and undergraduate degree programmes in Science, Computing and Engineering. This does not make sense and is reprehensible, in quite open contradiction to the Government's declared efforts to push for more high-level mathematics, science and technology in response to underpin the "knowledge economy" areas. The resources required to deliver postgraduate level courses in the mathematical sciences compared to undergraduate courses are far greater. The computing requirements are much more sophisticated but, more importantly, the staff needs are much greater. Classes are naturally smaller and the lecturers need to be more highly trained. The increased costs are substantial.

There is an assumption that non-taught research is somehow more valuable than graduate-level coursework. In the past two years taught postgraduate programmes have received a marked decrease in funding from the rates in place in 1999. In the Mathematical Sciences, one area that the government wishes to see strengthened, the cuts have been quite severe. The very nature of postgraduate programmes in these sciences is the provision of very intensive modern, theoretical, research-underpinned, taught material, often involving extensive computational techniques. These requirements are essential if we are to retrain and upskill those working in a professional capacity in areas requiring advanced mathematical and statistical knowledge -- just those areas needed in a "knowledge economy". The general open entry accessibility to tertiary education at many of our institutions further extends the necessity for taught instruction at higher level. The mainly taught postgraduate programmes, for example the Master in Financial Mathematics at Victoria University and the Master of Applied Statistics at Massey University are the most appropriate way of addressing the needs of graduates in these areas. These qualifications are just as valuable to the business and industrial community as a fully thesis-based qualification and require significant high level instructional and computing input.

At advanced levels in the sciences it is increasingly accepted practice that, in order to undertake meaningful research, students need to have a far greater background of study in the discipline through taught courses than is possible in an undergraduate degree. Top science and technology universities in the US require doctoral students to submit to a general comprehensive written examination in the discipline area before embarking on original research. Preparation for this can take the student as much time as the research itself. If New Zealand universities are to prepare candidates for research they must ensure that its top graduates have a wide and deep understanding of their discipline at an advanced level.

"Service" teaching funding needed to sustain mathematical sciences programmes
There are some other difficulties that we have not previously alluded to. In the EFTS competitive model the mathematical disciplines have often had an inadequate proportion of their already meagre funds generated by MOE income and student fees allocated to support the teaching and research by those delivering the instruction. Many degree programmes require all students to have a quantitative requirement, such as mathematics and/or statistics. Such "service" level courses often have large numbers of first year students who do not advance in the discipline area. The subject experts should however, under a research-led teaching environment, appropriately carry out this teaching. The funding derived from such instruction has become necessary to sustain mathematical programmes. The inadequate funding of the mathematical disciplines has a much wider flow on effect on all those disciplines that require a quantitative underpinning. Recent international observations (Comment attributed to Professor Marc Brunaud, Paris University of Jussieu reported in "French Science and Technology", No 38, September 2000, page 11.) (in this particular example, France) highlight "the relative loss of mathematical research in the training of engineers and business executives". "If this situation persists it risks limiting the country's capacity for innovation which is vital to our economy". These comments are also relevant to this country. Besides being important to the building of such expertise the delivery of such programmes are the lifeblood of the mathematical and statistical disciplines and without these opportunities such academic units struggle to establish and maintain critical staffing mass.

University internal funding distributions negatively impacting on the mathematical disciplines
The freedom of institutions to deploy revenue obtained through the EFTS system does not require them to allocate those funds equitably. Institutions that currently operate a revenue based model appropriately identify a proportion of the Ministry of Education and student fee income to support central administration and the provision and academic services. Under an EFTS based category funding model, the lower cost category disciplines contribute a greater proportion of funding to these essential activities. This is often seen in an unfavourable light by those disciplines inappropriately classified as a low cost discipline with excessive "contribution" rates. Because of the reduced funding levels in recent years and the demands for a greater range of new programmes the universities simply

haven't had the funding to recognise the changing nature of mathematical education. The retention of mathematics in the present cost window exacerbates the problem that the universities face.

The changes, which institutions need flexibility to cope with, cannot be easily addressed when funding is declining in real terms and way below all international benchmarks.

A funding model that identifies the provision of central services and the infrastructural fabric of the institution, coupled with a banded allocation model based upon the real costs of delivery within the respective disciplines, possibly recognising separately the teaching and research components, would seem to be a much fairer model. Without jeopardising institutional autonomy and academic freedom it would enable the main revenue streams to be more clearly identified and lead to enhanced institutional planning especially if coupled with the introduction of institutional profiles.

Conclusion
While the disciplines of our immediate concern are, as are many other disciplines, chronically underfunded we hope that we have brought to your attention the rationale needed to justify the relevance of relative increase in the tertiary funding in the mathematical areas.

The worst outcome of this whole exercise is that our top students are further penalised financially with increased fees, that universities cannot afford to recruit and retain international scholars to teach and carry out research in these disciplines and our ability to maintain internationally recognised qualifications in the mathematical sciences is diminished. We do not wish to see New Zealand universities turned into mass production mechanisms for partially competent undergraduate students and inadequately supported postgraduates. The net effect, one fears, is that the worst will remain in New Zealand and the best will go overseas.

This document was prepared by the Chair of the RSNZ Committee on Mathematics and Information Sciences following wide consultation with senior academics within the disciplines represented in the committee.

The RSNZ Committee on Mathematics and Information Sciences contains members appointed by the New Zealand Mathematics Society, the New Zealand Statistical Association, the Operational Research Society of New Zealand, the New Zealand Association of Mathematics Teachers as well as Fellows of the RSNZ in the mathematical and information sciences who represent the Academy of the RSNZ.

The document was approved by the RSNZ Committee on Mathematics and Information Sciences at its meeting held at the RSNZ Science House, Wellington on Monday 2nd April 2001.

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5 April 2001

CENTREFOLD

Gaven Martin

Gaven Martin is the first mathematician to be awarded the James Cook Fellowship---according to their website the most prestigious award of the Royal Society of New Zealand. This event marks an important step in the recognition of mathematics as a field of research for New Zealand scientists. At the same time the choice of Gaven Martin confirms the lofty status of the Cook fellowship, since he is a world-renowned mathematician who is already

recognized by the international mathematical community as one of the leading researchers in a wide variety of fields.

Gaven grew up in Rotorua and moved to Auckland just before starting high school. He completed his undergraduate workat the University of Auckland. Throughout high school and university, Gaven worked mostafternoons and weekends at a local vineyard(mostly washing and then filling bottles) and has since never lost hisaffection for the grape. Indeed he andDianne (his later to be wife) worked together there for many years. AtAuckland he was attracted to analysis bythe "demanding but beautiful" lectures of Ramankutty and then toquasiconformal mappings by lectures of Gauld andVamanamurthy, both of whom had recently been to Michigan. So off he wentto the University of Michigan in 1981with a Fullbright fellowship. While there he obtained an inaugural AlfredP. SloanDissertation Fellowship (awarded annually to the top 12 PhD math studentsin the US). His PhD thesis, writtenunder the supervision of Fred Gehring, was awarded the Sumner MyersPrize: the best PhD thesisat Michigan in 1986 (a prize he shares with the Uni-bomber!)

Very quickly Gaven became a leading member of the "quasiconformal community." He had post-doctoral experience at MSRI (Berkeley) and Yale (Gibbs instructor) during which time he held several grants from the NSF and the FinnishAcademy of Sciences. At the insistence of David Gauld, Gaven was given a lectureship at theUniversity of Auckland and returned to New Zealand for a year in 1988/9 where he and Dianne had their first child. Then the family spent 1990 at the Mittag-Leffler Institut of the Swedish Academy of Sciences and the Institute des Hautes Etudes Scientifiques (IHES), France, which Gaven says "was probably the most important and productive period of my career".

After returning to NZ in 1991, he was offered a professorship at the University of Sydney and a similar position in the Institute at the Australian National University. Subsequently Auckland matched these offers and in February 1992 he was given a Personal Chair at the University of Auckland, becoming the youngest full professor in New Zealand. Gaven spent the next four years jointly between ANU and Auckland.

There are two major themes to Gaven's research. First, since 1991, Gaven's collaboration with Tadeusz Iwaniec, following their seminal 1993 *Acta Mathematica* paper on quasiregular mappings, has hugely influenced several branches of analysis. In particular the elliptic regularity theory for the PDEs of conformal geometry; the generalised Beltrami systems

$$D^t f(x)\, H\,(f(x))\, D f(x) = J_f^{2/n}(x)\, G(x) G(x).$$

Here $G(x)$ and $H(x)$ are measurable conformal structures (matrix fields) on the domain and target space of a mapping f in a suitable Sobolev class. They showed the regularity theory was completely determined, in even dimensions, by the L^p -norms of the Hilbert transform on differential forms (a singular integral operator generalising the Spin and Dirac operators of conformal geometry). Beltrami systems play an important role in harmonic analysis, non-linear potential theory, non-linear elasticity theory and topological index theory. The surprising fact is that the solutions of these highly non-linear equations poses additional smoothness analogous to solutions of linear Laplace or Schrodinger equations. From this fact a number of spectacular results were established, including the complete solution (in even dimensions) of the Liouville problem (1850) on the solutions to Cauchy-Rieman systems ($G = H = Id$) and the Painleve problem on the structure of the singular sets for solutions to this and related systems. Since Dennis Sullivan showed that an arbitrary topological n-manifold ($n = 4$) admits measurable conformal structures, topological invariants can be picked up by studying the solutions to these equations. For instance a measurable Yang-Mills theory provides the analogous Donaldson invariants, and recently found their way into non-commutative geometry where Connes-Sullivan-Teleman used these equations to develop a more general theory of characteristic classes and the Novikov conjecture.

A few years later Gaven discovered another surprising connection between this equation and Hilbert's fifth problem on Lie groups. He proved that *every locally compact group which acts quasiconformally on a Riemannian manifold is necessarily a Lie group*. This led to uniqueness theorems for homeomorphic solutions to to generalised Beltrami systems for which there had been no earlier (non-trivial) results at all. Recently these results have been jazzed up to include odd dimensions as well and the degenerate elliptic setting. But the results there are not so precise. All this work has been encapsulated in the recent book Gaven wrote with Tadeusz for Oxford University Press.

Another major theme of Gaven's work has been the collaboration with Fred Gehring and others (notably Colin Maclachlan) on the geometry of discrete groups, and their connection with low dimensional topology and geometry (recall Thurston's Uniformisation programme which asserts that the canonical geometry of 3 dimensions is hyperbolic). A recent focus has been on the arithmetic properties of these groups and their orbit spaces (hyperbolic 3-manifolds) and recently good progress has been made in an attempt to classify the two generator groups, analogous to the hyperbolic triangle groups of 2 dimensions. Another problem is the higher dimension problem of Hurwitz: what is the minimal volume hyperbolic 3--manifold? Applications include generalisations of the famous $84g$-84 theorem on the maximal number of automorphisms of a Riemann surface to 3 dimensions. To date the best known results are due to Gaven and his coworkers. Early on in his collaboration with Gehring, they introduced the concept of convergence groups. These groups are close to Gromov's hyperbolic groups, and encapsulated the essence of the theory of Fuchsian groups. They were famously used to solve the Seifert Fibre space conjecture concerning foliations of 3-manifolds by circles. By earlier work (of many people including Gaven) it was known the

conjecture was equivalent to showing that every action of a convergence group on the circle was topologically conjugate to the action of a Fuchsian group. This was the problem finally solved by Gabai and Casson-Jungreiss.

For the two years before taking up the Cook fellowship he served the University of Auckland as an excellent and highly-respected head of department, a job he did not have to hesitate about giving up.

To finish this note, we include a few statistics: Professor Gaven Martin has been awarded 20 special grants and fellowships, in addition to 21 travel grants all over the world; he has held 16 visiting or temporary positions; he has had 4 administrative appointments at the University of Auckland; and most important of all, he has (at last count!) published 75 papers, many in top-notch international mathematical journals. \par

We hope that the inspiring example of Professor Gaven Martin as a brilliant researcher, a fair and honest administrator and a wonderful colleague will attract more talented students to mathematics.

Norm Levenberg
Boris Pavlov

Centrefolds Index

MANDELBROT MONK

Professor Gerhard Hiss (RWTH Aachen) visited the Department of Mathematics at The University of Auckland in June. He was much interested when he was told of an Internet article "Mandelbrot Monk" about a 13th-century monk Udo of Aachen, by Ray Girvan:

http://www.freezone.co.uk/rgirvan/udo.htm

That article reports a paper by a retired Professor of Mathematics at Harvard University, who examined some medieval manuscripts in Aachen Cathedral. Examining a miniature painting of the Nativity of Christ in a late-13th century manuscript, he was astonished to see the Star of Bethlehem represented by a Mandelbrot set! Further, he found in Aachen Cathedral another drawing of a Mandelbrot set, in a 13th-century Latin manuscript by the monk Udo of Aachen. Udo had been known only for his hymn to Lady Luck "O Fortuna", which Carl Orff re-used as the opening and closing chorus in his modern version of songs from Carmina Burana. In 1879 a scholar had briefly reported Udo's manuscript as treating theology and number mysticism. But the mathematician understood Udo's work as founding probability theory, with the second verse of "O Fortuna" being interpreted as tossing needles onto lined paper to estimate π, as Buffon did in the 18th century! Moreover, Udo invented the complex plane, and gave a cryptic account of an algorithm to construct the Mandelbrot set, with his drawing of the Mandelbrot set being more detailed than the Star of Bethlehem version!

Some mathematical websites have provided links to Ray Girvan's article; and it has been picked up by some e-mail news service, so that excited reports of it have been passed around the Internet. Alert readers of the article will notice several hints of its nature. The end of the article clinches the matter by its date: 1999 April the first. Ray Girvan has written his witty article very skillfully, reporting some genuine facts which are strange and little-known. The list of references cites many significant papers on mathematics and on medieval science. But the basic paper, by a retired Professor of Mathematics at Harvard, does not exist.

Garry J. Tee

BOOK REVIEWS

SPRINGER-VERLAG PUBLICATIONS

Information has been received about the following publications. Anyone interested in reviewing any of these books should contact

David Alcorn
Department of Mathematics
University of Auckland
(email: alcorn@math.auckland.ac.nz)

Abbott S, Understanding analysis. (Undergraduate Texts in Mathematics) 260pp.

Atkinson K,Theoretical numerical analysis. (Texts in Applied Mathematics, 39) 450pp.

Axler S,Harmonic function theory. (2nd ed) (Graduate Texts in Mathematics, 137) 259pp.

Badescu L,Algebraic surfaces. (Universitext) 258pp.

Bleistein N,Mathematics of multidimensional seismic imaging, migration, and inversion. (Interdisciplinary Applied Mathematics, 13) 510pp.

Boltyanskii VG,Intuitive combinatorial topology. (Universitext) 141pp.

Bos HJM,Redefining geometrical exactness: Descartes' transformation of the early modern concept of construction. (Sources and Studies in the History of Mathematics and the Physical Sciences) 470pp.

Buchmann J,Introduction to cryptography. (Undergraduate Texts in Mathematics) 230pp.

Capinski M,Probability through problems. (Problem Books in Mathematics) 257pp.

Cherry W,Nevanlinna's theory of value distribution. (Springer Monographs in Mathematics) 202pp.

Ching WK,Iterative methods for queuing and manufacturing systems. 321pp.

Crandall R,Prime numbers: a computational perspective. 545pp.

Dineen S,Multivariate calculus and geometry. (Springer Undergraduate Mathematics Series) (2nd ed) 254pp.

Deutsch FR,Best approximation in inner product spaces. (CMS Books in Mathematics, 7) 338pp.

Escofier J-P,Galois theory. (Graduate Texts in Mathematics, 204) 280pp.

Felix Y,Rational homotopy theory. (Graduate Texts in Mathematics, 205) 535pp.

Godsil C,Algebraic graph theory. (Graduate Texts in Mathematics, 207) 465pp.

Heinonen J,Lectures on analysis in metric spaces. (Universitext) 140pp.

Howie JM,Real analysis. (Springer Undergraduate Mathematics Series) 276pp.

Huggett S,A topological aperitif. 166pp.

Janich,Vector analysis. (Undergraduate Texts in Mathematics) 281pp.

Marcus B,Codes, systems and graphical models. (The IMA Volumes in Mathematics and its Applications, 123) 504pp.

Murty MR,Problems in analytic number theory. (Graduate Texts in Mathematics, 206) 452pp.

Perko L,Differential equations and dynamical systems. (3rd ed) (Texts in Applied Mathematics, 7) 553pp.

Postnikov MM,Geometry VI: Riemannian geometry. (Encyclopaedia of Mathematical Sciences, 91) 503pp.

Prestel A,Positive polynomials from Hilbert's 17th problem to real algebra. (Springer Monographs in Mathematics) 268pp.

Ribenboim P,Classical theory of algebraic numbers. (2nd ed) (Universitext) 681pp.

Rowe EGP,Geometrical physics in Minkowski spacetime. (Springer Monographs in Mathematics) 248pp.

Sagan BE,The symmetric group. (2nd ed) (Graduate Texts in Mathematics, 203) 238pp.

Senato D,Algebraic combinatorics and computer science. 546pp.

Schmid P,Stability and transition in shear flows. (Applied Mathematical Sciences, 142) 575pp.

The Geometry of Schemes
by David Eisenbud and Joe Harris, (Graduate Texts in Mathematics, 197),
Springer-Verlag, New York, 2000, 294pp, DM 119.00. ISBN 0-387-98638-3.

This fast new book provides an invigorating and exciting introduction into the sometimes daunting world of schemes. The reader is guided through the subject with a careful explanation of the motivations and examples that lie behind the scene. As a text book it does not aim to be an exhaustive reference. Instead it attempts to provide an explanation of what is really going on.

An affine scheme is dual to a commutative ring in the same way that an affine variety is dual to its coordinate ring. In classical algebraic geometry the coordinate ring is a finitely generated, nilpotent-free ring over an algebraically closed field. The theory of schemes results when we relax all those adjectives and allow any commutative ring to be a "coordinate ring".

The concept of a scheme is very general and has proved to be useful and powerful. Schemes provide the natural setting for algebraic number theory. From classical beginnings as an extension of algebraic geometry the theory of schemes has grown into an essential building block of modern mathematics.

In "The Geometry of Schemes" equal emphasis is placed on examples from algebraic number theory and algebraic geometry. However the authors do provide a geometric setting throughout the book.

The initial "Basic Definitions" chapter is followed by a chapter devoted to examples. The examples have been carefully selected to demonstrate how things go wrong as various properties of the coordinate ring are relaxed. This chapter is the core of the book for me, demonstrating in a direct way how the algebraic properties of commutative rings are reflected in the geometric properties of the scheme.

Chapter III introduces the main character in the world of schemes: the projective scheme. Chapters IV and V present a number of classical constructions that are enriched and illuminated through the theory of schemes. Finally, chapter VI explores the important categorical notion of a scheme's functor of points. This last chapter also opens a path into the modern literature and research.

Although it is not a second edition, the book clearly follows from the earlier book by the same authors, "Schemes. The language of modern algebraic geometry," (1992). However the present book includes much more, two thirds of the material is new.

The book is clearly prepared as the perfect companion to David Eisenbud's 1995 book, "Commutative algebra. with a view toward algebraic geometry." There is also evidence of Joe Harris and Phillip Griffiths' classical text on algebraic geometry: "Principles of algebraic geometry."

Both Eisenbud and Harris are experienced and compelling educators of modern mathematics. This book is strongly recommended to anyone who would like to know what schemes are all about.

Finlay Thompson
Victoria University}

Foundations of Differential Calculus
by L. Euler (translated by John D. Blanton),
Springer-Verlag, New York, 2000, 194pp, DM 119.00. ISBN 0-387-98534-4.

This book is a translation of the first part of Leonhard Euler's 1755 textbook \textit{Institutiones Calculi Differentialis}, and it offers us a fascinating snapshot both of Euler's understanding of differential calculus, and of his expository or teaching style.

From our modern standpoint, Euler's grasp of the foundations of calculus seems (on the surface) to be decidedly primitive. Here is someone who is happy to talk about the infinite and the infinitely small, someone who introduces differentiation with virtually no mention of limits, and someone who is happy to entertain the idea that

$$1+2+4+8+16+\ldots = -1$$

But, as we might expect from someone who was also enormously successful at applying calculus to a wide variety of problems, there are lots of worthwhile ideas lurking behind this caricature of Euler's thoughts. In the end, even limits seem to be there, just below the surface. Consider, for example, what Euler has to say about the above equation. His extended discussion comes at the end of Chapter 3 (On the Infinite and Infinitely Small). Here calculus is treated as an experimental science, and readers are invited to join Euler in his exploration, his conjectures and refutations, and his (possibly tentative) conclusion. He thinks aloud, as it were, wondering what sense he can make of such calculations.

For Euler, the expansion of the fraction

$$1/(1-x) = 1+x+x^2+x^3+x^4+x^5+\ldots$$

is an algebraic calculation derived by repeated long division. Letting x=1 and =2 gives the equations

$$1+1+1+1+1+\ldots = \infty$$

$$1+2+4+8+16+\ldots = -1$$

There is clearly something puzzling going on here: a sum of positive terms has given a negative answer, and a term by term comparison of the left-hand sides might even suggest that negative numbers are greater than infinity. But this idea does not make sense since, arguing in the same way for the series

$$1/(1-x)^2 = 1+2x+3x^2+4x^3+5x^4+...,$$

he gets two equations

$$1+2+3+4+5+... = \infty$$

$$1+4+12+32+180+... = 1$$

which would then suggest that 1 is bigger than ∞.

At this stage, Euler recalls the division process which gave rise to the

series, and he observes that the remainders involved actually grow larger the longer we continue dividing. So the remainders cannot be ignored. After analysing the remainders for the geometric series in more detail, Euler observes that "the sum of a series ought to be a limit the closer to which the partial sums should approach, the more terms are added."

But, he laments, these divergent series allow him to "discover many excellent results." He suggests that the difficulty lies in the word \textit{sum}, and that he should really refer to $1/(1-x)$ as merely "a finite expression" from which the series $1+x+x^2+x^3+x^4+x^5+...$ "can be derived." But now comes an interesting twist, typical perhaps of a mathematician. Euler decides to give the word \textit{sum} a different meaning! "Let us say that the sum of any infinite series is a finite expression from which the series can be derived. ... Since divergent series do not have a sum, properly speaking, there is no real difficulty which arises from this new meaning. Finally, with the aid of this definition we can keep the usefulness of divergent series and preserve their reputations."

We do not get to see how Euler will put this resolution into practice in this volume. He takes up the topic again in Chapter 1 of the next Part of *Institutiones Calculi Differentialis*, but for an English version we will have to wait for the completion of the future project hinted at by Blanton in his Introduction. In the meantime, perhaps we should probably bear in mind Euler's strategy (redefining the troublesome word) when we read his explanation of differentials in the Preface and see his use of them throughout the present volume. What did he really mean by those infinitely small quantities?

Euler's book also makes interesting reading from the educational point of view. Textbooks have of course changed hugely since 1755, and two changes jump out of the pages as soon as you open this book: there are no pictures and no exercises.

The first omission is a natural consequence of Euler's approach to the foundations of differential calculus (and is not caused, for example, by the difficulty of including illustrations). As he explains at the end of his introduction, he has discussed the geometry of plane curves elsewhere, and in this volume "everything is kept within the bounds of pure analysis, so that in the explanation of the rules of this calculus there is no need for any geometric figures."

What about exercises? Euler certainly expected his readers to do some. In Chapter 7, after a long discussion about the equality of various mixed partial derivatives, he advises his readers that they "must not only meditate on these properties with great care and examine their truth, but also work through many examples." The book itself is full of worked examples, but Euler expects a certain maturity of his audience. Once he has given a reasonable variety of examples, he encourages his readers to try similar exercises, but does feel any need to lead them further by the hand (page 91).

My present-day students would be horrified at the thought of having to make up their own exercises, and uppermost in their minds would be the problem of not knowing what the right answers were. Euler says nothing explicit about this problem, but there are perhaps some clues to his attitude in other, more subtle, features of the exposition. Euler delights in showing his readers different ways of obtaining the same result. Sometimes it is a simple observation: $(a+x)(b-x)$ can differentiated as a product, or can be multiplied out and then differentiated term by term. But some examples are more intricate. The function arcsin x is differentiated firstly by using its expression in terms of a complex logarithm, and secondly by a kind of "first principles" differentiation of $x = \sin y$. So students can check the correctness of their answers for themselves. (Present-day students can be asked to do this too and, after the expected initial resistance, many comment on the pleasant glow of reassurance which they experience, especially during exams.)

These alternative solutions serve another purpose, showing the connections between different parts of the subject (as in the arcsin example above). Making connections like this has not been a strong feature of late 20th century mathematics texts, perhaps because of the influence of the axiomatic approach -- once you have one proof of a result, why would you need another? One recent author who bucks this trend is Gilbert Strang, but I have found that

students do not like his books because of this very feature: his enthusiasm to show the interconnectedness of mathematics makes it very difficult for a student to find what he has to say on a particular topic! On the other hand, I think we all complain about the inability of students to transfer knowledge from one (section of a) course to another. It is interesting that making connections is one of the key ideas behind the numeracy projects currently under way in the primary sector. Perhaps we need to make it a more explicit part of our own courses too.

My Latin is a rusting hulk, abandoned during high school, but as far as I can tell Blanton's translation stays faithful to its eighteenth century origins, even to the point of retaining that era's wonderfully verbose (and occasionally rather obscure) style. Who nowadays, for example, would say that a particular form of an algebraic expression "is most accommodated to the expeditious differentiation of any rational function" (page 90)? Although he has modernized a few of Euler's notations (like using x^2 instead of xx), Blanton has retained the authentic $\sqrt{-1}$, reversing his decision to use i in his earlier translation of Euler's *Introduction to Analysis of the Infinite* (Springer-Verlag, 1988). Similarly, in Chapter 2, Blanton follows Euler and consistently uses the single word \textit{series} where a modern mathematician would probably want to draw a distinction between a sequence of terms and the series obtained by adding all these terms.

There are one or two misprints, but most of these are trivial. One, which made me reach for a piece of paper to check the calculations, involved a misreading of Euler's equation y =A sv x for the arc (or inverse) of the versed sine (page 112). Perhaps because this function has fallen into disuse (at least in mathematics courses), Blanton opted for a verbal equivalent but forgot the inverse part, translating the equation as: y is equal to the versed sine of x.

So overall this is a very interesting book. My only serious complaint is that Blanton stopped at the end of Euler's first Part, and that I'll have to wait a while before I see Euler's applications of differential calculus. Either that, or I'll have to brush up on my Latin!

John Hannah
University of Canterbury

Sweet Reason
by Tom Tymoczko and James Henle,
Springer Verlag, New York, 2000 , 644 pages, DM 79.00. ISBN 0-387-98930-7

What an interesting book! Although I am not sure exactly how to describe the book in total, I guess it can be summed up as a book in and about elementary modern logic. It is fair to say that logic, a subject close to my heart, while sadly not always an object of study in itself, is ubiquitous in modern mathematics and computer science. Informal logic is found everywhere, from the media to the classroom and the dinner table.

This book sets out to describe the the basics of formal logic, and then integrate this with informal logic with a critique towards the reader evaluating the logical content of everyday examples drawn from the media, from literature and many other sources.

In terms of the formal scope, it treats the usual parts of logic to be found in a decent first year course at university, such as propositional and predicate logic with a smattering of modal logic, as well as truth tables, paradoxes and formal languages. It examines notions of truth and validity, completeness and axiomatizations, especially applied to boolean algebra. These are all topics to be found in hundreds of books. There is also a lot of other material which is highly relevant but not so standard such as the busy beaver function, discussions of Frege, the paradox of the heap, the hangman paradox etc.

What is unique here is the "holistic" treatment that embeds everyday motivation into the text. I loved examples which ask the reader to read an argument and figure our the premises and conclusion. Then ask the reader to compose a rebuttal. *And then* ask the reader to compose a rebuttal to the rebuttal. It is exceptionally nice to see pages of text devoted to analyzing the logical content of things like tax forms, statements by judges, letters to editors, and statements supporting global capitalism, or claiming communism in the arts.

I think that this is the sort of book that generates strong opinions: you will either find it bewildering and perhaps loathe it, or you will find fascinating. It is certainly unique. I can think of no other logic text where you will find out the fact that "Buffalo buffalo buffalo buffalo buffalo buffalo buffalo." is a valid English sentence.

The text is exceptionally self contained. There are many exercises and the same material is constantly re-examined, with various threads running throughout the text. The exercises are embedded in the material, and hence the book could easily be read without any instructor.

My only trouble is picturing an audience. It would certainly serve as a text for a first year course in philosophical logic with mathematical leanings. As one who did logic as a subject at school in 6th and 7th form in Queensland, I would think that this would be a perfect book for such a course. It would also be excellent for anyone interested in finding out what logic is all about, and how it is used, or not used, in society. I am going to give my copy to the local school for use as a book for "mathematics extension". I think my teenage sons will love it.

Rod Downey
Victoria University

CONFERENCES

Inserted here was the First Circular for ANZIAM 2002.

Conferences in 2001

September 22--26 (Canberra) **45th Annual Meeting of the Australian Mathematical Society**
website: http://www.maths.anu.edu.au/conferences/AustMS2001/

September 23--26 (McLarens on the Lake resort, South Australia) **16th National Conference of the Australian Society for Operations Research**
email: ASOR2001@maths.adelaide.edu.au
website: http://www.dsto.defence.gov.au/corporate/conferences/asor/

September 26--28 (Brisbane) **Australasian Association for Engineering Education 12th Annual Conference**
website: http://www.icms.com.au/aaee2001/

December 3--6 (Palmerston North) **2001 New Zealand Mathematics Colloquium**
website: http://ifs.massey.ac.nz/NZMC2001/

December 7--10 (Auckland) **The Australasian Research Symposium on Lie Groups, Algebraic Groups, Quantum Groups, and their Representations (LAQ'2001)**
email: r.gover@auckland.ac.nz

December 10-13 (Christchurch) **The 52nd Annual Conference of the New Zealand Statistical Association** in conjunction with the **Conference of the Australasian Region of the International Biometric Society**.
website: http://nzsa.rsnz.govt.nz/Conference/home.htm

Conferences in 2002

May 27--31 (Singapore) **ICMI-EARCOME 2002 SEACME 9 "Mathematics Education for a Knowledge-Based Era"**
email: ctmapl@singnet.com.sg
website: http://math.nie.edu.sg/earcome/

NOTICES

DEATH OF JOHN FAUVEL

Members will be saddened to hear of the death of John Fauvel on 12 May 2001. A historian of mathematics at the Open University in the United Kingdom, John was well known to many of us from his visits to New Zealand, most recently in 1995 and again in 1998 when he was the NZMS Visiting Lecturer. He featured in this Newsletter's Centrefold in issue number 73. A lengthy page of personal tributes can be found at
http://www.dcs.warwick.ac.uk/bshm/Fauvel.html

FIRST ANNOUNCEMENT
EIGHTH SUMMER WORKSHOP
NEW ZEALAND MATHEMATICS RESEARCH INSTITUTE
MASONIC HOTEL, NAPIER, NEW ZEALAND
JANUARY 6-11 2002

The Eighth Summer Workshop of the NZMRI will be held in Napier, New Zealand from 6--11 January 2002. The workshop is co-sponsored by the ISI's Committee on Probability and Statistics in the Physical Sciences.

The theme of the workshop is "Applications of stochastic processes to biology, medicine and stochastic networks". The format of the workshop is a series of talks by several distinguished invited lecturers, with some opportunity for contributed talks. There will be morning and evening lectures, with afternoons free for discussion, networking and leisure.

Confirmed invited lecturers so far are

- Professor David Brillinger, UC Berkeley
- Professor Steve Evans, UC Berkeley
- Professor Ian McKeague, Florida State
- Professor Ruth Williams, UC San Diego
- Professor Keith Worsley, McGill University

There is no registration fee for the workshop. The Organizing Committee can offer some financial assistance with travel and accommodation to New Zealand graduate student participants, who are particularly urged to attend. Financial assistance, up to a maximum of $A300 per person, is available to student members of Australian Mathematical Society to assist with accommodation expenses. Some financial assistance to general participants may also be available from the organizers.

If you are interested in attending the workshop or in receiving further information please send email to the organizers (napier@stat.auckland.ac.nz). The workshop web page is at http://www.stat.auckland.ac.nz/napier2002/.

A second announcement, with more details of lectures and accommodation options, will be sent out in August.

Napier is situated in scenic Hawkes Bay, and constitutes one of the most complete examples of Art Deco urban architecture, due to the reconstruction of the city in the Art Deco style after the 1931 earthquake. Hawkes Bay is also New Zealand's second largest wine district, and the city and surrounding district offer many excellent restaurants and opportunities for wine tasting. There are extensive opportunities for outdoor activities, including tramping, swimming and fishing.

NZMS RESEARCH AWARD

This annual award was instituted in 1990 to foster mathematical research in New Zealand and to recognise excellence in research carried out by New Zealand mathematicians.

The NZ Mathematical Society Research Award for 1999 was made to: Mike Steel (University of Canterbury) for "his fundamental contributions to the mathematical understanding of phylogeny, demonstrating a capacity for hard creative work in combinatorics and statistics and an excellent understanding of the biological implications of his results".

The award for 2001 will be announced at the 2001 Mathematics Colloquium in Palmerston North in early December. Other recipients to date have been John Butcher and Rob Goldblatt (1991), Rod Downey and Vernon Squire (1992), Marston Conder (1993), Gaven Martin (1994), Vladimir Pestov and Neil Watson (1995), Mavina Vamanamurthy and Geoff Whittle (1996), Peter Lorimer (1997), Jianbei An (1998), Mike Steel (1999), and Graham Weir (2000).

Call for nominations 2001/2002

Applications and nominations are invited for the NZMS Research Award for 2002. This award will be based on mathematical research published in books or recognised journals within the last five calendar years: 1997--2001. Candidates must have been residents of New Zealand for the last three years.

Nominations and applications should include the following:

1. Name and affiliation of candidate.
2. Statement of general area of research.
3. Names of two persons willing to act as referees.
4. A list of books and/or research articles published within the last five calendar years: 1997--2001.
5. Two copies of each of the five most significant publications selected from the list above.
6. A clear statement of how much of any joint work is due to the candidate.

A judging panel of three persons shall be appointed by the NZMS Council in advance of the receipt of nominations. The judges may call for reports from the nominated referees and/or obtain whatever additional referee reports they feel necessary. The judges may recommend one or more persons for the award, or that no award be made. No person shall receive the award more than once. The award consists of a certificate including an appropriate citation of the awardee's work, and will be presented (if at all possible) around the time of the AGM of the Society in 2002.

All nominations (which no longer need to include the written consent of the candidate) and applications should be sent by 31 March 2002 to the NZMS President, Rod Downey, at the following address:

Professor Rod Downey
School of Mathematical and Computing Sciences
Victoria University of Wellington
PO Box 600
Wellington, New Zealand

Please consider nominating any of your colleagues whose recent research contributions you feel deserve recognition!

MATHEMATICAL SOCIETY OF JAPAN

Members of the NZMS are eligible for reciprocity membership of the Mathematical Society of Japan. Category I reciprocity membership for 2002, which includes the Journal of the MSJ, is ¥9,000 (a 50\% discount), while Category II, which also includes the Sugaku (in Japanese), is ¥10,800. Please write to: Mathematical Society of Japan, 25-9-203, Hongo 4-chome, Bunkyo-ku, Tokyo, 113-0033 Japan.

CALL FOR NOMINATIONS FOR NEW ZEALAND MATHEMATICAL SOCIETY COUNCIL POSITIONS

As the terms of office of two Council members (Douglas Bridges and Stephen Joe) come to an end in 2001, nominations are called for the resulting vacancies on the New Zealand Mathematical Society Council. The term of office of a Council member is three years. Council members may hold office for two (but no more than two) consecutive terms.

Nominations should be put forward by two proposers. The nominee and the two proposers should be current Ordinary or Honorary members of the New Zealand Mathematical Society. The nominations, including the nominee's consent, should be forwarded by Monday 5 November 2001 to the New Zealand Mathematical Society Secretary, Dr Charles Semple, Department of Mathematics and Statistics, University of Canterbury, Private Bag~4800, Christchurch (fax number: (03)~364~2587, email address: c.semple@math.canterbury.ac.nz). If nominations are sent by email, the two proposers and the nominee should each send separate email messages to the Secretary.

2002 NZMS VISITING LECTURESHIP

The New Zealand Mathematical Society coordinates and provides some financial support for a tour of New Zealand universities by a visiting mathematician. Usually this person, known as the NZMS Visiting Lecturer, will spend two to three days at each of the six main university centres, and give at least two lectures at each place: one for a general audience, and one more closely tied to his or her own particular research interests.

Recent NZMS Visiting Lecturers have included John Loxton (Macquarie University), Andreas Dress (University of Bielefeld), Colin Maclachlan (University of Aberdeen), Roger Grimshaw (Monash University), Valerie Isham (University College London), John Fauvel (Open University), and John Guckenheimer (Cornell University).

Nominations for the 2002 NZMS Visiting Lectureship are now being requested by the NZMS Council. Names of suitable candidates, along with a brief description of their current position and field(s) of interest, should be sent by 30 September 2001 to the NZMS Secretary, Dr Charles Semple, Department of Mathematics and Statistics, University of Canterbury, Private Bag~4800, Christchurch (fax number: (03)~364~2587, email address:c.semple@math.canterbury.ac.nz).

BIOSTATISTICAL SOFTWARE

Member Paul Johnson (Davis, CA) writes that he has just completed a CD-ROM of "Biostatistical Software." The CD-ROM costs US$12.95 which includes shipping and handling to anywhere in the world (so basically at cost).

The software includes: i) Clinical trial software, ii) Model selection, iii) Quality control, iv) Bootstrap, Monte Carlo, EM algorithm, and Box-Cox transformation, v) Pharmaceutical and nonparametric, vi) Time series and wavelet analysis, vii) Environmental and Ecological statistics, vii) Distance measure, degree of agreement and various tests, viii) Statistical analysis package and a Distributional library, ix) Randomization and Analysis-of-Mean Type tests, and x) Regression, Estimation and sample size determination.

For more detail please click on

http://pages.prodigy.net/johnsonp12/biostat.html

AITKEN PRIZE (NZMS STUDENT PRIZE)

The New Zealand Mathematical Society offers a prize, known as the Aitken prize, for the best contributed talk by a student at the annual New Zealand Mathematics Colloquium.

Named in honour of the New Zealand born mathematician Alexander Craig Aitken, this prize will be offered for the seventh time at the 2001 Colloquium to be held at the Massey University during the week 3--6 December 2001.

The prize will consist of a cheque for NZ$250, accompanied by a certificate. Entrants for the prize must be enrolled (or have been enrolled) for a degree in Mathematics at a university or other tertiary institution in New Zealand in the

year of the award.

During the Colloquium, they should give a talk on a topic in any branch of the mathematical sciences.

A judging panel will be appointed by the New Zealand Mathematical Society Council, and make recommendations to the New Zealand Mathematical Society President and Vice-President for the prize. Normally the prize will be awarded to one person, but in exceptional circumstances the prize may be shared, or no prize may be awarded.

Entrants should clearly indicate their willingness to be considered for the prize when they register their intention to contribute a talk at the Colloquium.

AUTOMATED REASONING

John Kalman, Emeritus Professor of Mathematics at the University of Auckland, has completed his large treatise on "Automated Reasoning with Otter". It has been published by Rinton Press Inc, Princeton, 2001, ISBN 1-58949-004-5 , with 16 + 536 pages and CD-ROM. The program OTTER was invented by William McCune for performing automated reasoning in mathematics and logic, and it is freely available on various computer systems.

Larry Wos (Argonne National Laboratory) wrote the Foreword to this book, in which he states that "Because of OTTER's arsenal of weapons for attacking deep questions and hard problems, a virtually limitless amount of treasure awaits the person who masters the use of this program. Even moderate familiarity with the program can yield information that has eluded great minds for decades. This volume provides a path to such riches -- including the solving of puzzles -- and to a new source of enjoyment. Indeed, seldom have I encountered such a complete treatment of a subject. John Kalman, the author of this masterpiece, deserves the highest accolades for providing this most detailed and useful work. Its exercises, its input files, and its proofs enable the reader to proceed in an orderly fashion that culminates in a fine understanding of the use of OTTER. Regarding the overall level of this volume, Kalman's book offers much for the beginner, but it also offers hidden treasure for the experienced researcher, even if the main interest is not in McCune's OTTER. Although OTTER is featured throughout, much of the material applies to the wider scope of automated reasoning in general. The author's deep appreciation of and reverence for automated reasoning is evident throughout this significant book."

The blurb quotes Branden Fitelson (University of Wisconsin) as saying that "Kalman's book is a masterpiece. The book contains a unique blend of theoretical and experimental material. Its myriad of worked examples make it a joy to use in the classroom. Students, teachers, and researchers alike should benefit greatly from Kalman's expertise."

FORDER LECTURER 2003

The Forder Lecturer for 2003 is Caroline Series.

Caroline Series is a professor at Warwick University where she currently holds a 5 year EPSRC Senior Research Fellowship. She was born and educated in Oxford and was an undergraduate at Somerville, then won a Kennedy Scholarship to do a PhD at Harvard. She has been at Warwick since 1979.

She started research in ergodic theory but rapidly got hooked on hyperbolic geometry, developing a special geometrical coding for geodesics with many applications, for which she won a LMS Junior Whitehead prize in 1987. For the last 15 years she has been analysing some beautiful relationships between limit sets of Kleinian groups and the corresponding hyperbolic 3 manifolds. A popular exposition of some of the ideas, with many pictures, is to be found in *Indra's pearls*, coauthored with David Mumford and David Wright and shortly to be published by Cambridge University Press.

Caroline is a founder member of European Women Mathematicians. She is interested in Green issues and in recent years has instituted and chaired the Warwick University Environmental Committee.

NOTICE OF ANNUAL GENERAL MEETING

The Annual General Meeting of the New Zealand Mathematical Society will be held during the 2001 New Zealand Mathematics Colloquium at Massey University on Monday 3 December 2001. The exact time and place of the AGM are currently being arranged. Items for the Agenda should be forwarded by Monday 22 October 2001 to the New Zealand Mathematical Society Secretary, Dr Charles Semple, Department of Mathematics and Statistics, University of Canterbury, Private Bag~4800, Christchurch (fax number: (03) 364 2587, email address:c.semple@math.canterbury.ac.nz).

MATHEMATICAL MINIATURE 15

Numerical Analysis and Hopf Algebras

H. G. Forder, who was Professor of Mathematics at Auckland University College from 1934 until his retirement in 1955, was the first real mathematician I had ever inet and I was always in awe of him. He told me that numerical analysis was boring and of no interest to a serious mathematician. I now realise that this was not a well-considered opinion and could only be regarded as a prejudice. Paul Halmos once burst into print under the title "Applied Mathematics is Bad Mathematics". 1 read this document carefully with an eye open for the irony that I felt must have been present; I did not believe such a great mathematician could, so lightly, dismiss the work of many other mathematicians. But I never recognised even a trace of irony - he really did intend to say what he seemed to be saying. Thus I enjoy a certain measure of perverse satisfaction that a small discovery of mine, which was motivated by nothing more than its application to that small part of Applied Mathematics known as Numerical Analysis, should now have a life of its own. I do not fully understand what a Hopf Algebra is but I have been assured by people who do, that the entity I am describing in this Miniature, is an example of such a structure.

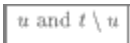
Let T denote the set of all rooted trees and let G denote the set of all mappings from T to R. Multiplication is defined on G x G to G by the formula

$$(\alpha\beta)(t) = \alpha(t) + \beta(t) + \sum_{u \lhd t} \alpha^*(t \setminus u)\beta(u),$$

where $u \lhd t$ denotes that u is formed from t by deleting a positive number of vertices, such that u is itself connected and shares the same root with t. In this notation, $t \setminus u$ denotes the graph formed by deleting u from t and a* denotes the multiplicative extension of a. For example, if

$t =$  , (1)

then there are nine choices for u. These are shown, together with $t \setminus u$, in the following table, which also gives the value of $\alpha^*(t \setminus u)\beta(u)$.

u and $t \setminus u$									
$\alpha^*(t \setminus u)\beta(u)$	$\alpha(\bullet)\beta($  $)$	$\alpha(\bullet)\beta($ $)$	$\alpha(\bullet)\beta($ $)$	$\alpha(\bullet)^2\beta($ $)$	$\alpha(\bullet)^2\beta($ $)$	$\alpha(\bullet)^2\beta($ $)$	$\alpha(\bullet)^3\beta($ $)$	$\alpha($ $)\beta($ $)$	$\alpha(\bullet)\alpha($ $)\beta(\bullet)$

Combining identical terms, we find

$(\alpha\beta)($  $) = \alpha($ $) + \beta($ $) + \alpha(\bullet)\beta($ $) + 2\alpha(\bullet)\beta($ $) + 2\alpha(\bullet)^2\beta($ $) + \alpha(\bullet)^2\beta($ $) + \alpha(\bullet)^3\beta($ $) + \alpha($ $)\beta($ $) + \alpha(\bullet)\alpha($ $)\beta(\bullet)$.

Under this operation, G is a group. Let $r(t)$ denote the "order" (number of vertices) in t. The subset of G denoted by H_p, for p a positive integer, is defined to contain those members which map every t e T with $r(t) <= p$ to zero. It turns out H_p. is a normal subgroup which along with the quotient group G/H_p and G itself are directly related to Runge-Kutta methods. The relation is that every Runge-Kutta method has a corresponding element of G associated with it and the group operation corresponds to composition of Runge-Kutta methods over successive computational steps. The special element E e G is defined by $E(t) = 1/t!$, where the factorial of a tree is the product over all vertices of the subtree formed by selecting this vortex and its successors. In the example in (1), t! = 8. The details of a particular Runge--Kutta method are usually expressed in terms of a matrix A, together with vectors c and b^T . To find the group element corresponding to (A,b^T, c), evaluate for each t e T an expression formed by replacing every leaf by c and each internal arc by an application of the linear operator A. Replace each internal node by the componentwise product of the quantities branching out from it. Finally, operate on the vector evaluated at the root by the functional b^T. In the case of (1), this gives $\sum_{i,j} b_i c_i a_{ij} c_j^2$. For some well-known Runge-Kutta methods, the corresponding group element is easy to write 3 down. For example, in the case of the Euler method, the single one vertex tree maps to 1 and all other trees map to zero. For the implicit Euler method, $t \mapsto 1$ for all t e T. If a corresponds to a given Runge-Kutta method, then a being in the coset EH_p, is equivalent to "the Runge-Kutta method has order p". The

concept of "effective order", which allows the computational benefits of high order to be shared more widely, allows a to be *conjugate* to a member of EH_p. For example the implicit midpoint rule for which $t \mapsto 2^{1-r(t)}$ and the implicit trapezoidal rule for which $t \mapsto 2^{-1}$ except for the tree with one vertex, which maps to 1, are conjugates of each other and each has order 2. The easiest way to find out more details is to write to me.

One of my reasons for writing this rather personal note is that I made a mistake in Miniature 14 and this has put me off number theory for a while. Irine Peng pointed out the error and, although further discussions with her led me to see how to repair the error quite nicely, my hope that we would write a correction together was stymied by her departure for graduate studies overseas. Another reason for the choice of subject is that it is an anniversary celebration of Kutta's seminal paper, which appeared in 1901.

John Butcher, butcher@math.Auckland.ac.nz