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NEWSLETTER

OF THE

NEW ZEALAND MATHEMATICAL SOCIETY

Contents

PUBLISHER'S NOTICE

This newsletter is the official organ of the New Zealand Mathematical Society Inc. This issue was edited by Steven Archer and printed at Victoria University of Wellington. The official address of the Society is:

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http://nzmathsoc.org.nz/ (Webmaster: bbaeumer@maths.otago.ac.nz)
The newsletter is available at: http://nzmathsoc.org.nz/?newsletter
Editorial enquiries and items for submission to this journal should be submitted as text or LaTeX files to steven.archer@vuw.ac.nz.

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PRESIDENTS COLUMN

2013 is the Year of Mathematics in New Zealand. It is also the international year of the Mathematics of Planet Earth, and the international year of Statistics. These two international events are well publicised, with distinguished speakers and workshops devotedto MPE and Statistics occurring across the globe this year.

The celebrations in NZ for the Year of Mathematics are now gathering momentum. There are three main celebrity activities. First, a 10 x 10 Distinguished Speaker Series, organised by the Royal Society of NZ, is being held across NZ. This involves ten distinguished speakers (ideally NZ speakers) speaking in ten different cities in ten different months. The first Distinguished Speaker in 2013 wasJames Sneyd of Auckland University, who spoke in the RSNZ building in Wellington on "Mathematics - Queen of the Planet Earth". This was a very well attended talk, and the speaker was outstanding.

The next speakers in the 10 x 10 Distinguished Speakers series will be Alex James (Nelson on 23 April); Mark McGuinness (Hamilton on 22 May); Dillon Mayhew (Rotorua on 20 June); Mick Roberts (Dunedin on 17 July); Robert McLachlan (Auckland on 27 August); James Curran (Palmerston North on 17 September); Boris Baeumer (Christchurch in October); Claire Postlethwaite (Napier on 10 November) and Michael Planck (December). Details are on : http://www.royalsociety.org.nz/events/10-x-10-lecture-series/

The second initiative is that all of the 10 x 10 Distinguished Speakers will be interviewed on National Radio on "Our Changing World", before their lecture, to further publicise the Year of Mathematics.

The third initiative is The Maths Quest, a poster competition for Year 7, 8, 9 and 10 school pupils (the last 2 years of primary (intermediate) and the first two years of secondary school). This Maths Quest is introduced using YouTube from White Island by (Sir) Vaughan Jones, complete with gas mask. The prizes include 31 iPad Minis, a classroom of programmable calculators and a trip to Wellington for the student winners. While in Wellington, the winners will first visit TePapa for food, games and displays, and after lunch, will meet briefly with Terry Tao. Then they travel to Parliament, and then to Weta Digital. While in Wellington, the winners will receive their iPad Mini prizes. For more information: http://www.nzamt.org.nz/

Students participating in The Maths Quest will prepare posters on themes such as "Unusual jobs using mathematics", "Mathematics of Life", "Mathematics of Planet Earth and Beyond". In all, there are 7 themes. The Maths Quest has been made possible largely by the generosity of all of the NZ university mathematics and statistics departments or schools (Auckland University, AUT, Waikato, Massey, VUW, Canterbury and Otago), the Alan Wilson Centre and the MacDiarmid Institute, Weta Digitial, Statistics NZ and Casio. I thank all of these sponsors for their generosity.

In keeping with 2013 being the Year of Mathematics in NZ, the PBRF results have just been published, and show Pure and Applied Mathematics ranked top of all disciplines in NZ, with an overall quality score of 5.81. Mathematics had the largest proportion (26.5%) of its researchers classified as A grade researchers. These outstanding results for mathematics must be an incentive for the mathematics community to consider rebidding for the next CORE funding round, and again emphasises the anomaly that mathematics demonstrates excellence in research, but is not funded for a Centre of Research Excellence. The Government is currently reviewing CoRE policy. Once this review is concluded, announcements are expected about a new selection round. At the moment there is no confirmed timing for a new selection round and current CoRE contracts run to 31 December 2015.

Graham Weir

President

New Zealand Mathematical Society

12 April, 2013.

INVITED PAPER

Modelling animal navigation

All mobile animals respond to a variety of environmental inputs (such as sights, odours and temperatures) and critical to understanding what factors drive the movement patterns of such animals are the methods used for quantifying and analyzing movement trajectories. The recent advent of GPS devices small enough to be carried by an animal has made available large quantities of movement data at previously unimaginable spatio-temporal scales. Corresponding with this progress has been the development of new statistical and mathematical methods of analysing such data. In my research, together with colleagues in the Biological Sciences, rather than analysing movement trajectories *post hoc*, we have been developing mathematical models which aim to predict how animals move under different circumstances.

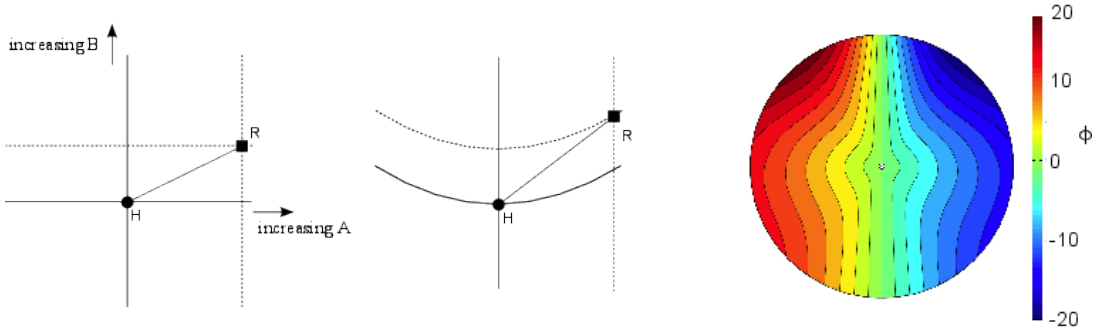
In particular, one question of interest is how migrating and homing animals are able to find their way. The range and variety of species that migrate long distances are vast, from sharks, sea turtles and whales in the oceans, to insects and birds in the skies. In these fluid environments, winds and ocean currents cause passive displacements of animals as they move. For animals to navigate successfully, it is therefore essential for them to have an effective and accurate mechanism for determining and monitoring position during travel.

Homing pigeons long have been the experimental model for the study of animal navigation and are thought to use a 'map and compass' mechanism [2] for navigation. The compass system is well understood, but much less is known about the cognitive map. There is experimental evidence that pigeons are able to detect both magnetic fields and olfactory signals, and it is likely that environmental variables such as these act as 'coordinates' in an animal's cognitive map. However, which environmental variables are used for navigation is highly controversial, and the mechanisms by which birds use these variables for navigation remains unknown.

Pigeons are well-known for their ability to successfully home under a variety of challenging conditions, but they rarely fly directly (i.e., 'as the crow flies') from a release site to the home loft, instead making a series of navigational errors which are corrected during flight. Identification of the source of these navigational errors can allow us to identify the mechanisms used for navigation. One intriguing phenomena observed during pigeon homing experiments is that of *initial orientation errors*. At many release sites, birds vanish from view in a direction different from the home direction [1, 3, 5]. This initial orientation error is release-site dependent, but consistent over time. If release sites distributed around a loft are divided into two groups, such that the error is clockwise in one group and anticlockwise in the other, experimental data has shown that the dividing line between these groups turns out to be a straight line through the target location.

We are developing a mathematical model to determine how homing pigeons use environmental variables to determine their position. Our preliminary model uses geometric techniques to predict the pattern of initial orientation errors of homing pigeons described above. The Earth's surface can be thought of as two-dimensional, and in this sense, two coordinates are required to determine position relative to a target location. We thus assume that the pigeon uses a bi-coordinate map for navigation. That is, we assume there exist two environmental variables which the bird has (a) the ability to measure, and (b) knowledge of the magnitude and gradient of at the home loft (the target location). We write x and y for two coordinates describing position, and without loss of generality, the home loft is at $x = y = 0$. We denote the two environmental variables as $A(x, y)$ and $B(x, y)$. We assume that the animal's cognitive map of the variables A and B consists of two Cartesian coordinates (shown in figure (a) below).

However, in reality, the fields A and B are unlikely to form Cartesian coordinates. The differences between the cognitive map and the true map generate the orientation errors. For given fields A and B, and a given release site (x_R, y_R), we use geometric arguments to compute the 'assumed location' (x_A, y_A), at which the bird believes it is located. Assuming the bird then tries to fly directly home, the initial orientation error $\phi(x_R, y_R)$ can be simply computed. Figure (b) shows one possible arrangement for the true map of these variables: here the contours of B are curved upwards. The release site is indicated by a black square, and the home loft by a black circle. Comparing figure (b) with (a) we can see that the bird will incorrectly compute its position to be 'south' of its true location. Figure (c) shows the value of ϕ (predicted by this model) over a range of release sites.



(a) Cognitive map (b) 'True' map (c) Orientation errors

It is clear that no actual environmental variable is arranged so simply as in figure (b) above. Our current research extends our model to include more complex situations. Specifically, we are interested in how the orientation error will behave when the contour lines are not a continuous distortion of straight contour lines, but include singularities. Such singularities commonly occur in environmental variables — in the magnetic field, singularities can be caused by local magnetic anomalies, which are particularly prevalent in volcanic regions such as New Zealand. We use techniques from bifurcation theory to analyse how the inclusion of such singularities in the variables affects the predicted orientation error. To test our predictions, we are running a series of experiments releasing homing pigeons near magnetic anomalies in the Auckland volcanic field. The data analysis is still in progress, but preliminary results are promising.

Claire Postlethwaite

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EDlTORIAL

This issue the features section includes reports on the 2012 Maths Colloqium held in December, the March/April tour of our Maclaurin Lecturer Marston Condor and the ANODE 2013 conference. I read that at the latter, John Butcher celebrated his 80th birthday, congratulations John!

The notices section has reports on the current itinerary of the 2013 Maclaurin lecturer Terry Tao and the retirement of Ray Hoare of HRS.

Steven Archer

LOCAL NEWS

AGRESEARCH

Phuong Nguyen successfully defended her PhD thesis entitled "Mathematical Modelling of Steroid Synthesis in Steroid-Producing Tissues and Steroid Partitioning in Circulation" in August. Phuong has now moved to Christchurch.

Amy Van Wey attended the International Biofilms conference in Paris in December, 2012. Amy presented her biofilm modelling work and also visited the laboratory of collaborators at INRA in Paris.

Gemma Phillips submitted her Master's thesis entitled "Dynamical Modelling of the effect of Insulin-like Growth Factor 1 on Human Cell Growth" and is currently writing up her work for publication in an international journal. Gemma was also co-awarded the runner-up prize for the best poster from an early career researcher at the New Zealand Mathematics Colloquium in December, 2012.

Paul Shorten gave a seminar on modelling fat metabolism at the Liggins Institute in Auckland and Tony Pleasants visited San Diego in December to discuss a joint project on epigenetics and give a workshop on his work in this area.

Paul Shorten

THE CALLAHAN INSTITUTE

John Burnell had Jeff Villacorte from EDC (Energy Development Corporation in the Philippines) visiting for two months to work together on a numerical model of the Bacman geothermal field in the Philippines.

Dion O'Neale attended the ANZIAM conference in Newcastle, Australia where he spoke on using network science to explore innovation; and the American Physical Society March meeting in Baltimore, Maryland where he presented a talk entitled "Power law distributions of patents as indicators of Innovation".

Bridget Ingham attended the AMN6 Conference in Auckland, and gave an invited paper entitled "Controlling crystal growth at the nanoscale: in situ synchrotron studies of corrosion product formation on mild steel". Bridget also recently spent two weeks at the Australian Synchrotron in Melbourne.

Also at the ANZIAM meeting in Newcastle, Shaun Hendy, of Victoria University and Callaghan Innovation, was awarded the inaugural E.O. Tuck medal, jointly with Geoff Mercer from ANU. The citation for Shaun is below:

Shaun Hendy has made remarkable contributions to applied mathematics and varied contributions to his profession, in particular to ANZIAM, as well as communicating the excitement of science to many communities. An innovative thinker and commentator who is widely read by policy makers, his research prowess is already indicated by the positions he holds: Professor of Computational Physics in Victoria University of Wellington's School of Chemical and Physical Sciences and Industry and Outreach Fellow at Callaghan Innovation. He also served as Deputy Director of the MacDiarmid Institute for Advanced Materials and Nanotechnology from 2008-12.

In February Doreen Mollenhauer attended the Sixth International Conference on Advanced Materials and Nanotechnology (AMN6) in Auckland. She gave a talk and presented a poster "Towards Understanding the Chemical Environment Effect on Gold-containing Clusters". Another collaborative poster was presented by Susan Biering "A theoretical study on the adsorption of pyridine derivatives on Au(100)". Doreen, along with former Applied Maths staff member Nicola Gaston (now VUW) have also had a new paper accepted for publication: D. Mollenhauer, N. Gaston, E. Voloshina, B. Paulus, J. Phys. Chem. C, 117 (9), 4470, (2013) "Interaction of Pyridine Derivatives with a Gold (111) Surface as a Model for the Adsorption to Large Nanoparticles"

Krista Steenbergen successfully defended her thesis: "Modelling the Melting of Gallium Clusters: A Path to Understanding Molecular Solids" in March. It was an eventful week for Krista, as a few days later she successfully completed the Taupo IronMan. She has since taken up a postdoc position at the Freie University in Berlin.

Our new French intern, Julie Huang, arrived in early April. She is from Paris, and attends the School of Mines in Nancy, France. She will be doing a 5 month internship on geothermal modelling, working with Warwick Kissling.

As in our last report, Kit Withers continues to produce papers at a prodigious rate in his retirement. A sample of the most recent ones:

"Hypergeometric functions where two arguments differ by an integer". Brazilian Journal of Probability and Statistics, 1-10. CS Withers and S Nadarajah.

"Sound field reproduction with energy constraint on loudspeaker weights". IEEE Transactions

on Audio, Speech and Language Processing, 20 (8). T Betlehem and CS Withers.

"Testing if a mixture is a mixture of gammas or a compound Poisson". The Mathematical Scientist. CS Withers and S Nadarajah.

"Bell polynomials for sums and products, with applications to derivatives of functions of trig or hyperbolic functions". Utilitas Mathematica. CS Withers and S Nadarajah.

"Edgeworth-Cornish-Fisher expansions for the distribution, density and quantiles of kernel density estimates". Statistica. CS Withers and S Nadarajah.

"Gram-Schmidt orthogonalization via the moments of a random variable". Utilitas Mathematica. CS Withers and S Nadarajah.

"Relations between multivariate moments and cumulants via Bell polynomials". Utilitas Mathematica. CS Withers and S Nadarajah.

Warwick Kissling

THE UNIVERSITY OF AUCKLAND

Department of Engineering Science

The Department of Engineering Science would like to start by congratulating Dr. Piaras Kelly and Dr. Andrew Taberner and their well-deserved promotion to Associate Professor.

A Warm Welcome to Our New HOD, Rosalind Archer.

The Department warmly welcomes Rosalind Archer as our first female HOD in the Department as well as the School of Engineering. Rosalind joined the Engineering Science Department in 2002 as a Lecturer after an Assistant Professor role in the Petroleum Engineering Department of Texas A&M University. Rosalind is a member of The Fluid Dynamics Group within the Department of Engineering Science which conducts internationally-recognised research with the aim of advancing our understanding of flow phenomena through mathematical, computational and experimental means. In addition, she is also a member of the Geothermal, Reservoir and environmental fluids group which focuses on research, teaching and consulting activities related to geothermal energy, particularly on the numerical simulation of geothermal reservoirs.

Rosalind's specialist research field is in the application of computational fluid mechanics to a diverse range of energy related problems such as Petroleum reservoir engineering (well testing, reservoir simulation, reservoir characterisation), Modelling wind flows for wind farm design and optimization, Gas hydrates and Geothermal energy. Recently, over the last few years, Rosalind established a very successful Master of Energy (MEnergy) programme at the UoA, an interfaculty postgraduate degree that enables students with undergraduate backgrounds in Engineering, Science or Commerce to develop expertise in any aspect of the energy industry. This has proved very popular supporting 25 postgraduates each year.

A Fond Farewell to Professor Matthias Ehrgott

We would like to wish every success to Prof. Matthias Ehrgott in his future endeavors in the Department of Management Science at Lancaster University, UK. Matthias Ehrgott studied Mathematics, Economics and Computer Science at the University of Kaiserslautern in Germany where he obtained Masters (1992), PhD (1997) and Habilitation (2001) degrees. In 2000, he moved to the Department of Engineering Science at the University of Auckland as a lecturer and was rapidly promoted to positions of Professor and Head of Department. Matthias' research interests are in multi-objective optimization and broad in application of medicine, transport and manufacturing. Matthias has published extensively

with 80 journal papers, book chapters and proceedings contributions on theory, methodology, and applications of multi-objective optimization. In addition, he has authored and edited 28 books, proceedings volumes and special issues of journals on the topic. He is well cited for his book "Multi-criteria Optimization" being a popular book to both undergraduates, postgraduates and researchers alike. He continues to serve on the editorial board of several journals, including Management Science, Computers & OR, and Journal of Global Optimization. Since 2002, he has been on the Executive Committee of the MCDM Society and since 2008 Vice President of the Operations Research Society of New Zealand. Matthias served the Department of Engineering Science for 13 years and was a very valuable member of the Department and will be sadly missed.

Awards & Honors

Prestigious Marsden Grant Awarded

The Department would like to congratulate Prof. Martyn Nash on his success in winning one of the Royal Society of New Zealand's most prestigious awards of a Marsden Program Grant.
Martyn's proposal was to the Engineering and Interdisciplinary Sciences panel and was entitled "Heart failure and remodelling: from images to mechanics" a description of which now follows. Heart failure is a leading cause of disease and death in New Zealanders. Yet we have a limited understanding of the mechanisms underlying impaired heart contraction, partly because heart failure often presents simultaneously with diabetes and obesity. As a result, effective diagnosis and treatment are often difficult. By combining biological information with medical imaging and engineering analysis Martyn and his team will result in personalised evaluations of heart failure mechanisms, adapted for each patient. This will require sophisticated computer models of the human heart. This new knowledge will motivate the development of clinical tools to diagnose specific forms of heart failure, which could revolutionise its detection and treatment. Martyn was also the recipient of the Royals Society's most coveted "James Cook" award in 2009.

Associate Professor Iain Anderson meets Prince Charles

Associate Professor Iain Anderson was one of a select group of researchers at the University of Auckland who was invited to meet His Royal Highness Prince Charles today at the OGGB. Iain the founder and Group Leader of the University's Biomimetics Lab explained to His Royal Highness how his group's work is focused on the imitation of natural systems to solve problems hosted at the Biomimetics Laboratory at the Auckland Bioengineering Institute to harvest latent energy of human motion into power for other uses.The team is committed to creating new technology through biomimicry, and has developed electronics solutions for artificial muscles made of stretchy rubber that can be made into sensors, power generators and actuators. Flexible electronics woven directly onto the artificial muscles themselves eliminate the problems faced by early prototypes of bulky external circuitry, making the Auckland research group ahead of world research counterparts.The variety of applications for this technology is widespread and includes soft robots and prosthetics. The team has a track record of commercialisation with growing sales of their control and sensing units to large international companies and research groups, as well as a vast number of applied research contracts. Together with UniServices they are focusing on the commercialisation of their growing intellectual property portfolio.

Visitors & Seminars

Robert Schieweck , University of Goettingen, "Locating a median strip in the plane" on March 13.

Ruth Heubner , University of Goettingen, "Ellipsoid bounds for convex quadratic integer programming" on March 13.

Prof. Jutta Geldermann (Chair of Production and Logistics and Dean of Economic Sciences), Georg-August University "Resource efficiency in interorganizational networks" on March 19.

Charles Unsworth

Department of Mathematics

John Butcher was honoured by the ANODE13 Conference here in January — a detailed report on ANODE13 is published elsewhere in this Newsletter. On March 22 the Departments of Mathematics and of Computer Science held a joint celebration for John Butcher's 80th birthday (March 31) and Garry Tee's 81st birthday (March 28).

Marston Conder has returned from his tour of the USA as the inaugural Maclaurin Fellow — his report is published elsewhere in this Newsletter. In August 2012 he extended substantially the "Foster Census" of cubic symmetric graphs by producing a complete list of such graphs with up to 10,000 vertices, supplemented by a coloured diagram which summarizes the list.

Graham Donovan has been promoted to Senior Lecturer.

Steven Galbraith is on sabbatical leave for semester 1. He attended the PKC conference in Nara, Japan and chaired a session. On May 17 he will chair a "conversation" with the writers Sylvia Nasar (author of **A Beautiful Mind**, about John Nash) and Masha Gessen (author of **Perfect Rigor**, about Grigory Perelman) as part of the 2013 Auckland Writers and Readers Festival. Then he will visit Georgia Tech in Atlanta and spend a week at Microsoft Research Labs in Redmond. In June–July he will travel to Europe to visit the University of Bristol, Oxford University and Royal Holloway University of London, as well as participate in research workshops in Paris and Warwick. He is serving on the programme committee for the conferences EUROCRYPT 2013 and ACISP 2013.

Sina Greenwood gave an invited talk at the the 48th Annual Spring Topology and Dynamics Conference in Connecticut, in March.

Allison Heard will retire as Senior Tutor in July.

Jari Kaipio was, at the end of 2012, awarded the title of Knight, First Class, of the Order of the White Rose of Finland. This is one of the highest civilian honours in Finland, and it is a major success for Jari. He received this honour based in part on his role as co–founder of the company, Roscole, which provides tomographic solutions for industrial problems. Jari's mathematical and statistical methods in tomography have established him as one of the leading applied mathematicians in the world, and we are lucky to have him on the staff at the University of Auckland.

Vivien Kirk has been promoted to Associate–Professor.

Dimitri Leemans was promoted to Associate–Professor, in March. In April he will give an invited talk at the MIT Combinatorics Seminar and at the AMS Sectional Meeting in the Special Session on Discrete Geometry of Polytopes. Also, he will be an invited plenary speaker of the GEMS 2013 conference (Graph embeddings on maps and surfaces) that will happen in Slovakia in July 2013.

Ben Martin has been promoted to Associate–Professor, and he was awarded an £800 travel grant from the London Mathematical Society to visit the UK in the second half of this year. At the 2012 Mathematics Colloquium, Ben and Tom ter Elst shared the NZMS Research Award.

Claire Postlethwaite's boy arrived a fortnight ahead of schedule, but both are doing very well. Claire and Graham are delighted with their son. She has also been pondering the mysteries of animal navigation, and has developed a simple geometric model of navigation, based on a logical pattern of irregularities that Michael Walker (Biological Sciences) had detected in his own homing pigeon data and in other researchers' data on animal migration. And Claire has gained accelerated promotion within the Senior Lecturer scale.

Arkadii Slinko was an invited semi–funded speaker at the Programme on Algorithmic Game Theory and Computational Social Choice, held at the Institute for Mathematical Sciences (IMS) in Singapore, from January 18 to February 2; and he was an invited fully–funded plenary speaker at the 7th Pan–Pacific Game Theory Conference, held at Adelaide from February 21 to 24. He was the Organiser of a 2–day workshop on Epistemic Game Theory on February 17 & 18 (held at the Owen G. Glenn Building), and of another 2–day workshop on Mathematical Economics of The Centre for Mathematics in Social Science on March 21 & 22 (held at Old Government House). He was appointed as Programme Committee Member of the

3rd International Conference on Algorithmic Decision Theory (ADT 2013), held at Université libre de Bruxelles on November 13 to 15.

James Sneyd has been selected by the AMS and NZMS to be the second Maclaurin Fellow. He will tour the USA in 2014, to give a series of Maclaurin Lectures at conferences and at distinguished universities. On March 21, James gave in Wellington the first of the RSNZ 10×10 lectures about Mathematics, on "The Queen of Planet Earth".

Garry Tee attended the conference (by invitation only) on "New Zealand and the Beginnings of Radio Astronomy", held at Orewa from January 30 to February 1. Some eminent pioneers of radio astronomy gave lectures including Alan Maxwell, whose M.Sc. thesis on radio noise from sunspots (Auckland University College, 1948) was the very first thesis on radio astronomy.

Tom ter Elst has been promoted to Associate–Professor. At the 2012 Mathematics Colloquium, Tom and Ben Martin shared the NZMS Research Award.

Caroline Yoon has recently been awarded a Beeby Fellowship, which is a joint initiative between the New Zealand Council for Educational Research (NZCER) and the New Zealand National Commission for UNESCO. The Fellowship is named after Dr Clarence Beeby, who was the first Director of NZCER, and was Assistant Director–General of UNESCO. The fellowship is intended to enable an innovative educator to produce a research–informed resource that will enhance classroom practice and students' learning. Caroline will be using the Beeby Fellowship to produce 5 booklets of modelling–based activities for secondary school students and their teachers, which use engaging real–world contexts to stimulate mathematical thinking.

Helen MacKenzie, Sheena Parnell and Moira Statham have retired as tutors. They were honoured by a 1–day seminar (February 1) on "Foundation Mathematics" with the guest speaker Helene Anderson (Bay of Plenty Technical Institute, and by celebrations in the Department of Mathematics and in the Mathematics Education Unit. Jamie Sneddon, after 20 years in the Department as student, tutor, researcher and general factotum, has transferred from the Mathematics Education Unit to the Faculty of Education (at the Epsom Campus). Phil Kane and Rachel Passmore have taken up new appointments as Tertiary Foundation Certificate (TFC) staff. Jac Field joins us in a joint appointment under two programmes: TFC and Certificate in Academic Preparation (CTACP). Andrew Stafford from Senior College joins us as our Teaching Fellow for 2013.

Dr Julie De Saedeleer from Brussells has accepted our offer of Professional Teaching Fellow. She will succeed Allison Heard in September 2013.

Three Postdoctoral Fellows have arrived in the Department: Dr Shi Bai has started as a Faculty of Science PBRF–funded post–Doctoral Fellow for 21 months. He is working with Steven Galbraith on lattice–based cryptography. In 2012 Shi completed a PhD in computer science at ANU, supervised by Richard Brent. Dr Sebastian Jambor will he here for 18 months as a Humboldt Feoder Lynen Postdoctoral Fellow, hosted by Marston Conder and Eamonn O'Brien. His research interests are in algebra and number theory, and he recently completed his PhD in group theory at RWTH Aachen. Dr Callum Sleigh will be working with Rod Gover on a 21–month Science Faculty FRDF grant on the geometry of natural equations. After completing an undergraduate degree in Music at the University of Auckland, Callum did Honours and Masters degrees in Mathematics. He then went on to do a PhD at the University of Melbourne, under Paul Norbury and Arun Ram. His research interests are: differential geometry, gauge theory, and complex algebraic geometry. He has also co–authored a paper on mathematical modelling of anesthesia.

At the 2012 Mathematics Colloquium, Stefanie Hittmeyer and Jennifer Creaser shared the prize for the best Student Talk, and Kate O'Byrne got the prize for best Student Poster.

Several PhD students have arrived this year: Peter Bratby (supervised by James Sneyd), Thomas Delacroix (Mike Thomas), Anton Gulley (Jari Kaipio), Sylvia Han (James Sneyd), Andrew Keane (Bernd Krauskopf & Claire Postlethwaite), Sergey Ozernikov (Arkadii Slinko), Dhanya Surith (Bill Barton) and Tomohiro Uchiyama (Ben Martin). The department has 3 scholarship winners in the most recent round of UoA Doctoral Scholarships. These scholarships are extremely competitive, and this is a very good result for Anton Gulley, Peter Bratby and Nina Anchugina (starting later this year with Arkadii Slinko).

Recent visitors include: Dr Gaetan Bisson (Macquarie University), Dr Rafal Bogacz (University of Bristol), Prof. Kevin Burrage (QUT & Oxford), Dr Pam Burrage (QUT), Prof. Rob Corless (Ontario Western University), Prof. John Guckenheimer (Cornell University), A–Prof. Dr Edward Huang (National Cheng Kung University), Prof. James Keener (University of Utah), Prof. Jonathan Kress (UNSW), Prof. Katryn Lenz (University of Minnesota–Duluth), Dr Daniel Lond (University of Canterbury), Dr Grant Lythe (University of Leeds), Prof. Heather Macbeth (Princeton), Prof. Robert McLachlan (Massey–Palmerston North), Prof.

Michael Osborne (MSI ANU), Prof. Bruce Peckham (University of Minnesota–Duluth), Prof. Linda Petzold (UC–Santa Barbara), Prof. Reinout Quispel (La Trobe University), Prof. Jonathan Rubin (University of Pittsburgh), Prof. Chus Sanz–Serma (Universidad de Valladolid), Dr Konrad Schoebel (Universität Jena), Dr Arthur Sherman (National Institutes of Health), Prof. Jozef Siran (Open University & Slovak University of Technology Bratislava), Prof. Don Taylor (University of Sydney), Prof. David Terman (Ohio State University), Dr Krasimira Tsaneva–Atanasova (University of Bristol), Prof. Jim Verner (Simon Fraser University), Dr Yangyang Wang (University of Pittsburgh), Prof. Gerhard Wanner (University of Geneva) and Prof. Jiping Zhang (Peking University).

Seminars

A–Prof. Juan Pablo Mejia–Ramos Rutgers "Informal arguments in university mathematics"

Colin Reid "Totally–disconnected locally compact groups"

Tara Brough "Automaton semigroups"

Prof. John Guckenheimer Cornell "Mixed–mode oscillations in the Belouzov–Zhabotinsky reaction" (2 lectures)

Andrew Waldron "Problems in massive gravity"

Jiping Zhan Peking "The action of finite groups on Sylow intersections"

Prof. Bard Ermentrout "Slow & Steady wins the game: Slow interactions in networks"

Dr Dov Samet Tel Aviv "Interim agreements: in the footsteps of Zeno, Parkinson, and Nash"

Prof. Andreas Cap Vienna "Essential infinitesimal automorphisms of projective and conformal structures"

Prof. Jonathan Kress UNSW "Invariant classification of superintegrable systems"

Prof. Matthias Ehrgott Engineering Science "Multiobjective optimization for supporting radiation therapy treatment planning"

Prof. Rod Gover "Compactification, projective geometry, and Einstein metrics"

Prof. Bruce Peckham Minnesota "The dynamics and bifurcations of some maps of the real plane close to $z^2 + c$"

Prof. Jonathan Rubin Pittsburgh "The dynamics of respiration: It's all in your head"

Dr. Shi Bai "Some algorithms for integer factorisation"

Prof. Kathryn E. Lenz Minnesota "Voting methods for municipal elections: propaganda, field experiments and what USA voters want from an election algorithm"

and

"Entry–level mathematics placement",

Prof. Robert McLachlan Massey "Geometric properties of the Kahan method"

Prof. Wolfgang Arendt "Invariance of convex sets for evolution equations"

Prof. S. R. Srinivasa Varadhan Abel Prize "Large deviations with applications to random graphs." (This is a joint Mathematics/Statistics Colloquium)

Dr Konrad Schoebel Jena "Separation of variables and moduli spaces of stable curves"

Dr. Mark Holmes Statistics "The importance of being Urn–est"

Dr Ben Greiner "Bargaining, asymmetric information, and communication — an experiment"

Dr Tim Trudgian "Something between the conjectures of Polya and Turan implies the Riemann hypothesis"

Prof. Kevin Burrage QUT & Oxford "New approaches for modelling the electrophysiology of the human heart"

Prof. Don Taylor Sydney "The LU–decomposition of matrices and algebraic groups"

Prof. Gaven Martin Massey "The solution to Siegel's problem"

Prof. Jonathan Conder "Constructive recognition of alternating and symmetric groups"

A–Prof. David Bryant Otago "How to regularize with a lasso in a positive manner"

Diana Coben "Mathematics in a safety–critical context: Nursing"

A–Prof. Arkadii Slinko "Secret sharing schemes (an elementary introduction)"

Dr Alex Galicki "Introduction to classical descriptive set theory and an application to classification problems in mathematics" (4 lectures)

Garry J. Tee

Department of Statistics

We have celebrated several notable successes since the last Newsletter. Congratulations to Professor James Curran, who gained his promotion to the top of the tree in December. Chris Wild won the 2012 Campbell Award for lifetime contribution to the NZ statistics profession at the NZSA conference in Dunedin - and despite already having contributed a lifetime's-worth he's still at it! We look forward to his two-lifetimes contribution award in due course. As just one example: Chris's paper with Maxine Pfannkuch, Matt Regan, and Nick Horton, "Towards more accessible conceptions of statistical inference", was the most-accessed paper in the Journal of the Royal Statistical Society, Series A, for the whole of 2011.

Mark Holmes won the NZ Mathematical Society's 2012 Early Career Award for Mathematical Research, in acknowledgment of him "rapidly having become a world expert in the theory of random walks, and in the analysis of high-dimensional models in statistical physics". No doubt Mark is now working on a celebratory walk to land randomly and expertly at the champagne cabinet. Thomas Lumley has become the fourth member of our department to be elected as a Fellow of the American Statistical Association, and all jolly good Fellows they are too.

Congratulations to James Russell on winning the 2012 Prime Minister's MacDiarmid Emerging Scientist Prize, a lucrative $200K scoop. At a fancy breakfast awards ceremony in Te Papa, James and his erstwhile PhD supervisors got to brush shoulders with John Key (see photo), while his current HoDs in Statistics and Biology narrowly missed brushing shoulders with Steven Joyce (shoulder just visible on far left of picture). Details, photos, videos, and more at http://www.pmscienceprizes.org.nz/winners-2012-the-prime-ministers-macdiarmid-emerging-scientist-prize/

We have welcomed three new staff over the last year. Brendon Brewer joins us as a lecturer, following a PhD in Astrophysics from Sydney and postdocs at UNSW and UC Santa Barbara. His research interests are in astrostatistics and all things Bayesian, and he excelled himself by winning a Fast-Start Marsden grant before he even arrived.

Ciprian Giurcaneanu joins us as a senior lecturer, coming from the University of Bucharest followed by 14 years in the Department of Signal Processing in Tampere University of Technology, Finland. Ciprian's interests are in signal processing, time series analysis, and the foundations of statistical inference.

Steffen Klaere joins us in our second joint appointment with the Biology department. Steffen comes most recently from the University of Otago where he held a postdoctoral position with David Bryant. He has also held postdocs in Austria and Auckland since completing his PhD in Munich. Steffen's interests include statistical inference in phylogenetics and population genetics, and applications in phylogenomics.

We are also pleased to welcome Ian Tuck from NIWA, who has one day a week in the department following the establishment of the Joint Graduate School of Coastal and Marine Science. Ian is a Principal Scientist with NIWA and is group leader of the Auckland fisheries and marine ecology group. After spending his early career in Aberdeen, he joined NIWA in 2006. His research interests are in fisheries stock assessment, particularly scampi and shellfish, so any questions on scallops and cockles should be directed to Ian.

We have also farewelled Wiremu Solomon and Wayne Stewart recently, who have left to pursue new adventures, in Wayne's case in Oklahoma. We thank them both for their countless contributions to the department and wish them well in their future endeavours.

Rachel Fewster

AUCKLAND UNIVERSITY OF TECHNOLOGY

School of Computing and Mathematical Sciences

An AUT University computer science team has won New Zealand's first ever NASA Space Apps Challenge with a mobile phone application that allows users to share their sightings of the International Space Station. The students in the winning team were: Boris Fron, Eleanor Da Fonseca, Harrison Black and Weixiong Cen. They were mentored by

AUT lecturers including Andrew Ensor and Sergei Gulyaev.

The School of Computing and Mathematical Sciences was one of sponsors for the 2013 NZ Mathematical Olympiad annual training and selection camp, organized by the NZ Maths Olympiad Committee. This year's training programme was held in the second week of January in Auckland, and Robin Hankin represented AUT to join the coaching team.

Between December 2011 and March 2012, Anuj Bhowmik and Zhenwen Cai were awarded the Summer research assistantships by the Faculty of Design and Creative Technology, AUT University. Anuj Bhowmik worked with Jiling Cao on the project "Rational expectations equilibrium of asymmetric information economies", and Zhenwen Cai worked with Jiamou Liu on the project "Algorithms for dynamic games".

In December 2012, Jiling Cao was accredited to a *Fellow of New Zealand Mathematical Society* at the Society's annual Mathematical Colloquium at Palmerston North. In the first half year of 2013, Jiling took a Research and Study Leave. In February, Jiling presented talks at the 31st Australasian Economic Theory Workshop, held at the University of Queensland, and the 13th Devonport Topology Festival at Auckland. Invited and hosted by Professor Yasunao Hattori, Jiling visited Kyoto Institute of Technology and Shimane University in March to deliver a couple of seminar talks and also discuss potential research collaboration with Japanese colleagues. Jiling also participated in the 4th Centre of Mathematical Social Sciences Summer Workshop and presented a talk. The theme of this year's workshop was Mathematical Economics. On 24 March, Jiling's PhD student Anuj Bhowmik successfully defended his PhD thesis entitled "Blocking efficiency and competitive equilibria in economies with asymmetric information". The three external examiners were Prof Rabee Tourky (ANU), Prof Yeneng Sun (National University of Singapore) and Prof Maria Gabriella Graziano (University of Naples Federico II). At the end, Anuj decided to take a lectureship position at India Statistical Institute, located in his hometown Kolkata.

Jeff Hunter delivered an invited talk ("Generalized inverses of Markovian kernels in terms of properties of the Markov chain") at a Special session, at the Haifa Matrix Theory Conference at the Technion, Haifa Israel, in memory of Professor Michael (Miki) Neumann on November 15th, 2012. In December, in recognition of his recent research activities, he was awarded a Deans Research Award, Faculty of Design & Creative Technology. Jeff stepped aside from his recent role as Head of Mathematical Sciences within the School to continue in a part-time role from the beginning of February 2013 focusing on his research and continuing with a mentoring role within the Mathematical Sciences.

In November 2012, Farida Kachapova received a faculty award for Excellence in Learning and Teaching. In 2013, her e-book "Mathematical models in portfolio analysis" was published by Bookboon company.

Sergiy Klymchuk gave a keynote address entitled "Provocations, Paradoxes, Sophisms and Counterexamples in Calculus" to 240 senior school mathematics teachers at the annual conference Mathematics and Calculus Teachers' Day in November 2012. The address received excellent feedback from the participants. One of participants, Peter Garrick from Howick College, writes: "I wish to thank you for your outstanding presentation. I felt that your presentation was head and shoulders better than any I have ever attended. I'm enjoying the book and am enthused enough to start my 7.30am Calculus Scholarship classes early this year." Sergiy also gave a plenary talk titled "Algebra or Language or both - Students' Difficulties in Solving Application Problems" to 120+ mathematics teachers at the Teachers' Algebra Day in April 2013. He also presented a paper titled "The Impact of Attention on Assessment" at the 6th East Asia Regional Conference on Mathematics Education (EARCOME-6) in Thailand in March 2013. Earlier this year Sergiy established the STEM Tertiary Education Centre at the Faculty of Design and Creative Technologies.

Jiamou Liu took up an invited researcher position at Laboratoire d'Informatique Algorithmique: Fondements et Applications (LIAFA), at Universite Paris Diderot - Paris 7, between February and April. At LIAFA Jiamou has been working with Dr. Tayssir Touilli, in the Verification Group, on the topic of formal verification and model checking on malware detection. The goal is to build a formal model of computer viruses. Jiamou also gave an seminar "Automatic Structures" in the Computability Seminars at LIAFA. In February Jiamou also attended two workshops in Europe: the GAMES winter school held at Champery, Switzerland and the Algorithmic Model Theory (AlMoTh) workshop, held at TU Berlin, Germany.

In early 2013, Wenjun Zhang was appointed as Lecturer in Applied Mathematics at AUT University. Wenjun completed his PhD in Applied Mathematics from the University of Auckland early last year and has recently been an intelligence analyst in the

Inland Revenue Department of New Zealand. Wenjun also has a first class BSc (Hons) in Applied Mathematics from the University of Auckland and a BSc in Mathematics and Applied Mathematics from Zhongshan University, Guangzhou, China.

Seminars

Robin Hankin (Auckland University of Technology), "The Unified neutral theory of biodiversity"

Stuart Weston (Auckland University of Technology), "Object identification from a large amount of astronomical data"

Wenjun Zhang (Auckland University of Technology), "Outstanding GST returns estimation model"

Jiling Cao

UNIVERSITY OF CANTERBURY

Department of Mathematics and Statistics

If you wondered what happened at UC during the reporting period of the last NZMS newsletter, the local news from UC were inadvertently left out of the print version of the newsletter, but are included in the online edition available at http://nzmathsoc.org.nz/downloads/newsletters/NZMSnews116_Dec2012.pdf

The start of the year saw several postgraduate students completing their degrees or being awarded fellowships. Congratulations and best wishes for their future endeavours to each of them!

Gloria Teng defended her PhD Thesis entitled "Statistical Regular Pavings and Their Applications" on 8 January. Gloria returned to Malaysia to take up a permanent lecturing position, starting as assistant professor, in data mining at the Faculty of Engineering and Sciences, University Tunku Abdul Rahman, Kuala Lumpur.

Miriam Hodge successfully defended her PhD thesis titled "Bias Correction and Change Measurement in Spatio-temporal Data", in February. Miriam was supervised by Jennifer Brown and Marco Reale and is currently undertaking statistical work in Abu Dhabi.

PhD student Steve Manion has been awarded The Korea Foundation (KF) Postgraduate Studies Fellowship for 2013. This fellowship is provided by the KF and is administered by the Korean Studies Association of Australasia (KSAA) for research students in Australia and New Zealand.

PhD student Sha (Joe) Zhu departed in January to take up a postdoctoral position at Oxford University. He was awarded a Chinese overseas student fellowship at a ceremony in Wellington on 16 March at the Chinese Embassy. The award was established by the China Scholarship Council in 2003 and a total of 14 PhD students from NZ have received this award since its inception. Joe was one of two students from NZ who received awards this year.

PhD student Claudia Seibold has been awarded a prestigious fellowship to Vienna on the Young Scientists Summer Program at the International Institute for Applied Systems Analysis (IIASA). The IIASA is a scientific research institute located in Laxenburg, near Vienna, Austria, and its program offers research opportunities to young researchers whose interests correspond with IIASA's ongoing research on issues of global environmental, economic and social change. From June through August, Claudia will work within the Institute's research programs under the guidance of IIASA scientific staff. Fifty-one participants from 23 countries are participating this year. Claudia is one of the three Germans who are funded by the National Member Organisation for Germany - the German Association for the Advancement of IIASA.

Congratulations to Marco Reale, who has been appointed to the Consumers Price Index (CPI) Advisory Committee to the Government Statistician. Periodically convening independent advisory CPI committees help to ensure public confidence in the index and is recommended as good practice in the International Labour Organization's resolution on CPIs. The committee's recommendations will be included in a report, which will be published in July 2013. These recommendations will inform the next CPI review, scheduled for 2014. Statistics NZ last convened a CPI advisory committee in 2004.

Peter Renaud's final lecture to his Mathematics 1B class was gatecrashed by an unruly mob of academics who presented him with a cake to mark the occasion! Peter has been teaching in this department since September 1968, during which time he claims to have "subjected two generations of unwilling students to something like 6,000 lectures." "But students are a forgiving lot", he adds modestly! Peter retires at the end of semester one.

From left: Peter Renaud, Jeanette McLeod, Alex James, Rick Beatson, Phil Wilson

In February the department welcomed Nuttanan (Nate) Wichitaksorn, our new fixed-term Statistics lecturer who recently obtained his PhD in Econometrics from the University of Sydney Business School. His main research interest is Bayesian Econometrics, especially for the financial time series and limited dependent variable models both in terms of univariate and multivariate analyses. He enjoys (but doesn't claim to be good at) playing soccer, jogging, swimming, and singing (Thai) karaoke (sometimes).

The department also saw the arrival of several new MSc and PhD students. Giulio Dalla Riva graduated MSc(Hons) from the University of Trento, Italy, in July. He will be undertaking a PhD in Mathematical Biology under the supervision of Mike Steel and Charles Semple. Giulio's research interests lie in the application of network theory to the study of ecological phenomena (phylogenetic networks, food webs, evolution, etc), and when not working he enjoys being around mountains, kitchens and poetry slams.

Timm Treskatis has returned to UC after a year in Germany to begin a PhD in Computational and Applied Mathematics (CAMS). His current project, supervised by Miguel Moyers-Gonzalez and Chris Price, is in the field of control theory for non-Newtonian fluids. Problems considered may include parameter identification, flow control and similar, and employing adaptive PDE solvers suitably combined with state-of-the-art optimisation methods. Other than his PhD, Timm enjoys cooking and eating.

Shakira (Bibi) Suwan graduated with Honours from UC in 2009 and recently rejoined us as a PhD student. Her current project, supervised by Dominic Lee and Carl Scarrott, is to develop, implement and analyse random attributed graph models and technique; for example, Bayesian latent variable model and seeded graph matching for vertex nomination. Her other interests include watching Korean and Thai soap operas, shopping and swimming.

Alan Williams is a professional engineer who is undertaking an MSc (CAMS) degree supervised by Raaz Sainudiin and Kourosh Neshatian (Computer Science and Software Engineering). He is here to learn as much as he can about the maths behind predictive analytics. In particular, he's looking at revenue optimization for an online ad exchange using non-negative matrix factorization and regularized logistic regression on a cluster. Alan enjoys mountain biking, running, whitewater kayaking, games and he's fascinated by government policy, music, economics and sealing wax!

Discovering blockland was the beginning of Paul Cordue's Maths journey. Blockland is a place where numbers are represented as blocks, and operations are a manipulation of blocks. Blockland gave Paul the confidence to pursue study at university and also contributed to his success. He initially went to university to do Physics but he found that Maths was a lot of fun, so he spent most of his time studying that. After he had finished a BSc(Hons) at Victoria University, he undertook a Summer research project with Charles Semple and Simone Linz. The project was on phylogenetic networks and the task was to find out when a phylogenetic network displays the maximum number of trees. They're still working on that problem so that's what Paul is currently working on for his PhD, under Charles' supervision.

Anuj (AJ) Misra describes himself as a vegan, compulsive doodler and impulsive tramper. He has joined us to complete a PhD in Mathematics working with Clemency Montelle on the History of Mathematical Astronomy in Ancient India. His involvement in this project is a culmination of his interests in ancient languages, mathematical artistry, cognition science, philosophy and socio-anthropology on the one hand and his training as an Applied Mathematician and Astrophysicist on the other. AJ looks forward to an exciting 3 years in Christchurch and, more specifically, at UC with endless intriguing discussions and countless stimulating coffees!

Conferences, workshops, visits

Jeanette McLeod went to 36ACCMCC (the 36th Australasian Conference on Combinatorial Mathematics and Combinatorial Computing) held at the University of New South Wales (Sydney) in December and gave a talk entitled "Divers observations on switching reconstruction".

A group of four academics from the department travelled to Massey University in Palmerston

North in early December to attend the NZMS Colloquium. Their contributed talks were "Diagrammatic reasoning in pre-symbolic algebra" (John Hannah), "Approximation of escape rates in open dynamical systems" (Rua Murray), "Hydrodynamic stability of a thixotropic fluid" (Miguel Moyers-Gonzalez) and "2-transitive finite elation Laguerre planes are miquelian" (Günter Steinke).

James Degnan was in Hawaii for the Pacific Symposium in Biocomputing, 3-7 January, where he gave a talk on "Evaluating variations on the STAR algorithm for relative efficiency and sample sizes needed to reconstruct species trees". He also made a research visit to the University of Alaska Fairbanks, where he worked with Professors John Rhodes and Elizabeth Allman. Elizabeth Allman will be an Erskine visitor in July and August, and John Rhodes will visit also. In Alaska, the weather was so much warmer than usual for January that, they had to cancel school one day due to rain turning the frozen roads to ice. They call this an "ice day" rather than "snow day" since usually snow and cold weather (where it frequently reaches -40 C) don't cause schools to cancel.

The work of Mike Steel and other researchers has mathematically analysed particular types of chemical reaction networks as possible mechanisms by which life originated. In a recent interview published in the NZ Herald, Mike said: "We are seeking to find out if the formation of these first steps of life were an amazingly lucky accident or something that might be expected. Many researchers find it hard to imagine how such a molecular network could have formed spontaneously from the chemical environment of early Earth. ... For scientists, the aim in origin of life research is not to find out how life actually began, that's something we may never know, but rather how it might have begun, so we know a plausible scenario for its formation by natural processes. My personal view is that the formation of life, given the conditions on earth, was not particularly unlikely. But whether there are other life forms in the universe staring out into space and wondering if they are alone or not, that's a totally different question." This research with former UC postdoc Wim Hordijk and current Honours student Josh Smith, was presented at the Princeton Centre for Theoretical Science, USA, at an Origins of Life meeting sponsored by NASA and the Society for the Study of Molecular Evolution, 21-24 January. This was followed by an invited presentation to the European Organisation for Nuclear Research (CERN) in Switzerland February, and in Toyko in March.

At a January workshop at the headquarters of the Royal Society of New Zealand in Wellington, Clemency Montelle, along with other Rutherford Discovery Fellows, got a chance to discuss research and development in New Zealand with the Hon. Steven Joyce, Minister of Tertiary Education.

Douglas Bridges was in Nis (Serbia) for a few days in January, to meet the people who are organising a conference there this coming June, a conference whose program committee he chairs. Then he had two weeks in Greifswald, on the Baltic coast in Germany, working with Josef Berger. This made two successive Januaries in which he has seen the sea frozen!

The first of what is hoped to be many Fluids in New Zealand (FiNZ) conferences was held 30th January - 1st February. FiNZ 2013 attracted 40 delegates working in fluid dynamics in universities, CRIs, and industry, with 12 different institutions represented. The organising committee of Phil Wilson (chair, UC Mathematics & Statistics), Miguel Moyers-Gonzalez (UC Mathematics & Statistics), and Mathieu Sellier (UC Mechanical Engineering) were especially pleased that experimentalists, theoreticians, and numerical analysts were well-mixed at the conference. Four excellent plenary speakers - Dr Teo Burghelea (Laboratoire de Thermocinetique, CNRS, University of Nantes), Prof Jim Denier (Auckland), Dr Stephane Popinet (NIWA), Prof Leslie Yeo (RMIT) - gave eight hours of talks, and a further eight hours were contributed by 16 speakers ranging in experience from masters students to professors. Lively discussions ensued and potential collaborations were explored. The organising committee would like to express their thanks to the College of Engineering at UC for the financial support of FiNZ 2013 which enabled registration to be free. Further details and photographs can be seen here: http://www.math.canterbury.ac.nz/finz2013/

Congratulations to Paul Brouwers who was awarded a grant from the College of Engineering to participate in the GPU Technology Conference in San Jose, California, from 18 21 March 2013. Paul presented his collaborative work with Igor Rychkov.

The Joint Mathematics and Philosophy Retreat Weekend, 22-24 March, at the UC field station at Cass, was a chance for UC and visiting staff and students to have a weekend of academic discussion, fellowship and fresh air. Scholarly fare included talks on probability, popper, parsimony and phylogenetics, the mathematics of knots and tangles, precursors to algebraic notation, and our very own contradancing session!

Visitors

Erskine visitor Professor Peter Olsson comes to us from the Department of Applied Mechanics

at Chalmers University of Technology in Gothenburg, Sweden. Peter's latest research is focused on how cloaking could provide protection of structures from elastic waves - something that may have applications In earthquake protection engineering. While Peter was Deputy VC at Chalmers University of Technology and also PVC at Jonkoping University, he had pivotal roles in decision-making for the teaching of maths for engineers at Swedish universities. While here, he will be teaching into Engineering Mathematics 2.

Professors Sean Cleary and Katherine St John from City University of New York arrived in January with their son Daniel for a 3-month visit. Sean is an Erskine visitor and will teach into part of MATH240 Analysis and Groups. His research interests include group theory, geometry and topology. Katherine's research interests include computational biology, random structures and algorithms, languages and logic.

Dr Dominic Klyve, who is an assistant professor in the Department of Mathematics at Central Washington University, arrived in February. His research interests include computational number theory, the history of mathematics, and the development of statistical techniques to study questions in science and medicine. He will be contributing to our History of Mathematics course and will be focussing on Euler.

Recent visitors include: Richard Law (York University, UK), Teodor Burghelea (CNRS, University of Nantes, France), Amelia Taylor (Colorado College, USA), Andreas Pedersen (Aarhus, Denmark) Benny Chor (Tel-Aviv University, Israel), Kim Plofker (Union College NY).

Seminars

Benny Chor (School of Computer Science, Tel-Aviv University) "Genetic Code Symmetry and Efficient Design of GC-constrained Coding Sequences"

Dominic Klyve (Central Washington University) "Zeta Functions and the Mathematics of Juggling"

Katherine St. John (City University of New York, USA) "Math for Fun and (Small) Profit: An Eclectic Tour of Prize Problems in Mathematics"

Amelia Taylor (Colorado College, USA) "Primary Decomposition of Ideals Associated to Conditional Independence Models"

Elena Moltchanova (University of Canterbury) "Bayesian Model Averaging"

Peter Olsson (Chalmers University of Technology, Gothenburg) "A Harry Potter Cloak for Earthquake Waves? Rerouting of Elastodynamic Waves"

Kevin Ross (Fonterra) Optimisation Challenges at Fonterra

Sean Cleary (City College of New York and the CUNY Graduate Center) "The Unusual World of Thompson's Groups"

Gloria Teng (University of Canterbury) "Statistical Regular Pavings and their Applications"

Günter Steinke

More local news, after the centrefold and mathematical miniature.

CENTREFOLD

Robert Ernest Lee (Tank) Aldred

I have known 'Tank' for over 30 years now first as an undergraduate student, then as a graduate student and finally as a colleague and research collaborator. However, there is still a lot that I don't know about him. Or is it just that my age is now concealing what I once knew? Anyway, if his father was such an admirer of General Robert E Lee that he gave that start to Tanks name, why wasnt his second name Edward? While the Medium M3 Tank with U.S. pattern turrets was known as the 'General Lee Tank', I have it on good authority that this was not the inspiration for the epithet, 'Tank'. Unfortunately the origins of the name have now been buried in the mists of time.

Tank was keen on Herpetology from a young age, and his mother had to put up with Death Adders in the lounge room. However, there is a silver lining to this: his pythons did mean that the house never had any problems with mice.

Son of a medical father, Tank grew up in the Australian bush and was taught various things that might be of use in that surrounding. For instance, he could apply sutures to personal injuries, without anaesthetic should the need arise. Tank also learned much about farming that has made him more of a practical person than most academics. Some of these skills were used to acquire his first employment, though I'm sad to see that grave digging and polar bear shooting are not on his current cv. I hasten to add that the latter shooting was not with a gun but occurred while employed by a film crew on location in wildest Canada. But these early skills have no doubt been useful on his 'station' at Brighton, just outside Dunedin, where his horticultural abilities are continually employed and where his wife Karen, accidentally, and with great dismay, can sometimes be seen killing rabbits during the 2 hours or so it takes to cut the grass with the mower with the 50 inch cut. When will the creatures realise that ducking under the tall grass is no guarantee of safety?

His father's influence on Tank was considerable. One of these influences was the father's fascination with explosives that led to him producing his own bombs. Tank was given an early introduction to the joys of blowing things up when a family friend bought an old silver mine near Nariel, Victoria, complete with 50 pounds of gelignite. The uncertain stability of the product meant it was best not to use it for precise work in the mine but it needed to be disposed of somehow. A desire for a new dam made the decision easy; detonate the whole lot at once! The deafening blast, showers of earth clods and a massive crater left Tank with tunnel vision when it came to removing stubborn tree stumps. It needs to be said that, although he longs for the days when authorities were chemically more liberal, he has found other less exciting ways to remove tree stumps in Brighton.

As can be inferred from the above, Tank spent his school years in country Australia and moved to the University of Melbourne to complete his formal education. Since then he has had short term positions first at Otago and then Southern Illinois University. This latter position meant a move from New Zealand. It was a long and sad day for the then current head of the maths and stats department as Tank took with him to the States the then secretary of the department.

Tank came back to Otago in 1989 where he has held a position ever since, rising through the ranks to a very well deserved personal chair in 2010. During the last 20 years, Tank's research output and collaboration has been exceptional. In that time he has collaborated with some of the leading researchers in the world both in Otago and at Vanderbilt University, USA, the Technical University of Denmark, Silpakorn University, Thailand and Nihon University, Japan. Quite appropriately in 2006, Tank received both the New Zealand Mathematical Society Research Award and the Nihon University Medal.

Tank's work has covered many areas including Latin Squares, Combinatorial Designs, Association Schemes and Permutation Patterns but his main interest has always been with Graphs. In particular he is interested in determining bounds on the existence of special structures such as perfect matchings, 2-factors and cycles. As a result of his work in these areas, he has now written over 80 refereed papers, more than half of which are in journals rated A or A* by the ERA system.

On perfect matchings Tank has produced ground breaking work with Michael Plummer (Vanderbilt University), the co-author of the definitive and most widely cited research monograph on matchings. This collaboration has been extremely fruitful over many years and has recently established proximity thresholds for Matching Extensions that were unanticipated by others working in this field. Tank and Michael have shown that, in planar and projective planar triangulations, which cannot be more than 2-extendable, if the edges to be included are separated by a pairwise distance of at least 5, then any given number of edges can be specified and there will be a perfect matching including all of the specified edges. Other particularly interesting topological results include, for a fixed genus (orientable or non-orientable) there are only finitely many graphs of that genus which are 4-extendable.

On 2-factors, Tank has studied Forbidden Subgraph Characterizations of graphs admitting 2-factors in joint work with Professors Akira Saito (Nihon University) and Jun Fujisawa (Keoi University). The Forbidden Subgraph characterizations are something like the famous Kuratowski characterisation of planarity where it is known that a graph is planar if and only if it avoids subdivisions of two subgraphs. In the 2-factor work Tank and his collaborators are determining sets of induced subgraphs which, if avoided, will guarantee the existence of a 2-factor. These have been widely studied and most forbidden sets involve a claw or star (a K(1,n) for some n). Recently they have been able to determine forbidden subsets which contain no claws or stars. Besides novel structural considerations, this work also requires deft application of Tutte's f-factor theorem.

Tank has also made significant contributions to the determination of 2-factors of graphs with Unique Isomorphism Type in association with John Sheehan (University of Aberdeen) and Bill Jackson (Queen

Mary, University of London). This involved some quite sophisticated investigations of det-extremal graphs and Pfaffian orientations producing results for both bipartite and non-bipartite graphs.

On cycles, Tank has worked with three of the world's best graph theorists: Carsten Thomassen (Technical University of Denmark), the world's leading authority on structural graph theory, Brendan Mckay (Australian National University, Canberra), one of the foremost exponents of the use of computers in graph theory (his program 'nauty' is widely used by researchers using computers to investigate graphs and combinatorics), and Nick Wormald (recently appointed as a Laureate Fellow at Monash University), a world leader in probabilistic methods in Graph Theory.

The collaboration with Carsten Thomassen has resulted in the complete resolution of two long-standing conjectures. The first showed that the minimum number of cycles in a 3-connected cubic graph on n vertices grows superpolynomially but subexponentially with n, resolving a conjecture of Barefoot, Clark and Entringer from 1980. The second presented a counterexample to a strong form of the Path Partition Conjecture posed by Mihok in around 1980. This also produced major progress in another conjecture that has stood for thirty years. This considered the maximum number of cycles in a graph with cyclotomic number r which was naively bounded by Entringer and Clark in 1981. Tank and Carsten resolved the problem entirely for planar graphs and brought about the first meaningful reduction in the upper bound (based on the dimension of the cycle space) for general graphs.

Also worth noting in this area is that, with Brendan McKay and Nick Wormald, Tank established the nonexistence of a hypohamiltonian graph on 17 vertices. This is noteworthy because it stood (for nearly twenty years) as the last order for which the existence of a hypohamiltonian graph remained unresolved.

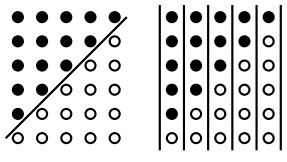
During 2011 to 2014 Tank is co-leading a research project on graph structures with Carsten and Patrick Sol (a leading French Coding Theorist) at King Abdulaziz University, Jeddah, Saudi Arabia. This project, which consists of a series of workshops, is part of a Distinguished Scientists program aimed to assist local researchers to develop and sustain their own research programmes. The project involves eminent scholars from all over the world including two Fields Medallists. In the project, Tank, Carsten and Patrick are investigating some consequences of Tank's work bounding the numbers of cycles in graphs, bounding numbers of codewords of certain types and improving other matroid bounds related to both cycles and coding.

Tank is currently the Immediate Past President of the Combinatorial Mathematics Society of Australasia, Editor-in-chief of the Journal of Combinatorial Mathematics and Combinatorial Computing, Editor of the journal Transactions on Combinatorics, and Associate Editor (sharing Editor-in-chief's duties with Carsten Thomassen) of the Electronic Journal of Combinatorics.

Derek Holton

Mathematical minature MM30: $1 + 1 = 2$ and counting

Two consequences of $X+X = 2X$ are (a) $X = \frac{1}{2}(X+X)$ and (b) $X = 2X-X$. To prove the elementary result $1 + 2 + \cdots + n = \frac{1}{2}n(n + 1)$, use (a) where the first X consists of the white discs and the second X consists of the black discs. Instead of counting the black and white discs separately, count them in columns. I have used this with each of my grandchildren to see if curiosity is ignited; so far without success.



An application of the $X = 2X - X$ formula goes back about a thousand years to the invention of the game of chess. According to a story from the Arabian Nights, the inventor of chess presented his invention to the king who was so pleased that he told the inventor to choose his own reward. The inventor replied that all he wanted was one grain of wheat for the first square on a chess board, 2 for the second, 4 for the third, and so on doubling each time. The total number of grains of wheat on the 64 squares, which we will call X, is equal to $X = 1 + 2^1 + 2^2 + \cdots + 2^{n-1}$, with $n = 64$. Subtract this from $2X = 2^1 + 2^2 + 2^3 + \cdots + 2^{n-1} + 2^n$ and we are left with $X = 2X - X = 2^n - 1$. In the case of $n = 64$, $X = 2^{64} - 1 \approx 1.844674 \times 10^{19}$. If each grain of wheat weighs 50mg, the total weight of wheat to be given as the reward is 9.223372×10^{14} kg, enough for every person on earth to consume 350 kg of wheat every day for a year.

The table below shows some examples of partitions of numbers with the single vertical line separating partitions with no repeated parts from those which do have repetitions. The total number of partitions of n is denoted by $p(n)$ with $q(n)$ the number only of partitions with distinct parts. Finally, $r(n)$ is the number of distinct partitions with an even number of parts minus those (denoted by *) with an odd number of parts.

n						$p(n)$	$q(n)$	$r(n)$
0						1	1	1
1	1^*					1	1	-1
2	2^*		$1+1$			2	1	-1
3	3^*	$2+1$	$1+1+1$			3	2	0
4	4^*	$3+1$	$2+2$	$2+1+1$	$1+1+1+1$	5	2	0

By identifying each of the non-equal-parts partitions with the set of corresponding factors, we recognize that

$$(1+x)(1+x^2)(1+x^3)(1+x^4)\cdots$$
$$= 1+x+x^2+2x^3+2x^4+\cdots = q(0)+q(1)x+q(2)x^2+q(3)x^3+q(4)x^4+\cdots$$

This formal generating function has counterparts for the $p(n)$ and $r(n)$ sequences:

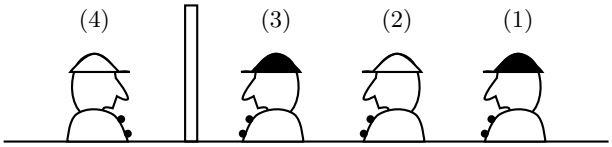
$$(1-x)^{-1}(1-x^2)^{-1}(1-x^3)^{-1}(1-x^4)^{-1}\cdots$$
$$= 1+x+x^2+2x^3+3x^4+\cdots = p(0)+p(1)x+p(2)x^2+p(3)x^3+p(4)x^4+\cdots$$
$$(1-x)(1-x^2)(1-x^3)(1-x^4)\cdots$$
$$= 1-x-x^2+0x^3+0x^4+\cdots = r(0)+r(1)x+r(2)x^2+r(3)x^3+r(4)x^4+\cdots$$

It is surprising that the r values are known. If $n=\frac{1}{2}k(3k-1)$ or $n=\frac{1}{2}k(3k+1)$ (*pentagonal numbers*) then $r(n)=(-1)^k$ with $r(n)=0$ for all other values of n.

Because $\big(p(0)+p(1)x+p(2)x^2+\cdots\big)\big(r(0)+r(1)x+r(2)x^2+\cdots\big)=1$, there is a simple way of calculating partitions recursively

$$p(n)=p(n-1)+p(n-2)-p(n-5)-p(n-7)+p(n-12)+p(n-15)\cdots$$

I will now refer back to two questions from MM29 and MM28. Prisoner number (2) knows his hat is white because if it had been black, then (1) would have claimed that *his* hat was white.



The four notes of music in MM28 are named, by German musicians, as D, Es (pronounced S), C, H. Dmitri Shostakovich used DSCH as a musical signature using the Cyrillic to German transliteration system,

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LOCAL NEWS continues

MASSEY UNIVERSITY

Institute of Natural and Mathematical Sciences

In November, Graeme Wake attended the Wellington-Manawatu Applied Mathematics Day, The Gravida (CoRE) Science Symposium and the Riddet CoRE. He spoke at all three with different talks.

Alona Ben-Tal, Robert McKibbin, Mick Roberts, Winston Sweatman, Graeme Wake and students Amjad Ali, Andrea Babylon, Karen McCulloch, Nurul Syaza Abdul Latif, Graeme O'Brien and Ali Ashher Zaidi attended the NZMS Colloquium in Palmerston North. Alona and Robert were members of the committee (chaired by Alona) to select the ANZIAM best poster prize.

Shaun Cooper was an invited speaker at two conferences held in India during December to commemorate the 125th anniversary of the birth of the Indian mathematician Ramanujan: "The Works of Srinivasa Ramanujan and Related Topics" at The University of Mysore; and "The Legacy of Srinivasa Ramanujan" at The University of Delhi.

Annalisa Conversano was invited to participate and give a presentation at the Workshop "Model Theory: Groups, Geometry and Combinatorics" in January at the Mathematical Research Institute of Oberwolfach (Germany). An extended abstract of the talk on joint work with Marcello Mamino and Anand Pillay is going to be published in the Oberwolfach Reports.

Carlo Laing, Gaven Martin and several students attended the NZMRI Workshop on Geometric Mechanics and Shape at Ohope Beach in January.

Graeme Wake celebrated his 70th birthday with four separate parties in late January all in separate locations. One was on a flotilla of kayaks on the Orewa estuary. Clearly, as he observed, "birthdays are good for you: the more you have the longer you live!!", but he is less sure about the effect of the parties. Vice-Chancellor Steve Maharey spoke at the campus occasion. Graeme also gave an overview talk on his group's cancer-cell growth work in Canterbury University on 26th April. Helmut Maurer from Munster, Germany visited us in mid-February to integrate his optimisation theory procedures into our bio control modelling project being pursued by Graeme Wake and Syaza Abdul Latif in partnership with Plant and Food Research Ltd.

There was a large involvement of Massey University members in MISG 2013, the first of a series of three held at QUT in Brisbane. Robert McKibbin was a moderator for the project brought by PPCNZ and Winston Sweatman for the project brought by Fonterra. Other Massey (Albany) participants were Mick Roberts and Nurul Syaza Abdul Latif.

Alona, Robert, Carlo, Mick, Winston, Graeme and PhD student Syaza attended the ANZIAM conference in Newcastle, NSW. Robert gave an invited talk "Geofizz unfazed" as the ANZIAM Medal winner. Carlo was on the JH Michell Medal committee.

Alona, Carlo and Sophie Shamailov attended the WUN (World Universities Network) workshop on "Failure of Cell Signalling" at Long Bay, Auckland, 27 February – 1 March.

In March Robert travelled to Japan to take part in a Symposium on Sustainable Energy within the Faculty of Engineering at Kanazawa University. This was by invitation of Shigeo Kimura, Professor of Thermal Systems, Institute of Nature and Environmental Technology. In the event, the symposium was part of a new tenure track programme that the Japanese Government is encouraging universities to take up, with a reward of some extra funding. Four young researchers from the Institute of Science and Engineering gave talks on their work, interspersed with talks from their overseas collaborators (one each from Denmark, Russia and NZ). Robert's "pair" was Dr Takaaki Kono, a member of Professor Kimura's research group, who described his CFD analysis of wind conditions on roofs of buildings on which are mounted small wind turbines; Robert's talk was on mathematical modelling of some heat and mass transport processes in geothermal systems. In addition, he was asked to deliver a 2 hour lecture (on World Mathematics Day, no less) as part of the Institute of Nature and Environmental Technology's seminar series, he spoke about "Modelling some multi-component multi-phase dispersive flows on our Planet Earth".

Gaven Martin was a visiting research fellow at the Institute of Pure and Applied Mathematics, UCLA in March/April, and is a fellow at Magdalen College, Oxford during April – September.

Mick Roberts visited Istvan Kiss at the University of Sussex for one week in April to develop a research collaboration. While there he gave a seminar "Epidemic models with uncertainty". He then attended the workshop "Mathematics and Biology: a Roundtrip in the Light of Suns and Stars" at the Lorentz Center, Leiden University, where he presented a keynote paper "Epidemic models and threshold quantities". The workshop was held to mark the 65th birthday of Odo Diekmann.

Carlo Laing has been appointed to the editorial board of Applied Mathematical Modelling.

Andrea Babylon began her PhD program in March, with the topic "Modelling infectious diseases in multiple species". Her supervisors are Mick Roberts and Graeme Wake. Carlo's 2010-11 summer student, Ben Smith, has been accepted into the Psychology PhD program at the University of Southern California.

Seminars:

Alona Ben-Tal, "What is a mathematician?"

Tassos Bountis (University of Patras, Greece) "Complex problems in Hamiltonian dynamics"

Elena Calude, "Inductive complexity of the P versus NP problem"

Howard Edwards , "Ma Vie En Statistics"

Michael Hirschhorn (University of New South Wales, Sydney) "Ramanujan and the subject of partitions"

Dillon Mayhew (Victoria University of Wellington) "Computer-age geometry: introduction to matroid theory"

Bruce Peckham (University of Minnesota, Duluth) "Enrichment in consumer-producer population models with stoichiometry"

Shaun Cooper

UNIVERSITY OF OTAGO

Department of Mathematics and Statistics

In the subject area *pure and applied mathematics*, the University of Otago ranks first in the 2012 Performance Based Research Fund (PBRF) Quality Evaluation with a quality score of 6.7.

In honour of the 70th birthdays of the Department's John Clark and Patrick Smith from the University of Glasgow, the "International Conference on Algebra" will be held in Balikesir, Turkey from 12-15 August 2013. Details can be found on the conference webpage http://ica.balikesir.edu.tr.

Misi Kovács is a fellow of the Priority Program "Mathematical methods for extracting quantifiable information from complex systems" of the German Research Foundation DFG. Misi was also invited speaker at the annual meeting of the program in November and gave the plenary lecture "Strong and weak approximation of a class of stochastic Volterra equations".

Dr Sooran Kang has been appointed as a new Postdoctoral Fellow in January. Sooran is working with Iain Raeburn and Astrid an Huef.

Daniel Turek, a former PhD student in Statistics, has left the Department to take up a postdoctoral position in the Department of Statistics at the University of California, Berkeley. Daniel will be working with Associate Professor Perry de Valpine on the "development and implementation of Bayesian statistical models". They plan "to produce general open-source software that will make a broad range of hierarchical model analysis methods available in one computing environment for applications in biology and other fields".

Boris Baeumer attended the ANZIAM 2013 Colloquium from 3-7 February and the ANZIAM executive meeting in Newcastle. Boris gave a talk entitled "Stable processes with boundary constraints and fractional Cauchy problems".

Ting Wang visited the School of Mathematical Sciences at Beijing Normal University for research collaboration with Prof Li Yong.

Janine Wright attended the Spring Meeting of the International Biometric Society (Eastern North American Region) in Orlando, Florida from 10-13 March. Janine talked about "Non-invasive genetic mark-recapture with heterogeneity and multiple sampling occasions".

Visitors

Visitors over the last few months have been Robert Archbold (University of Aberdeen), Laura Cowen (University of Victoria, Canada), Attila Házy (University of Miskolc), Ernesto Nungesser (KTH Royal Institute of Technology, Stockholm), Peter Otto (Willamette University, Oregon) and David Pask (University of Wollongong).

Seminars

Wim Hordijk (SmartAnalytix) "Autocatalytic sets and the origin of life"

Wolfgang Arendt (University of Ulm) "The non-autonomous Cauchy problem by forms: regularity and invariance"

Attila Házy (University of Miskolc) "Generalized and approximate convexity"

Benny Chor (Tel Aviv University) "Genomic DNA k-mer spectra: models and modalities"

Peter Otto (Willamette University, Oregon) "Mixing times of Markov chains with applications in statistical mechanics"

Laura Cowen (University of Victoria, Canada) "Group heterogeneity in the Jolly-Seber-Tag-Loss model"

David Pask (University of Wollongong) "Skew product graphs"

Mike Paulin (Department of Zoology) "The origin of inference: An evolutionary-ecological approach to neural mechanisms of reasoning with uncertainty"

Jörg Hennig

UNIVERSITY OF WAIKATO

Department of Mathematics

Keith Allen was recently appointed to the continuing Senior Tutor position in the department. Keith has formerly been doing some teaching in the department on a contract basis. Keith's appointment gives the department nearly 11 full-time equivalent academic staff. A postdoctoral fellow on a two-year fixed term position is expected to join the department in August.

Ian Hawthorn is on study leave in the first half of the year. In his absence, Ernie Kalnins has taken on the reins of Acting Chairperson of Department.

A current BSc (Hons) student, Jordan McMahon, was recently awarded a William Georgetti Scholarship. He will use this scholarship to undertake postgraduate study at the University of Bonn. Last year, Jordan was awarded an International PhD Scholarship from the Rutherford Foundation Trust.

Travellers include Ian Craig who visited the UK for over two weeks in January/February, Yuri Litvinenko who visited Germany for nearly three weeks in February, and Nick Cavenagh who spent two weeks in Brisbane in April. In January, Stephen Joe attended the ANODE 2013 conference held in celebration of the 80th birthday of John Butcher. Stephen was very impressed with the musical talent displayed by conference participants during the conference dinner.

The amalgam of renovated and extended building next to G Block (where the Department of Mathematics is located) was officially opened at the end of February. The ground floor houses a joint reception area for our Faculty of Computing and Mathematical Sciences as well as the Faculty of Science and Engineering.

Seminars

T. Trudgian (Australian National University), "Something between the conjectures of Polya and Turan implies the Riemann Hypothesis".

M. Ussher, "Investigating gravity and electromagnetism on a 10 dimensional manifold with local symmetry so(2,3)".

E. Nungesser (KTH Royal Institute of Technology, Stockholm), "The future of some homogeneous spacetimes with an ensemble of free falling particles".

A. Coley (Dalhousie University), "Persistence of black holes through a cosmological bounce".

H. Knospe (Cologne University of Applied Sciences), "Nonstandard methods in p-adic analysis".

Stephen Joe

VICTORIA UNIVERSITY OF WELLINGTON

School of Mathematics, Statistics and Operations Research Te Kura Mtai Tatauranga, Rangahau Pnaha

One of the biggest news items from Victoria concerns a change at the top: from January 2013 Peter Donelan took over from Megan Clark as the Head of School. We are all very grateful to Megan for her hard work steering the School through the recently completed PBRF process, from which we emerged firmly among the leaders in mathematical sciences research in New Zealand. Peter hasn't escaped leading us through evaluation processes completely though, because all the programmes in the School are being reviewed later this year as part of a regular review cycle at the University.

We are very happy to have three new postdoctoral research staff who all started in early 2013. Alexander Melnikov received his two Phds late in 2012; one from Novosibirsk under the direction of Professor Sergei Goncharov, and the other from Auckland under the direction of Andre Nies and

Bhakhadyr Khoussainov. Alexander works in computability theory, specializing in computable algebra and analysis. He is here for a year on a postdoctoral fellowship to work with Rod Downey and Noam Greenberg (plus Adam Day once he arrives). In 2014 Alexander will begin a two year fellowship at the University of California Berkeley. Tanya Gvozdeva received her PhD from Auckland University in 2012 under the direction of Arkadii Slinko. Tanya works in combinatorics and the mathematics of social choice. She is here for the 2013 year as a teaching fellow and will accompany Alexander Melnikov to Berkeley in 2014. Rong Chen is a talented young matroid theorist who has a permanent position at Fuzhou University in China. She has been awarded a Fellowship from the Chinese government to spend one year visiting Victoria University to work with the matroid group here.

Our congratulations to two of our professors, Rob Goldblatt and Rod Downey. Rob received the Royal Society of New Zealand's 2012 Jones Medal, the mathematical sciences award for lifetime achievement, awarded every two years since its inception in 2010. Rob won the award for his world-leading research in modal logic and category theory. Rod Downey was selected to join the inaugural class of Fellows of the American Mathematical Society, in honour of his distinguished contribution to mathematics. Rod was officially inducted at the worlds largest mathematics meeting, the Joint Mathematics Meetings, in San Diego in January 2013. Rod was also awarded a Marsden grant, announced in October 2012, for his project on "Algorithmic Randomness, Computation and Complexity". Further Marsden success in the School came for Richard Arnold, Ivy Liu and Shirley Pledger, who were funded for their project on "Cluster Analysis for Ordinal Categorical Data".

In some travel and conference news, Stefanka Chukova and Richard Arnold met with former VUW colleague Yu Hayakawa (now at Waseda University in Tokyo) in Nanjing to present a joint paper on modelling multicomponent systems at the 5th Asia-Pacific International Symposium on Advanced Reliability and Maintenance Modelling (APARM 2012) held in November. Stefanka has been a member of the APARM Steering Committee since 2003, while Richard and John Haywood were both members of the APARM 2012 Technical Program Committee. Richard also met with Yu Hayakawa at the International Society for Bayesian Analysis meeting in Kyoto in June. John Haywood and his collaborator Granville Tunnicliffe Wilson gave an invited presentation at the Joint Statistical Meetings in San Diego in August 2012. Ivy Liu had a sabbatical in the second half of 2012 which took her to Harvard and to various universities in China and Taiwan. Ivy also continued her joint work with our former colleague Eleni Matechou, who is now at the University of Oxford.

The Fourth Wellington Workshop in Probability and Mathematical Statistics (WWPMS4) will be held at Victoria University of Wellington early in December 2013. Planning is well under way and more details are available at the Workshop web page: http://msor.victoria.ac.nz/Events/WWPMS2013/WebHome. The Workshop Program Committee (chaired by Estate Khmaladze) includes statisticians from around the country and the Organising Committee Co-Chairs are John Haywood and Ivy Liu.

John Haywood was also part of the Organising Committee (and the Proceedings Editor) for the 46th Operations Research Society of New Zealand Conference (ORSNZ'12), which was held at VUW on 12 and 13 December last year. Mark Johnston, Stefanka Chukova and Nokuthaba Sibanda made up the remainder of the Organizing Committee, with administrative support from Ginny Whatarau and Ping Shen. As always (it seems - thanks Andrew!), the ORSNZ President, Andrew Mason, helped out significantly with the organisational details, as did ORSNZ Treasurer Andrea Raith. Generous sponsorship was received from the Science Faculty at Victoria University of Wellington, The Optima Corporation, Concept Consulting, Orbit Systems, Derceto, Hoare Research Software and the Department of Engineering Science at the University of Auckland. In total there were 60 talks (including 16 in the Young Practitioner Prize) slotted into the two days. For further details and the full conference proceedings, please see the conference website: https://secure.orsnz.org.nz/conf46/. To crib from what I wrote the last time we hosted the ORSNZ Conference (in 2008): we confirmed that organisation of an Operations Research conference involves a lot of Operations Research: forecasting, break-even analysis, project management, sensitivity analysis, and also constraints, costs, uncertainty and risk. A great payoff though, when it all came together so nicely.

As just noted, among others Hoare Research Software (HRS) again sponsored the ORSNZ Conference. I would like to express my personal thanks, on behalf of many conference organisers and an almost-uncountable number of student attendees, for the generous support Ray Hoare has provided over very many years - usually to sponsor student prizes. HRS finished trading at the end of April 2013: enjoy your retirement Ray!

There are quite a few success stories concerning our students. Simon Anastasiadis was recently awarded his MSc in Statistics and Operations Re-

search with distinction. He has since been offered admission to several prestigious US PhD programs, all with full financial support. These include the UC Berkeley Industrial Engineering and Operations Research programme, with the prestigious Berkeley Fellowship for Graduate Study, the interdepartmental doctoral degree programme in Operations Research at MIT, and the Management Science and Engineering programme at Stanford University. Simon has accepted the offer and financial support from Stanford, and he will be undertaking his postgraduate studies starting in September 2013.

Wellingtonian Felix Barber was one of 51 students from 24 countries (and the only New Zealander this year) to be awarded the Gates Cambridge Scholarship, which will allow him to study for his Masters in Applied Mathematics at the University of Cambridge. Felixs award comes after his recent success with the William Georgetti Scholarship, which awarded him $180,000 over three years to support the PhD study he hopes to begin at Cambridge after his Masters degree. Felix has very recently received his Victoria BSc with First Class Honours, majoring in Mathematics and Physics.

Kemmawadee Preedalikit (known to all of us as Far) successfully completed her PhD on "Joint Modeling of Longitudinal Ordinal Data on Quality of Life and Survival". Far was supervised by Ivy Liu and Nokuthaba Sibanda. PhD student Valentina Baccetti (supervised by Matt Visser) was the joint winner of the prize for best talk in the Applied Maths category at the 2012 New Zealand Mathematics and Statistics Postgraduate conference in Auckland (NZMASP: http://nzmasp2012.webs.com/). Valentina's presentation was on "Inertial frames without the relativity principle: breaking Lorentz symmetry". There was more Victoria success at NZMASP with Paul Cordue winning the People's Choice award for his talk "Adventures in block land". Other presenters from Victoria included Richard Arnold's PhD students Daniel Fernandez Martinez and Darcy Webber. Daniel spoke on "Likelihood-based finite mixture models for ordinal data", while Darcy presented "Broad scale management in spatially heterogeneous fisheries - does it matter?". Daniel and Darcy both also presented talks at the New Zealand Statistical Association Conference in Dunedin from 29-30 November 2012. Darcy was the co-recipient (with Brigid Betz-Stablein from Massey) of the prize for best student presentation. Congratulations on all these student successes!

On ANZAC Day 2013 we received the very sad news that Irene Pestov had recently passed away at the Ottawa General Hospital after a courageous battle with breast cancer. Irene was married to Vladimir Pestov, who was a professor of mathematics here at Victoria University of Wellington before moving to Ottawa in mid-2002. Irene was also Mark McGuinness' first PhD student.

In happier news, Mark McGuinness will deliver the next Royal Society of New Zealand's 10x10 Lecture Series presentation on "Erupting Rocks and Dusts" at the University of Waikato on 22 May 2013. The 10x10 Lectures are a series of ten speakers at ten locations in ten months, where New Zealand mathematicians talk about their work and how they are helping to find solutions to today's problems. More details about Mark's lecture can be found at http://www.royalsociety.org.nz/events/10-x-10-lecture-series/hamilton-may/. The subsequent 10x10 Lecture will also be given by a Victoria mathematician: Dillon Mayhew will present on "Codes and ciphers the mathematics of the internet" at the Rimu Room, Scion, Rotorua on 20 June 2013. Further details of Dillon's lecture can be found at http://www.royalsociety.org.nz/events/10-x-10-lecture-series/rotorua-june/.

Finally, in some news that was missed from mid 2012, John Harper gave three talks on transits of Venus, to the Wellington Astronomical Society, the Wellington Public Library and the Karori Historical Society. The last talk was on the evening before the transit itself, which occurred on 6 June 2012. John was glad he had seen the 2004 transit while visiting the UK, since the 2012 one was invisible from Wellington because it rained all day!

Seminars

For abstracts for these seminars, please enter an appropriately-old date in the School's seminar web page: http://msor.victoria.ac.nz/Events/Seminars

Ittay Weiss (University of the South Pacific), "Metric inspired models for the geometry of operads and directed topology"

Iain Aitchison (VUW), "Mathematics - Star of Ishtar, Daughter of Sin (From Plimpton 322 and Pythagorus, to Elliptic Curve Cryptography)"

Peter Jupp (University of St Andrews), 2012 Shayle Searle Visiting Fellow in Statistics at Victoria University, "Inference on population size in binomial detectability models"

Rod Downey (VUW), "Alan Turing, the Birth of Computing, the Power of Mathematics"

David Simpson (Massey University), "Stochastic Regular Grazing Bifurcations"

Kei-ichi Akama (Saitama Medical University), "General solution of the braneworld with the Schwarzschild ansatz"

George Willis (University of Newcastle, Australia), "Totally disconnected, locally compact groups"

Ian McKeague (Columbia University), "Adaptive resampling for detecting the presence of significant predictors"

Roman Dwilewicz (Missouri University of Science and Technology), "Hartogs Type Holomorphic Extensions"

H. Garth Dales (University of Lancaster, UK), "Finitely-generated maximal left ideals in Banach algebras"

Daniel Fernandez (VUW), "Likelihood-based finite mixture models for ordinal data"

Darcy Webber (VUW), "Spatial complexity in stock assessment"

Iain Aitchison (VUW and University of Melbourne), "A butterfly effect: crystallographic phyllotaxy"

Kei-ichi Maeda (Waseda University), "Black Holes in an Expanding Universe"

Xiaoling Dou (The Institute of Statistical Mathematics, Japan), "Dependence Structure of Bivariate Order Statistics and its Applications"

Timothy Trudgian (Australian National University), "Something between the conjectures of Polya and Turan implies the Riemann hypothesis"

John Haywood

OBITUARIES

Irene Pestov, 1956 - 2013.

Irene was born in eastern Siberia in 1956. She left the former USSR in 1991 with her husband Vladimir and two children, and settled in Wellington in 1992.Vladimir became a very popular and energetic professor in the mathematics department at Victoria University of Wellington, while Irene started a PhD in applied mathematics, supervised by Mark McGuinness at VUW and Graham Weir at IRL.

Irene had an excellent and rigorous background from the USSR in the general principles of mathematics and physics, and began her PhD studies in New Zealand with an unusually mature understanding of physical systems and with a number of manuscripts already published. She completed her PhD thesis in 1996, by showing how a vapour-liquid counterflow in geothermal systems could evolve to form two layered structures, one being water-dominated, and the other steam-dominated. She showed that her theory characterised many geothermal systems around the world. A portion of her results were published in the Journal of Fluid Mechanics in 1998.

While studying for her PhD, Irene demonstrated her life long love for travel. She was the most travelled of the students and staff at VUW, travelling to conferences in exotic places typically 3 or 4 times a year, at a time when travel funding was difficult to obtain. She was active in the local and national mathematics community of NZ, presenting many papers on her research results.

Irene had a very strong will, and an intense determination to understand the basic properties of physical systems. She was courageous in her scientific approach, and enjoyed mastering new and significant challenges. These strong personal characterisitics were very important when Irene moved to Canberra in 1999, as a scientist in the Australian Federal Government, to study the characteristics of the Great Artesian Basin in Australia.

Before Irene's arrival in Canberra, groundwater studies in Australia had assumed that temperature was unimportant in understanding groundwater reservoirs, despite hot water springs existing in parts of central Australia. Irene showed conclusively, using the methods she had learned from her geothermal studies, that thermal convection was perhaps the most important transport mechanism in most of the Great Artesian Basin. This was probably her most important scientific discovery.

Irene and Vladimir found an excellent solution to the two-body problem, which had up until then resulted in Irene working in Canberra while Vladimir worked in Wellington, which was good for Air New Zealand profits for a few years. Both independently found work at the University of Ottawa.

Two months after Irene began work in 2002 on Dam Breach Modelling as a mathematician at Ottawa University in Civil Engineering, she was reunited with Vladimir, her daughter Xenia and her son Slava. Irene was a Senior Scientist between 2007 & 2013 at the Defence R&D Canada Centre for Operational Research and Analysis (CORA), where she worked during her last years on a Net-Enabled approach to Arctic Search and Rescue, on which she wrote an extensive technical memorandum, summarizing the present state of SAR systems and making suggestions for the future. She was very proud of this work.

Irene also continued her personal interests in travel, walking and music, and maintained contact with friends in New Zealand. Sadly, Irene passed away peacefully at the Ottawa General Hospital, on April 24, 2013, after battling breast cancer.

It has been a privilege to know this courageous and talented woman.

Graham Weir

Warwick Kissling

Mark McGuinness

FEATURES

Report from the 2012 Maths Colloqium

New Zealand Mathematical Society Colloquium 2012 We had a beautiful flight from Auckland over the top of Mt Ruapehu to Palmerston North for the 2012 New Zealand Mathematical Society Colloquium. We had pizza and drinks at the evening registration and a chance to meet people and find our accommodation which was in the comfortable, warm student halls of residence on site. Next day we had a substantial breakfast before finding our way to the conference venue. I was presenting a poster so found a board and pinned it up. Over the course of three days we had a range of excellent plenary speakers then a choice of (usually four) talks. We are fortunate to have a wide range of mathematical subjects at the one conference so can hear about the research in many different fields.

The days were full. We arrived at 8.30am on the first day, had the poster session at lunchtime and did not finish till after the NZMS AGM till 6pm by which time there was no food on campus nor buses we were told, but we were rescued by one of our staff members with a car who took us into Palmerston North to buy fish and chips which we ate back at the hostel. The second day had a longer morning session and an excursion in the afternoon followed by a very nice colloquium dinner at Wharerata and a chance to talk to other mathematicians at our table. Some got rather wet on the way to the dinner as there was a sudden downpour just as we left our accommodation however staff with cars came to our rescue again and ferried us to the dinner.

By the last day our brains were getting overloaded but I particularly enjoyed the talk by Prof Charles Little on graph theory as he assumed no previous knowledge and defined everything. At afternoon tea we learnt of the devastating tornado in Auckland and those of us from Auckland were a little concerned about what we might find at home, if we could get home as the airport was temporarily closed. The conference wrapped up before 4.30 and we were off to the airport and actually got an earlier plane then bounced our way into Auckland and home to find no damage fortunately.

I am a postgraduate student who has completed all undergrad study extramurally from Massey University and I enjoyed meeting many of my lecturers for the first time and getting reacquainted with others that I had meet on contact courses. I enjoyed getting feedback on my poster and having to try to answer questions. I enjoyed the plenary sessions as all the speakers were very good. Some of the talks I did not understand as many in research areas I had little knowledge of but still interesting to hear what people do in others fields. This was my first maths colloquium and an interesting and enjoyable experience.

Lynette O'Brien

Massey University

13/12/12

Report from Marston Conder as Maclaurin Lecturer 2012/13

In August 2011 I was delighted to be selected by the American and New Zealand Mathematical Societies as the first Maclaurin Lecturer, under a new reciprocal exchange between the AMS and the NZMS.

My tour took place in March and April 2013, and included brief visits to each of six universities (U California San Diego, U Washington (Seattle), Vanderbilt U (Nashville), U Chicago, Colgate U (Hamilton, NY) and U Texas at Austin). I gave one or two lectures at each place, and enjoyed interacting with faculty and students and other visitors in each place. Also I gave an invited address (and a talk in one of the special sessions) at the American Mathematical Society meeting in Boston the weekend 6-7 April 2013. A summary of my lectures is listed below.

I enjoyed the tour very much. It was particularly worthwhile visiting a range of institutions, especially those where I had never been previously, but it was also good to go to places where I knew one or two people already. A particular highlight for me was giving a talk to a large number of high school students and teachers at "Math Day" at U Washington, Seattle. In total, about 1500 students and teachers were there for the day, so the talks were given in three parallel sessions – an amazing event.

I'm very grateful to the AMS and the NZMS for this opportunity, and to my hosts at the various places I visited for the welcome and excellent hospitality that they provided.

Lectures:

* "Discrete objects with maximum possible symmetry" (UC San Diego 21 March, Vanderbilt U 28 March, AMS Meeting 6 April, U Texas at Austin 9 April)

* "Symmetry and chirality" (U Washington, 25 March)

* "The intersection condition for regular polytopes" (Vanderbilt U 29 March, AMS Meeting 7 April)

* "Some unexpected consequences of computation with groups" (U Chicago 3 April, Colgate U 4 April).

Marston Conder (April, 2013)

ANODE 2013

This past January we had the opportunity to celebrate the 80th birthday of John C. Butcher—a trifle early because his real birthday is in March—at the ANODE 2013 conference held in Auckland, New Zealand. The participants came from all over the world: aside from the many New Zealanders and the occasional Australian, there were people from Taiwan, China, Japan, Canada, the United States, Italy, Norway, Sweden, Russia, France, Switzerland, and (the farthest possible country, being antipodal to New Zealand), Spain. The central attraction of the conference was of course the science.

Several interesting developments were reported, some very surprising. Kevin Burrage, a very well-known former student of John's, opened the conference and talked about about solving stochastic models for cardiac tissue; my most memorable quote from that talk was "These are all healthy rats; or at least they were, at one stage". Linda Petzold when speaking of model reduction introduced us to the "stiffest, nastiest ODE [she's] ever seen", modeling the coagulation cascade in coagulopathy. Robert McLachlan gave a *very* surprising talk, throwing open again many questions that had been thought closed in the study of Runge-Kutta methods, showing RK methods that preserved invariants which were not thought to be possible to preserve. Several other talks on geometric integration, notably that of Zaiju Shang, also showed that the area is lively and active.J. M. Sanz-Serna of Vallodolid, Spain reported on the use of B-series (so useful for numerical methods) in the solution of *perturbation* problems.

I spoke on the utility of barycentric interpolation (including rational interpolation and Birkhoff-Hermite interpolation) for solving ODE and included some methods taught to me by John himself. There were many other talks, which I unfortunately do not discuss here for lack of space. I encourage the reader of this letter to consult the ANODE 2013 website for further details.

I do report that John C. Butcher himself gave two talks; one on on work with one of his current students, Gulshad Imran, and another on a new class of methods, which he calls G-symplectic methods. As he has been for many decades, John is a leader in the numerical analysis community; his ideas and his influence continue to be felt strongly.

Gerhard Wanner gave *two* talks, one in a special session on Geometry that was joint with the Mathematics Department of the University of Auckland, where he discussed the importance of Pappus to the development of modern mathematics (and incidentally pointed out the existence of a new book, which I think is wonderful, called "Geometry by its History", by Oestermann and Wanner). This first talk gave rise to several instances of good-natured humour in subsequent talks, which sadly will not be reported here—because, well, "you had to be there". Professor Wanner's second talk was also a history talk: a discussion of part of the history of 'stiffness' in the solution of ODE. Among other amazing things, he told us that the first stiff method—namely an implicit Taylor series method—is due to Euler, which as far as I can see no-one had realized at all in modern times. To be fair it's probably true that Euler had no notion of stiffness of an ODE; but still it's another example that "Euler is the master of us all". There was also serious discussion of the influence of Wolfgang Gröbner. This talk closed the conference.

I was absolutely delighted to be part of this celebration of John's birthday and of his many contributions to the field.

PS: Of course there were other activities at the conference. There was an excursion to the gannet colony at Muriwai Beach (several beautiful photos were taken by Hans Munthe-Kass and will appear on his website) where the gannets, the most beautiful birds in the world in my estimation, were hatching and fledging their young; and there was a delightful conference banquet that included some stellar music,

especially singing by the gifted Raffaele D'Ambrosio of the University of Salerno (who aside from his singing at the banquet gave a very nice talk in the conference!), and a lovely Irish song sung by John himself. All in all you may well be sorry you missed it; still, we are trying to convince John to allow another celebration when he reaches 88, the so-called beiju or rice birthday as celebrated in Japan as being especially lucky. Hope to see you all there, in the event!

Robert M. Corless

Distinguished University Professor

University of Western Ontario

CONFERENCES

The New Zealand Climate Change Conference 2013 . From June 4 to June 5, in Palmerston North, organised by the New Zealand Climate Change Centre.

http://www.nzclimatechangecentre.org/event/conference2013

Workshop in Demography and Life Insurance:Methods and Practice . On June 26, in Wellington.

http://msor.victoria.ac.nz/Events/DemographyWorkshop

Australia New Zealand Applied Probability Workshop . From July 8 to July 11, in Brisbane (Queensland Australia).

http://www.smp.uq.edu.au/people/YoniNazarathy/AUSTNZworkshop/2013/main.html

4th Science Symposium: Next Generation Liquid Biofuels and Co-Products . From November 21 to November 22, in Auckland.

http://www.engineering.auckland.ac.nz/uoa/home/about/events/events/template/event_item.jsp?cid=563966

2013 Joint NZSA+ORSNZ Conference . From November 24 to November 28, in Hamilton.

https://secure.orsnz.org.nz/conf47/

11th Engineering Mathematics and Applications Conference . From December 1 to December 4, in Brisbane (Queensland Australia).

http://emac2013.com.au/

Fourth Wellington Workshop in Probability and Mathematical Statistics . From December 2 to December 5, in Wellington.

http://msor.victoria.ac.nz/Events/WWPMS2013

NOTICES

Itinerary of Terry Tao, 2013 Maclaurin lecturer

Terry Tao will be giving talks in Auckland, Hamilton, Dunedin, Christchurch, Palmerston North and Wellington.

On August 19. At Auckland Uni (joint with Massey, Albany), "Sets with few ordinary lines, and the orchard planting problem" and a public talk, perhaps on primes.

On a date to be decided. At Waikato University, Either "Sets with few ordinary lines, and the orchard planting problem" or "The combinatorics of discrete random matrices".

On August 26. At Otago University, "Arithmetic progression in the primes".

On August 27. At Canterbury University, "Arithmetic progression in the primes" and a public lecture.

On August 28. At Palmerston North Massey, "Arithmetic progression in the primes".

On August 29. At Wellington, The Maths Quest: TePapa + Parliament.

On August 30. At Wellington, "Arithmetic progression in the primes" and a public lecture.

On August 31. From Auckland. Terry departs NZ.

Overall contact person for central questions: Geoff Whittle of VUW geoff.whittle@vuw.ac.nz<mailto: geoff.whittle@vuw.ac.nz>

Ray Hoare to retire

Ray Hoare to retire, and HRS to close Many in the mathematical community will have heard that Ray Hoare of HRS (Hoare Research Software Ltd) is to retire at the end of this month, and his six person company HRS is to cease trading. From 1 May 2013 the products sold now by HRS will be distributed by others. This is likely to affect almost everyone in the mathematical community, because of the widespread uptake of HRS products within NZ. His products have included Mathcad, Statistica, Simulink and Matlab. Ray has made arrangements for a smooth transition, and the HRS web site will persist, to recommend how existing customer services can continue after HRS ceases to trade. An immediate change for the NZMS will be the ending of the long standing support from HRS to the mathematical community. The last page of the NZMS Newsletter has featured a full page advertisement from HRS, starting in black and white with the Number 92 issue on December 2004, then changing to a full page colour advertisement in Number 108 in April 2010, and continuing uninterrupted until the present issue, which will sadly be the last to advertise HRS products on our last page. HRS has been a consistent and strong supporter of the NZMS Colloquia, and many other mathematical events over many years. For example, since 1994, Ray has continuously supported the best student talk at the NZSA conference. Ray gained his PhD in the 1960s, after spending 9 years at Victoria University of Wellington. In between tramping trips, he wrote in 1962 a Fortran program to facilitate calculation of the magnetisation of his cylindrical rock samples for a Physics MSc; measured and modelled solar heating in Antarctic lakes, motivated by the opportunity to put his name on one of these; and spent 3 months solving equations, with Graeme Wakes help and no mathematical software, as part of his Ph.D. in Chemistry.

He continued measuring and modelling in Canada, working on experimental electronic devices, but returned to NZ so his children would grow up as kiwis. His major project on his return was leading a team from the Ministry of Works, now part of NIWA, to measure the nutrient input to Lake Rotorua. For that project he had to develop his own statistical software, which he shared with others.

He considers himself fortunate to have been fired from the Waikato Regional Council, which gave him the freedom to launch into selling software when he was introduced to SYSTAT by Steve Thompson of MWD, about 1990. Thus HRS was conceived.

Ray has been providing expert pre-sales advice, technical support and training for mathematical software products throughout NZ for over 20 years. The training courses in particular have involved a great many of NZ's mathematical community directly with Ray. We wish Ray all the best in his retirement, and we thank him for his continuous and generous support of the NZMS in particular, and the NZ mathematical community in general, over many years.

Graham Weir President NZMS

THE NEW ZEALAND MATHEMATICAL SOCIETY (INC.)

APPLICATION FOR FINANCIAL ASSISTANCE

Please fill in where appropriate

Name of Applicant: .....
Address: .....
.....
.....
email: .....

Academic Affiliation / Official Status / Present Position:
.....

NZMS Status: Ordinary member ..... Student member .....
Date membership started .....

Signature: ..... Date: .....

Type of assistance sought		Amount
(a)	Student Travel Grant	.....
(b)	Research Grant: conference/travel/other	.....
(c)	Grant from South Pacific Fund	.....
(d)	Conference/Workshop Organisation	.....
(e)	Other (please specify below)	.....

.....

Please outline the purpose of this application and how you intend to use the funds (include any appropriate dates)

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Estimated total expenditure (please include a breakdown of this expenditure, e.g. conference fees, travel accommodation, etc)

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Other sources of assistance sought/approved:

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List all previous support of this kind you have received from the NZMS in the past five years. (Please note that the society has a total funding cap of $1000 per application)

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Please attach and include the following supporting evidence to your application:

- For student applicants, a brief supporting statement from your supervisor outlining the relevance of the activity to your studies.
- For non-student applicants, a brief statement of support from your Head of Department.
- A statement outlining the benefit of the activity for which funds are being sought (this must be written by the applicant).
- Quotes for flights and accomodation if these are included in the total expenditure.
- Conference details if this application is supporting attendance at a conference including details of any presentation (oral or poster).

Applications without **all** the supporting material will be returned and not considered.

Please email your complete application as a single pdf file to the NZMS secretary alex.james@canterbury.ac.nz. Alternatively you may send a hard copy to:

Dr Alex James, Secretary, NZ Mathematical Society,
Dept of Maths and Stats
University of Canterbury,
Private Bag 4800,
Christchurch.

The NZMS Council normally considers these applications at its meetings in June and December each year.

Application for membership of the NZMS

The New Zealand Mathematical Society (Inc.) is the representative body of professional mathematicians in New Zealand, and was founded in 1974. Its aims include promotion of research and education in the mathematical sciences, the development, application and dissemination of mathematical knowledge within New Zealand, and effective cooperation and collaboration between mathematicians and their colleagues in New Zealand and in other countries.

Membership categories:

Ordinary*	$69.50 p.a.	(Full details at nzmathsoc.org.nz)
Reciprocal	$34.75 p.a.	

For overseas residents who are fully paid-up members of societies with which the NZMS maintains a reciprocity agreement (the American Mathematical Society, the Australian Mathematical Society, the Canadian Mathematical Society, the Edinburgh Mathematical Society, the Irish Mathematical Society, the London Mathematical Society, and the Mathematical Society of Japan).

Student*	$13.90 p.a.	For currently enrolled students in NZ
Overseas student	$34.75 p.a.	For currently enrolled students overseas

(15% GST is added to rates for NZ residents.)

* The Society offers NZ students and new staff a special free one-year membership

When paying their subs, members can also:

- elect to make a donation to the NZMS Endowment for Student Support
- pay their ANZIAM subs of $16 ($8 for students)

Please complete below and mail to:

John Shanks, NZMS Membership Secretary, Department of Mathematics and Statistics, University of Otago, P.O. Box 56, Dunedin 9054, New Zealand

or Fax: +64 (3) 479 8427

E-mail: jshanks@maths.otago.ac.nz

NZMS Application Form

Name: _____ Title: _____

Address: _____

_____

_____

An institutional address is preferred

E-mail: _____

Membership category: ☐ Ordinary ☐ Reciprocal ☐ Student ☐ Overseas student

If Reciprocal then complete this: *I am a fully-paid up member of* _____

☐ I am/wish to be a member of ANZIAM and pay its fees at the same time.

Signed: _____ Date: _____

Please send no money now. You will be invoiced once your application is accepted.

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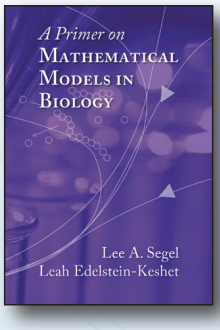

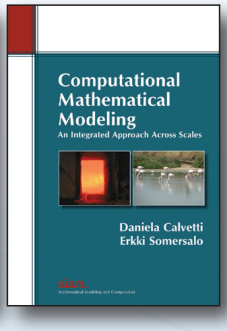

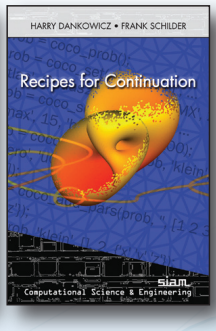

A Primer on Mathematical Models in Biology

Lee A. Segel and Leah Edelstein-Keshet

This textbook grew out of a course that the popular and highly respected applied mathematician Lee Segel taught at the Weizmann Institute and it represents his unique perspective. It introduces differential equations, biological applications, and simulations and emphasizes molecular events (biochemistry and enzyme kinetics), excitable systems (neural signals), and small protein and genetic circuits. It is intended for upper-level undergraduates in mathematics, graduate students in biology, and lower-level graduate students in mathematics who would like exposure to biological applications.

2013 • xxvi + 424 • Softcover • 978-1-611972-49-8
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Computational Mathematical Modeling: *An Integrated Approach Across Scales*

Daniela Calvetti and Erkki Somersalo

Mathematical Modeling and Computation 17

This textbook concentrates on two modeling paradigms: the macroscopic, in which the authors describe phenomena in terms of time evolution via ordinary differential equations, and the microscopic, which requires knowledge of random events and probability. The text emphasizes the development of computational skills to construct predictive models and analyze the results.

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Classics in Applied Mathematics 71

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Computational Science and Engineering 11

This book provides a comprehensive introduction to the mathematical methodology of parameter continuation, the computational analysis of families of solutions to nonlinear mathematical equations. It develops a systematic formalism for constructing abstract representations of continuation problems and for implementing these in an existing computational platform.

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Matrix Computations, *Fourth Edition*

Gene H. Golub and Charles F. Van Loan

Johns Hopkins University Press 1

This cover-to-cover expansion and renovation of the third edition of this classic book is an essential reference for computational scientists and engineers in addition to researchers in the numerical linear algebra community. Anyone whose work requires the solution to a matrix problem and an appreciation of its mathematical properties will find this text useful and engaging.

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List $70.00 • SIAM Member $49.00 • JH01

Least Squares Data Fitting with Applications

Per Christian Hansen, Víctor Pereyra, and Godela Scherer

Johns Hopkins University Press 2

Anyone working with problems of linear and nonlinear least squares fitting will find this book invaluable as a hands-on guide, with accessible text and carefully explained problems. Included is an overview of computational methods together with their properties and advantages, topics from statistical regression analysis that help readers to understand and valuate the computed solutions, and many examples that illustrate the techniques and algorithms.

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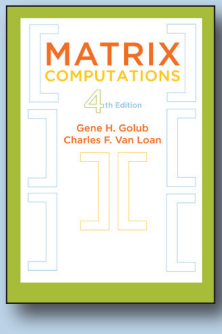
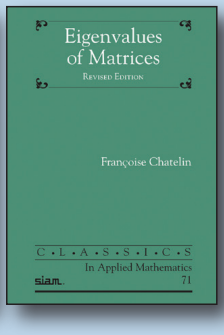
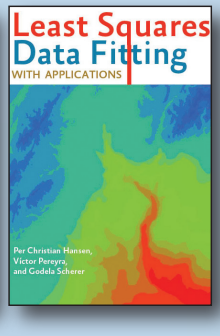
List $85.00 • SIAM Member $59.50 • JH02







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